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Liquidity Creation and Trust Environment*

Jérémie Bertrand

IESEG School of Management[†]

Paul-Olivier Klein

Université Lyon 3[‡]

Jean-Loup Soula

EM Strasbourg Business School, University of Strasbourg[§]

Abstract

Trust towards banks plays a central role in theoretical literature. Diamond and Dybvig (1983) argue that in a trustworthy environment banks can easily collect deposit foster banking activity and asset transformation. Diamond and Rajan (2001) posit that a high trust environment discourages banks from creating liquidity. To address these conflicting views, the current study measures liquidity creation using Berger and Bouwman's (2009) methodology, then assesses the level of trust in the environment with four proxies and two additional instruments deployed in previous research. The results confirm a positive effect of trust in banks on liquidity creation, especially for small or state-chartered banks and during economic downturns. The results are robust to time effects and potential endogeneity concerns.

JEL Codes: G21, G32, Z1

Keywords: Banking; Liquidity Creation; Trust; Financial Intermediation.

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[†] IESEG, School of Management, 3 Rue de la Digue, 59000 Lille, France, France.

[‡] Université Jean Moulin Lyon 3, iaelyon School of Management, Magellan. 6 Cours Albert Thomas, 69008 Lyon, France. Email: paul-olivier.klein@univ-lyon3.fr. Orcid: orcid.org/0000-0003-2403-5980.

[§]EM Strasbourg Business School, 61 avenue de la Forêt Noire, 67085 Strasbourg Cedex, France., Email: jlsoula@unistra.fr

1. Introduction

Liquidity creation is a key function performed by banks (Bhattacharya and Thakor, 1993), as well as a prominent measure of banking activity (Berger and Udell, 2014). Banks create liquidity by funding illiquid assets, such as long-term loans, with liquid liabilities, such as deposits. The central role of liquidity creation in banks' activities and its importance for the economy has been demonstrated theoretically (Diamond and Dybvig, 1983; Kashyap, Rajan, and Stein, 2002). More recently, Berger and Udell (2014) offered a measure of bank liquidity creation, that allows for further empirical investigation. A great literature utilizes Berger and Udell's measure to assess the relationship between bank liquidity creation and various economic outcomes (e.g. Fidrmuc, Fungáčová, and Weill, 2015; Berger and Udell, 2017; Casu, Pietro and Ponce, 2018).

While there exist different factors that affect liquidity creation, such as competition (Horvath, Seidler and Weill, 2016; Jiang, Levine and Lin, 2019), capital regulation (Casu, Pietro and Ponce, 2018; Berger, Udell, Kick and Schaeck, 2016) or deposit insurance (Fungáčová, Weill and Zhou, 2017), seminal banking literature posits liquidity creation to be intrinsically dependant of one key factor: trust environment (Diamond and Dybvig, 1983; Diamond and Rajan, 2001).

Trust plays an essential role in economic transactions. Among others, Algan and Cahuc (2010) show the role of inherited trust on economic growth. Measuring trust as social capital, Guiso, Sapienza, and Zingales (2004) document how it encourages financial development, and Lins, Servaes, and Tamayo (2017) reveal its effect on corporations. Guiso, Sapienza, and Zingales (2008) demonstrate the role of people general trust on stock market developments. In credit markets, trust is also an essential component. A vast literature shows the positive role trust exerts on credit market development (Becchetti and Conzo, 2011 - trust is measured through an experiment), access to credit (Moro and Fink, 2013; Tang, Deng, and Moro, 2017 - trust is measured at the loan officer level) and lending terms (Kim, Surroca, and Tribó, 2014 - trust is measured as repeated non-opportunistic behaviours). Such studies imply two perspectives on trust: specific trust between the client and the bank (Tang, Deng, and Moro, 2017) and an environment of trust in which a bank operates (Guiso, Sapienza, and Zingales, 2004).

We focus on this latter form, the environment of trust, in an attempt to document its impact on banking activity, measured as liquidity creation. Such an approach is similar to the one adopted

by Algan and Cahuc (2010), Guiso, Sapienza, and Zingales (2004) Guiso, Sapienza, and Zingales (2008) and follows a strand in the literature that emphasizes the importance of the degree of trust in the economy (e.g., Grayson, Johnson, and Chen, 2008), and notably the role of trust as a social norm for economic transactions (Basov and Bhatti, 2013). Evidence suggests that the trust environment plays a critical role in the provision of loans (e.g. Chen, Liu, and Wang, 2016) and the supply of bank services (e.g. Järvinen, 2014) We extend this perspective and focus on the impact of the environment of trust on banks' liquidity creation.

Employing this perspective, we also attempt to resolve a debate among theoretical approaches to banking. Theoretical literature identifies the environment of trust in which banks evolve as a crucial factor affecting liquidity creation but posits two opposite predictions. On the one hand, in a trust environment, banks might collect deposits more easily, which would reduce the costs associated with a liquidity mismatch, as when they are forced to liquidate assets to meet depositors' demands (Diamond and Dybvig, 1983; Allen and Santomero, 1997; Allen and Gale, 2004). Higher trust in banks also reduces the risk of switching depositors and the risks of runs for all banks (Saparito, Chen, and Sapienza, 2004), which facilitate the transformation of maturities. This view predicts a positive link between trust in banks and liquidity creation. But on the other hand, an environment of trust might limit banks' incentives to create liquidity. Diamond and Rajan (2000, 2001) propose that financial fragility prompts liquidity creation; due to the discipline that depositors exert on banks, banks have incentives to monitor and grant loans to risky borrowers. According to Myers and Rajan (1998), liquidity creation also can be used as a signal by banks to demonstrate that they are acting in the interest of their depositors and lending for the long-run, which prevents them from substituting assets (Flannery, 1994). From this perspective, greater general trust in banks reduces their incentives to elicit more trust, by creating liquidity, implying a negative link.

With this study, we seek to identify which prediction dominates and if a positive environment of trust is conducive to or obstructs liquidity creation, as an overall indicator of banking activity. We employ quarterly U.S. bank data, obtained from the Federal Reserve Call Reports, and run panel fixed effect regressions with banks and macroeconomic controls for the period from 1985 to 2016. We use Berger and Bouwman's (2009) bank liquidity creation measure. Then to estimate the level of trust in the economy, we employ the annual value of "Trust in Banks" reported by the Gallup survey. This type of survey measure has already been widely employed in the literature (e.g. Knell and Stix, 2015; Jansen, Mosch, and van der Crujisen, 2015; and Stevenson and Wolfers, 2011). It provides a direct measure of respondents' trust in financial

institutions, without relying on proxies. Because we use quarterly fixed effects in the regression, we can rule out time effects while also capturing time trends in our sample.

Then we integrate three alternative indicators of the trust environment to address potential issues with the survey-based variable. First, we use the occurrence of a financial crisis as an exogenous source of a drop in trust, similar to Sapienza and Zingales (2012). We refine the measure by distinguishing financial versus banking crises too (Berger and Bouwman, 2013). Second, we determine the number of past bank failures by state, as a source of state-specific decreases in trust (Jansen, Mosch, and Crujisen, 2015; Van der Crujisen, de Haan, and Jansen, 2016). Third, similar to Guiso (2010), we consider victims of Madoff's Ponzi scam as an exogenous source of diminished trust. With state-level variables, we benefit from more granularity; shocks to trust offer us means to tackle potential endogeneity issues. We further address endogeneity concerns with instrumental variables regressions, using two different instruments.

We first estimate the effect of the environment of trust in banks on the overall liquidity creation and then distinguish between on- and off-balance-sheet liquidity creation. To establish additional findings, we explore situations in which a strong environment of trust likely has a more critical role. In particular, and in line with prior liquidity creation literature (e.g., Berger and Bouwman 2009, 2013), we explore differences in the relation between trust and liquidity creation according to bank sizes. Small and large banks likely react differently to modifications in the trust environment, because they do not have access to the same pool of depositors and rely on different lending technologies. Big banks (too big to fail) benefit from an implicit state guarantee that also should affect the relationship between trust and liquidity creation. Moreover, we explore banks' charters, which reflect different levels of proximity between banks and their customers and thus could alter the relationship between the trust environment and liquidity creation. Both trust (Stevenson and Wolfers, 2011) and liquidity creation (Berger and Bouwman, 2012) also are affected by business cycles; trust is especially critical during economic downturns, and liquidity creation is often hampered by recessions (Berger and Bouwman, 2015). To document these effects, we track the evolution of the relationship between liquidity creation and trust over the business cycle.

The main results reveal a positive relationship between trust in banks and liquidity creation, spanning overall, on-, and off-balance sheet forms of liquidity creation. We confirm this positive relationship across multiple specifications, alternative trust variables, and instrumented

regressions. The link is particularly positive and significant when the trust environment is more critical, namely, for small banks, state-chartered banks, and during economic downturns. With these findings, this study contributes to two main strands of literature. First, we address a theoretical debate about the relationship between general trust and liquidity creation and thereby provide a conclusive resolution to the contradictory predictions by Diamond and Dybvig (1983) and Diamond and Rajan (2001) that underlie banking intermediation theories. Second, we expand insights into liquidity creation by showing that norms and values, including trust, exert strong influences on liquidity created by banks, which constitutes their main output (Berger and Udell, 2014).

To establish these contributions, in Section 2 we review prior literature as a foundation for developing the hypotheses. Section 3 contains the data and methodology. In Section 4, we discuss the results, followed by robustness analyses in Section 5 and conclusions in Section 6.

2. Literature and Hypotheses

We focus our discussion on the two opposing theoretical predictions for how an environment of trust in banks might affect banks' liquidity creation, to frame our hypotheses.

2.1. The Positive Effect of Trust on Liquidity Creation

Diamond and Dybvig (1983) predict a positive impact of a trust environment on banks' activities and liquidity creation. Their perspective focuses on depositors. A more trusting public makes the collection of deposits easier and reduces the risk of sudden withdrawals or bank runs. That is, more trusting depositors are less likely to withdraw their funds at short notice (Sapariro, Chen, and Sapienza, 2004). With the resulting stable source of funding, banks can create liquidity on the asset side, which reduces banks' liquidity mismatch concerns and fosters their financial soundness. As Allen and Santomero (1998) and Allen and Gale (2004) document, liquidity mismatches are costly for banks. If they face an unexpected shortage of deposits for example, banks might be forced to conduct a fire sale of their assets, which has substantial costs. By lowering the risk of unexpected withdrawals, trust reduces the likelihood of liquidity mismatches and thus their costs, which also might encourage banks to engage in more asset transformation. Thus, trust should enhance liquidity creation.

Trust among depositors also increases banks' resilience to financial shocks. Runs are triggered by a sudden, common fear that the bank cannot refund depositors (Chari and Jagannathan, 1988), usually rooted in some severe harm to the bank's financial soundness that appears to

threaten its capacity (Shin, 2009). However, Chari and Jagannathan (1988) show that a bank run can start even without any adverse information. According to Diamond and Dybvig (1983), a depositor run is a potential outcome of deposit contracts, even without any exogenous event (Postlewaite and Vives, 1987). The trigger is some damaged *perception* of the bank's ability to refund deposits, which sparks a shared fear. Thus, even without any objective drop in banks' financial stability, runs become self-realizing. The famous example of A.P. Giannini halting a run on Bank of America in 1906, by physically piling up gold reserves on the street, also shows how restoring trust (i.e., by demonstrating the institution's soundness) can reduce panic and avoid bankruptcy (Berger, Molyneux, and Wilson, 2014). By stabilizing deposits, trust by the public in banks increases their risk-bearing capacity (Repullo, 2004), so banks can lend more and create more liquidity.

Overall, this first view posits that a positive trust environment ensures a smooth stream of deposits, which mitigates the costs associated with liquidity mismatch and fosters banks' financial soundness. This enables banks to further transform maturities and to take additional risks, generating more loans and exerting a positive effect on liquidity creation.

2.2. The Negative Effect of Trust on Liquidity Creation

If banks create liquidity to gain public trust, trust instead might have a negative effect on liquidity, as depicted by two models, reflecting the asset and the liability sides.

First, Diamond and Rajan (2001) take the perspective of entrepreneurs to argue that financial fragility explains why banks fund long-term loans with short-term deposits (i.e., create liquidity). That is, lenders face credibility issues when lending to entrepreneurs: they are unlikely to conduct a fire sale of assets as soon as liquidity needs arise, because doing so would impose high costs. The bank needs a credible reason to conduct a fire sale, such that not liquidating the project outweighs the liquidation costs. The solution is a very liquid type of funding, such as deposits. Runs threaten the existence of the lender and provide a justification for a fire sale of assets, in case of liquidity needs. Financial instability due to short-term deposits and long-term loans gives credibility to the bank. From this perspective, financial fragility is actually the root of liquidity creation and excessive trust would have an adverse effect. If depositors unconditionally trust banks, there is little threat of a run, which reduces the

credibility of a bank and its bargaining power relative to entrepreneurs. Ultimately, it might reduce the incentives of the bank to fund long-term loans and create liquidity.⁵

Second, accrued public trust may reduce banks' need to demonstrate their trustworthiness to depositors. For Myers and Rajan's (1998), liquidity creation is the *raison d'être* of banks; it allows them to demonstrate that they act in the best interest of clients. Depositors may be concerned that banks misuse deposits though, and bankers may face moral hazard concerns when they use deposits to fund investment projects. Thus they might substitute assets, take excessive risk, or divert deposits for their own sake (Flannery, 1994). Funding illiquid long-term loans with short-term liquid deposits is an effective way for bankers to send credible signals to depositors: They put themselves at risk and demonstrate their goodwill. From this perspective, liquidity creation is the best solution to mitigate bankers' moral hazard, but accrued public trust in banks would seize up this mechanism. If the public trusts banks, without making that trust conditional on their behavior, bankers lack incentives to demonstrate their goodwill by lending in the long run, so they may engage in less liquidity creation.

In turn, this second view suggests that banks engage into liquidity creation to gain public trust, in the form of credibility on the asset side (Diamond and Rajan, 2001) or on the liability side (Myers and Rajan, 1998). General trust in banks reduces the strength of these mechanisms, as well as the incentives of banks to secure public trust by transforming assets and maturities. From this perspective, a trust environment might reduce liquidity creation.

2.3. Testable Hypotheses

Our literature review yields two main testable hypotheses. First, according to Diamond and Dybvig (1983), a better trust environment should reduce mismatch risks and allow banks to engage in maturity transformation, so we hypothesize:

H1: an increase in trust environment is associated with an increase in liquidity creation.

Second, turning to Diamond and Rajan (2001), we instead might predict that an environment with more trust in banks reduces the incentives of banks to elicit and sustain that trust, by creating more liquidity. Then we predict:

H2: An increase in trust environment is associated with a decrease in liquidity creation.

⁵ A deposit insurance scheme could have a similar effect, by reducing banks' financial fragility and incentives to create liquidity. Fungáčová, Weill, and Zhou (2017) explore this possibility but do not find a significant impact.

3. Data and Methodology

We adopt an empirical approach to determine which hypothesis is valid and to resolve existing, conflicting perspectives. In this section, we present the data and methodology used to conduct the analysis.

3.1. Data

Using bank data from quarterly Call Reports on all U.S. banks, spanning 1986Q1–2016Q4 and cleaned as Berger and Bouwman (2009), we obtain 38,218 observations of 3,555 U.S. banks. To estimate their liquidity creation, we gather data from Christa Bouwman’s website⁶ and apply Berger and Bouwman’s (2009) “cat fat” measure (*LC*), which includes both on- and off-balance sheet items. It classifies each item by assigning a weight according to the liquidity created. Liquid liabilities and illiquid assets take weights of 0.5, illiquid liabilities and liquid assets are weighted -0.5, and some items have 0 weight. We then multiply the value of each item with its weight and sum them, which produces a value, in USD, of the liquidity created by the bank. To clarify the effect of trust on different components of liquidity creation, we separate this “cat fat” measure into on- and off-balance sheet components (respectively, *LC_BS* and *LC_OFF*). Following prior literature (Berger and Bouwman 2009, 2013), we normalize all liquidity creation measures by banks’ gross total assets (GTA).

Studies that investigate the impact of the trust environment (e.g., Algan and Cahuc, 2010; Guiso, Sapienza, and Zingales, 2004, 2008) establish that the key consideration is trust as a social norm, not trust at the individual level. Trust environment and individual trust are radically different and are measured differently. In this paper we focus on the trustworthy environment in which banks operate, and refrain from analyzing the role of specific bank–client relationships, as documented by Tang, Deng, and Moro (2017), among others. Our measure *Trust in Banks* relies on the Gallup surveys, collected annually, at the beginning of each calendar year. The survey asks, “Please tell me how much confidence you, yourself, have in banks—a great deal, quite a lot, some, or very little?” People also can indicate a “no opinion” answer. The use of survey data to account for trust in banks provides a direct estimate, not based on proxies. Thus, to establish average public confidence in banks, we created a confidence average of the distribution of answers in Table 1, by assigning a score to each modality (none

⁶ <http://web.mit.edu/cbouwman/www/data.html>, last visited on 14/01/2019.

= 0, very little = 1, some = 2, quite a lot = 3, and great deal = 4⁷). The weighted average of the answers is in the last column in Table 1 and equals to about 2, or some confidence. However, in such surveys, people who do not know how to answer tend to give an average response, which may be why we observe a peak for the “some” modality. To avoid this bias, we focus on “great deal” responses.⁸ Similar approaches have been adopted by various authors, such as Knell and Stix (2015), Jansen, Mosch, and van der Crujisen (2015), and Stevenson and Wolfers (2011).

Table 2 contains summary statistics, which show that the average LC/GTA is 29.17%, the average LC_BS/GTA is 23.98%, and the average LC_OFF/GTA is 5.19%. Average trust in banks reaches 14%. Figure 1 details the evolution of trust in banks and liquidity creation, revealing that both trends follow a similar pattern and correlate positively. Liquidity creation steadily increased from 26% to almost 35% over 1985–2004. Then the 2008–2009 financial crisis took its toll, such that liquidity creation fell sharply to 27% in 2009, after which it recovered progressively, to 35% in 2016. Similarly, trust in banks hit the highest rate of 22% in 2006 and sharply decreased to 8% in 2009. Recovery was slower for trust than for liquidity creation, reaching only 11% in 2016. Trust in banks exhibits greater volatility over the period. That is, liquidity creation follows stable trends, but trust varies more year-to-year.

3.2. Methodology

To examine the relationship between liquidity creation and the trust environment, we employ the following panel fixed effects ordinary least squares regression:

$$LIQCREAT_{i,t} = \alpha + \beta * Trust\ in\ banks_t + \boldsymbol{\gamma} + \boldsymbol{\vartheta} * \boldsymbol{W}_{i,t} + v_i + \mu_t + \varepsilon_{i,t}, \quad (1)$$

where i denotes the bank, t indicates the quarter, $LIQCREAT_{i,t}$ is the liquidity creation measure ($LC/GTA_{i,t}$, $LC_BS/GTA_{i,t}$, or $LC_OFF/GTA_{i,t}$), and $Trust\ in\ Banks_t$ is our measure of trust. Because the Gallup surveys are conducted at the beginning of each year, we use current values of $Trust\ in\ Banks$. Furthermore, $\boldsymbol{Z}_{i,t-1}$ is a vector of bank controls, linked to the associated vector of coefficients $\boldsymbol{\gamma}$. We use the lag of these variables to avoid endogeneity concerns. Specifically, we account for the bank’s size, using the natural logarithm of gross total assets ($\log(GTA)$). We control for different levels of capitalization with banks’ equity ratio, defined

⁷ In this calculation, we don’t take into account individuals answering “no opinion”.

⁸ To test the sensitivity of our results, we use the sum of the “great deal” and “quite a lot” responses, and the average index of confidence. Results remain qualitatively similar and are available on request.

as equity over GTA. We also control for the bank's default risk using the z-score (Laeven and Levine, 2009), defined as the return on assets (ROA) plus a ratio of equity capital to GTA, divided by the standard deviation of ROA. A higher z-score implies a lower default probability. For these control variables, we obtain data from the Call Reports. In addition to bank-specific variables, we control for general economic conditions, so $W_{i,t}$ represents a vector of macroeconomic variables, linked to an associated vector of coefficients ϑ . For the annual gross domestic product (GDP) growth, market capitalization, inflation rate, and unemployment rate, we gather information from the World Bank. To control for competition at the state level, we use the Herfindahl-Hirschman index as a measure of loan market concentration. Finally, v_i and μ_t are bank and time fixed effects, respectively and if included, and $\varepsilon_{i,t}$ is the random error. The Appendix contains definitions of all the variables and their sources.

4. Results

In presenting our results, we first focus on the main specification for the full sample, then move to the subsamples.

4.1. Main Results

Regarding the relationship between trust and liquidity creation, the first two columns in Table 4 provide the estimates of the relationship between *Trust in Banks* and *LC/GTA*. Whether we include quarters and bank fixed effects (column 2) or not (column 1), we find a positive relationship between trust and liquidity creation. A 1 percentage point increase in the number of people who report great trust in banks is associated with an increase of 0.169 of the ratio of liquidity creation to total assets. Back-of-envelope calculations indicate the economic effect: Over the study period, Trust in Banks dropped from 22% in 2006 to 9% in 2010, leading to a 221 bp decrease in liquidity creation in terms of GTA. Mean GTA equals \$38.65 million, so in economic terms, a 13 percentage point decrease in Trust in Banks leads to a \$854,165 drop in liquidity creation on average at the bank level. The relationship is weaker when we include bank and quarter fixed effects, but it remains positive and significant. Our findings thus add validity to the prediction that improved public trust fosters liquidity creation. Banks can attract depositors more easily and benefit from a stable source of funding, which reduces the risk of maturity mismatches and allows banks to engage more in maturity transformation. If the public trusts banks, they also gain financial strength, by reducing the risk of runs. This outcome tends to allow banks to lend to riskier borrowers and create more liquidity.

The impact of the control variables on liquidity creation also confirms previous results. That is, bank size is positively associated with liquidity creation (Berger and Bouwman, 2009); the effect of the capital ratio is negative (Casu, di Pietro, and Trujillo-Ponce, 2018); risk negatively affects liquidity creation (Berger and Bouwman, 2009); and higher competition negatively affects liquidity creation (Horvath, Seidler, and Weill, 2016).

However, public trust may affect on- and off-balance sheet liquidity creation differently. For example, Jansen, Mosch, and van der Crujzen (2015) identify a negative relationship between public trust and the use of opaque products, such as special purpose vehicles or derivatives. Therefore, we refine our results by distinguishing these effects. On-balance sheet liquidity creation mainly refers to deposits and long-term loans; off-balance sheet liquidity creation stems from banks' guarantees, commitments, derivatives, and participation (Berger and Bouwman, 2009). This second form of liquidity creation is not trivial; as Berger and Sedunov (2017) point out that off-balance sheet forms account for 50% of U.S. banks' liquidity creation.

In columns 3–6 of Table 4, we report these differentiated estimations. Trust exerts a consistently positive impact on liquidity creation, even when we control for quarter and bank fixed effects. The coefficient of *Trust in Banks* is positive and significant in each case, but the magnitude differs notably. Depending on the specification, the effect of trust on liquidity creation is 3 to 4 times stronger for on-balance sheet items. This finding gives some credence to the idea that trust in banks primarily fosters depositors' trust and allows banks to grant more illiquid loans.

4.2. Subsample Analysis

We now document the relationship between trust and liquidity creation from three perspectives: size, charter, and business cycles. Each approach has potential consequences for this relationship. Therefore, we introduce specific predictions for each case, followed by the relevant results. We want to determine if the trust environment is more acute in specific situations that tend to feature a greater role of trust.

4.2.1 Bank Size

Size has a crucial role in liquidity creation (Berger and Bouwman, 2009, 2013; Jiang, Levine, and Lin, 2019), and big banks are the main creators of liquidity. According to Berger and Bouwman (2009), they represent 2% of U.S. banks in number but create 81% of liquidity. They also generate more off-balance sheet liquidity. In addition, big banks tend to use more transactional approaches in lending (Berger and Udell, 2002), with a reduced role of monitoring, whereas small banks often focus on relationship lending, which may make them

more sensitive to environmental trust effects (Saparito, Chen, and Sapienza, 2004). Moreover, banks have access to different types of deposits, depending on their size. Large banks tend to rely on national and international depositors; smaller banks depend more on local ones. Trust is essentially an interpersonal element, so small banks may be more sensitive to changes in the levels of depositors' trust. Many large banks are also denoted "Systemically Important Financial Institutions," so their deposits are implicitly guaranteed from the State, and they face less risk of bankruptcy (O'Hara and Shaw, 1990), which likely tempers the effect of depositors' trust on their liquidity creation. Finally, large banks tend to rely more on derivatives to create liquidity.

To test the resulting effects of size on the trust–liquidity creation relationship, we adopt Berger and Bouwman's (2009) thresholds to create size classes: Large banks possess GTA above US\$3 billion, medium banks have GTA between \$1 billion and \$3 billion, and small banks possess GTA less than \$1 billion. In Table 5, we report the relationships of trust with liquidity creation overall, on-balance sheet, and off-balance sheet. It reveals that the positive relationship between trust and liquidity creation overall is only valid for small banks but nonsignificant for medium and large banks. Similarly, the positive relationships of trust with on- and off-balance sheet creation both are valid only for small banks. For medium banks, the relationship of trust with off-balance sheet liquidity creation even is negative, in line with the view that more trust leads (medium-sized) banks to reduce their use of off-balance sheet items. This finding appears linked specifically to the use of derivatives by medium banks, whereas small banks reinforce their commitment to and engagement with local firms. Overall then, we confirm that trust primarily matters for small banks, which mainly source their deposits locally, such that they are more affected by changes in trust. They also lack too-big-to-fail status, which reinforces the importance of trust.

4.2.2. Banks' Charters

In the U.S. banking system, banks can be chartered at the state (state chartered) or federal (national chartered) level. Several historical reasons explain this dual-banking system (White, 2011). Deregulation since the 1980s has eroded the distinction between state and national charters somewhat (Blair and Kushmeider, 2006), allowing for fiercer competition across states (Stiroh and Strahan, 2003), but substantial differences between the two types of banks persist and affect their abilities to conduct activities in different states (Johnson and Rice, 2008). Therefore, we estimate the impact of a bank's state versus national charter on the relationship between trust and liquidity creation, with the prediction that trust relates to proximity. State-

chartered banks have access to local pools of depositors, so they may depend more on trust to create liquidity. They also may tend to lend mostly to state-level borrowers, which would reinforce this role of trust in lending. National-chartered banks instead can diversify their sources of funding more easily, so they depend less on depositors' trust to create liquidity.

When we estimate the model for each subsample, as detailed in Table 6, we find that the relationship between liquidity and trust is significant and positive only for state-chartered banks; for national-chartered banks, the relationship is positive but nonsignificant. Thus proximity appears to influence the relationship between trust and liquidity creation. For banks that source their deposits locally, trust fosters liquidity creation, a result that aligns with the findings regarding bank size and emphasizes the interpersonal role of trust in contributing to liquidity creation. For on-balance sheet liquidity creation, we find similar results, though the results for off-balance sheet liquidity creation are more mixed, indicating similarly negative effects for both types of charters.

4.2.3. Business Cycle

Trust plays a crucial role during economic downturns for firms (Lins, Servaes, and Tamayo, 2017). To overcome some of the negative effects of recessions, firms might take advantage of the trust relationships they already have established, such as by expanding their use of trade credit (Wu, Firth, and Rui, 2014). Similar mechanisms operate in the banking industry. Banks build relationships with clients and depositors that allow them to maintain their activities even during bad times, in both interbank markets (Bräuning and Fecht, 2017) and retail banking (Bolton et al., 2016). Accordingly, we expect trust to be more important for liquidity creation during economic downturns. Greater trust encourages a flight-to-quality (Gatev and Strahan, 2006), so trusted banks might collect and retain deposits more easily, such that they can expand their lending. This effect might be especially relevant for banks that primarily use relationship lending (Beatriz, Coffinet, and Nicolas, 2018). To test the effect of the business cycle, we split our sample according to the output gap, a common measure of business cycles that also relates to inflation expectations and monetary policies (Orphanides and van Norden, 2005). With data from the Bank of International Settlements, we calculate the output gap as the difference between realized and expected GDP (i.e., negative output gap means growth is below expectations).

Table 7 contains the results for both negative (columns 1-3) and positive (columns 4-6) output gaps; the positive impact of trust on liquidity creation holds only when the output gap is

negative, that is, during recessions. The relationship becomes nonsignificant when the output gap is positive. Thus, during downturns, trust allows banks to create more liquidity by facilitating their deposit collection and long-term lending, and these findings hold for both on- and off-balance sheet liquidity creation. Thakor (2005) similarly shows with a model that banks create more off-balance sheet liquidity during economic booms, to avoid a failure to honor previous engagements that might damage their reputation. They do so even if interest rates are higher, and they may be interested in changing their lending terms. If banks benefit from higher trust in general though, they may be less concerned about damaging their reputation, which results in less off-balance sheet liquidity creation.

5. Robustness Analyses

We perform two robustness tests to confirm the validity of our results. First, we check three alternative measures of trust in banks to address the potential issues associated with our main measure. Second, we employ two instruments to deal with endogeneity concerns associated with our main measure of trust.

5.1. Alternative Measures of Trust

Although the Gallup survey provides a convenient, widely used estimate of trust (e.g., Stevenson and Wolfers, 2011), it creates potential concerns about endogeneity and granularity. Therefore, we consider three alternative measures.

5.1.1. Experience of a Financial Crisis

Financial crises undermine confidence in financial and banking systems (Knell and Stix, 2015), as well as trust at the individual level (van der Crujisen, de Haan, and Jansen, 2016), and these exogenous shocks have long-lasting effects (Lins, Servaes, and Tamayo, 2017). With the logic that financial crises constitute shocks to trust levels, we also acknowledge that the shock might be positive or negative, depending on the type of crisis. Berger and Bouwman (2013) distinguish two types of crises that affect banks differently: banking and market. Banking crises originate from a failure in the banking system and hamper trust in banks. Market crises instead originate outside of the banking system and may foster trust in banking institutions, relative to the market, and generate flights-to-quality by depositors to banks (Gatev and Strahan, 2006).

In Table 8, we present these two measures of trust, in accordance with Berger and Bouwman's (2013) classification of crises and crisis periods. The results confirm our predictions: A banking crisis is associated with reduced liquidity creation, likely signaling a drop in trust of banks. A

market crisis instead is associated with an increase in liquidity creation, in line with reinforced trust in banking institutions. These findings also are consistent for liquidity creation overall, as well as on- and off-balance sheet liquidity creation.

5.1.2. Experience of Bank Failures

As Knell and Stix (2015) show, fewer banking failures are associated with more trust in banks. Jansen, Mosch, and Cruijsen (2015) and van der Cruijsen, de Haan, and Jansen (2016) even use previous bank failures to measure a loss of trust in financial institutions. With the same logic, we include the number of bank failures per state and year as alternative measures of trust, which offer two advantages relative to our main measure. First, the information is available at the state level, which increases the granularity of our estimations. Second, even if greater liquidity creation affects the probability of bank failure (Fungáčová, Turk-Ariss, and Weill, 2015), the number of bank failures remains relatively low over the entire period, tempering endogeneity concerns. Because we use a measure at the state level, we only include banks present in one state, removing those that operate in multiple states, so we can properly identify the link between trust and liquidity creation for each state.

The results in Table 8, using the bank failure rate (number of bank failures divided by the number of banks, obtained from the FDIC) as a proxy for trust in banking institutions, affirms our predictions. By using the failure rate from the previous year, we isolate the effect on liquidity creation by banks that did not fail and rule out any mechanical effect. An increase in this lagged bank failure rate is associated with a decrease in liquidity creation, which we posit is an effect of a decrease in trust in banks. This results hold for liquidity creation overall and on-balance sheet liquidity creation, but the coefficient is not significant for off-balance sheet liquidity creation. This result may arise because most large banks are not represented in the sample, which are the ones that primarily use off-balance sheet products.⁹

5.1.3. Madoff Scam

Finally, we include the number of victims of the Madoff scam¹⁰ as an alternative measure of a drop in trust (Guiso, 2010; Bertsch et al., 2018). This alternative approach provides two main

⁹ Including the whole sample in the estimation yields a negative, significant coefficient for *Bank Failure* for both on- and off-balance sheet liquidity creation.

¹⁰ Bernard Madoff's fraud resulted in a momentous scandal in 2008. He ran a multi-billion-dollar Ponzi scheme for almost 20 years and defrauded more than 4,000 people, both individuals and institutions, for which he was sentenced to 150 years in prison. Hurt (2009) provides a detailed narrative of the scam.

advantages. First, it is available at the state level, so again we gain granularity in our estimates. For consistency, we restrict the sample to banks operating in one state only. Second, it represents an exogenous shock in trust that is not affected by liquidity creation, so we can rule out reverse causality. The results in Table 8 again are consistent with our prior findings: Liquidity creation overall decreases with the number of victims of the scam. Thus, diminished public trust in financial institutions diminishes banks' liquidity creation.

5.2. Instrumental Variables

To ensure that variations in trusts in the environment are exogenous, we use instrumental variables to reflect *Trust in Banks* that help isolate the effect of exogenous variations in trust. That is, in line with Guiso, Sapienza, and Zingales (2004), we employ electoral turnout as a first instrument. It reflects other aspects of trust in society, such as public engagement and trust in institutions (Putnam, 1993). Compared with survey answers, electoral turnout also provides a more objective measure of public engagement. However, it may reflect elements that are not directly linked to trust, such as moral values or group appurtenances. For our purposes, we regard electoral turnout as a potentially reliable instrument for *Trust in Banks*, because it is unlikely to affect liquidity creation directly but is likely to be linked at least partially with trust in society, including banks. The U.S. Electoral Project provides electoral turnout data every two years, at the state level.

To compensate for the lack of annual data, we employ a second instrument that may capture the exogenous aspect of trust in banks: trust in Congress, which the Gallup surveys include on an annual basis. In previous literature in psychology (Yang, 2006; Devos, Spini, and Schwartz, 2002; Newton and Norris, 2000, Buriak *et al.*, 2019) as well as in economics (Stevenson and Wolfers, 2011), researchers have established that trust in different general institutions is related. Thus, when trust in general institutions, such as Congress, increases, it should imply increased trust in banks too. With this second instrument, we can capture general trust in institutions.

In Table 9, the first column provides the first-stage regression, and the next three columns summarize the regressions with trust in banks instrumented by electoral turnout and trust in Congress. The first-stage regression confirms a relationship between the instruments and the instrumented variable. An increase in electoral turnout is associated with a decrease in trust in banks; an increase in trust in Congress increases trust in banks. Both coefficients are significant, and the opposing signs affirm that the two variables measure different aspects of trust, as also confirmed by the high R^2 and significant F-test.

In the second stage, we instrument *Trust in Banks* using the residuals from the first regression, then estimate the impact of the instrumented variable on overall, on-, and off-balance sheet liquidity creation. In support of our predictions, the relationship between the instrumented variable and liquidity creation overall is positive and significant. The magnitude is slightly higher but close to the value in our main model. The model is also correctly specified, with a high R^2 , significant F-test, and nonsignificant Hansen test. The relationship is positive and significant for on-balance sheet liquidity creation too. We do not observe a significant estimate for off-balance sheet liquidity creation, but the sign of the coefficient is positive, a difference from our main results that may stem from the choice of instruments.

6. Conclusions

Liquidity creation is one of the two key functions of banks and essential for a well-functioning economy. Many factors might explain its extent, but the role of trust seems central. Trust enables banks to collect deposits and provide long-term lending, and this essential role has been emphasized in substantial theoretical literature (e.g., Diamond and Dybvig, 1983; Diamond and Rajan, 2001). But those theoretical models predict two contrasting effects. A positive trust environment might foster liquidity creation, by reinforcing banks' deposit stability, reducing liquidity mismatch costs, lowering the risk of runs, and encouraging banks to take additional risks (Diamond and Dybvig, 1983; Allen and Gale, 2004; Repullo, 2004). But higher trust also might hinder banks' liquidity creation, by reducing their incentives to signal trustworthiness (Diamond and Rajan, 2001; Myers and Rajan, 1998; Flannery, 1994).

We find that a trustworthy environment promotes liquidity creation, overall, on-, and off-balance sheets. We rule out time effects, by using quarterly fixed effects at the bank level. In subsample analyses, we highlight that this effect is stronger for small banks, state-chartered banks, and during economic downturns. That is, trust is needed more when interpersonal relations are crucial. With robustness tests to check for potential flaws in our approach, we also address granularity and endogeneity issues. Furthermore, our instrumental variable regression helps isolate exogenous variations in trust that affect liquidity creation. Our consistent results confirm the positive relationship of trust and liquidity creation.

Thus, we address a critical question about the role of trust for banks' core functions. Recent literature suggests the role of norms and values in the economy as key drivers of economic processes and agents' ability to interact. Our approach affirms the impact of societal values on the banking system and provide meaningful insights, as well as policy recommendations.

Liquidity creation is critical to any economy, as a necessary service for depositors and entrepreneurs, but also as a source of economic growth. We provide empirical evidence of a positive relationship between liquidity creation and trust in banks, so policies designed to foster trust in banks should have positive effects on liquidity creation. The basic mechanisms underlying deposit insurance probably relate positively to trust in banks, because depositors can assume banks' stability, so they should be less likely to engage in bank runs. Public policies and prudential regulations, as well as specific communications about these policies, may induce more public trust in banks that can encourage more liquidity creation.

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Table 1. Distribution of Responses

This table displays the distribution of responses to the question, “Please tell me how much confidence you, yourself, have in banks—a great deal, quite a lot, some or very little?” by year. We assigned a score to each modality of the question: none = 0, very little = 1, some = 2, quite a lot = 3, and great deal = 4. Then we took a weighted average of the answers.

Year	Great Deal	Quite a Lot	Some	Very Little	None	No Opinion	Average
2016	11	16	47	25	1	1	2.13
2015	12	16	45	24	2	1	2.16
2014	10	16	43	28	2	0	2.08
2013	10	16	45	26	2	1	2.10
2012	9	12	42	33	2	1	1.96
2011	10	13	40	33	3	1	2
2010	9	14	45	28	2	1	2.04
2009	8	14	49	26	3	1	2.04
2008	11	21	45	21	1	1	2.22
2007	15	26	44	13	1	1	2.43
2006	18	31	39	10	0	1	2.58
2005	22	27	39	11	1	0	2.60
2004	17	36	36	10	0	1	2.60
2003	19	31	38	11	1	0	2.58
2002	17	30	39	12	1	1	2.53
2001	17	27	41	13	1	1	2.48
2000	14	32	41	11	1	1	2.5
1999	16	27	40	15	1	1	2.44
1998	16	24	43	14	1	2	2.43
1997	17	24	42	15	1	1	2.43
1996	16	28	41	13	1	1	2.47
1995	18	25	42	12	1	2	2.50
1994	12	23	46	17	0	2	2.30
1993	14	23	42	19	1	0	2.32
1992	9	20	44	23	2	1	2.15
1991	12	20	46	19	2	1	2.25
1990	13	23	40	21	2	1	2.28
1989	18	24	38	16	2	2	2.45
1988	16	33	38	11	1	1	2.55
1987	15	36	38	10	1	1	2.56
1986	13	36	37	12	1	1	2.51
1985	15	36	36	11	1	2	2.56
1984	20	31	33	14	0	2	2.58

Table 2. Descriptive Statistics

This table provides descriptive statistics for the study variables. The appendix contains their definitions.

	Mean	Std. Dev.	Min	Max	Median
Dependent variables					
LC/GTA (%)	29.171	17.886	-37.506	148.819	29.135
LC_BS/GTA (%)	23.983	15.129	-38.581	71.653	24.543
LC_OFF/GTA (%)	5.187	5.179	-11.74	129.091	3.935
Independent variables					
Trust in banks (%)	14.219	3.317	8	22	15
Log(GTA)	11.685	1.077	10.127	18.634	11.511
Equity / GTA	0.093	0.033	0	0.513	0.088
Z-Score	30.579	33.677	-8.074	4235.908	25.381
GDP growth (%)	2.819	1.424	-2.776	4.685	2.862
Market capitalization (thousands)	11,200	7,708	2,531	27,400	10,800
Inflation rate (%)	2.886	1.24	-0.356	5.398	2.931
Unemployment rate (%)	6.016	1.242	4	9.800	5.700
Herfindahl-Hirschman index	347.476	347.761	47.956	1943.264	224.145
Robustness variables					
Bank failure rate	0.018	0.066	0	1	0
Bank crisis	0.178	0.383	0	1	0
Market crisis	0.088	0.283	0	1	0
Madoff victims (thousands)	0.048	0.305	0	5.108	0
Election turnover	48.074	10.862	20.2	78.4	49.2
Trust in Congress	7.743	2.462	3	13	8
Observations	38,218				

Table 3. Correlation Matrix

The table displays pairwise correlations across the main variables. Significance levels of 0.10, 0.05, and 0.01 are indicated by *, **, and ***, respectively.

	Trust in banks	Bank failure rate	Bank crisis	Market crisis	Madoff victims	LC/GTA	LC_OFF/GTA	LC_BS/GTA	Z-score	Equity / GTA	Log(GTA)	GDP growth	Market cap.	Inflation rate	Unemp. rate	HHI
Trust in banks	1															
Bank failure rate	-0.04***	1														
Bank crisis	-0.42***	0.2***	1													
Market crisis	0.15***	-0.06***	-0.14***	1												
Madoff victims	-0.2***	-0.01	-0.04***	-0.05***	1											
LC/GTA	0.06***	-0.11***	-0.01**	-0.01	0.02***	1										
LC_OFF/GTA	0.05***	-0.06***	0.03***	-0.01	-0.02***	0.64***	1									
LC_BS/GTA	0.05***	-0.11***	-0.02***	-0.01	0.03***	0.96***	0.41***	1								
Z-score	-0.09***	-0.03***	-0.07***	-0.02***	0.07***	-0.14***	-0.06***	-0.15***	1							
Equity / GTA	-0.07***	-0.01	-0.08***	0.01**	0.08***	-0.3***	-0.11***	-0.32***	0.3***	1						
Log(GTA)	0.05***	-0.01*	-0.01	0	0.05***	0.35***	0.48***	0.25***	-0.06***	-0.17***	1					
GDP growth	0.44***	-0.07***	-0.53***	0.01**	-0.12***	0.06***	0.03***	0.06***	-0.07***	-0.13***	0.1***	1				
Market capitalization	-0.24***	-0.19***	-0.27***	-0.01	0.23***	-0.06***	-0.05***	-0.05***	0.26***	0.36***	-0.16***	-0.24***	1			
Inflation rate	0.32***	0.21***	0.3***	-0.05***	-0.2***	0.04***	0.03***	0.04***	-0.19***	-0.27***	0.1***	0.14***	-0.72***	1		
Unemployment rate	-0.62***	0.02***	0.08***	-0.26***	0.15***	-0.04***	-0.05***	-0.03***	0.03***	0	-0.01**	-0.25***	-0.02***	-0.19***	1	
Herfindahl-Hirschman index (HHI)	-0.01*	-0.1***	-0.14***	0.3***	0.01**	-0.03***	0.03***	-0.04***	0.01**	0.07***	-0.01**	0.2***	0.2***	-0.19***	-0.27***	1

Table 4. Main Results

For these panel fixed effect regressions, the dependent variable is listed in the second row. LC = liquidity creation, LC_BS = on-balance sheet liquidity creation, LC_OFF = off-balance sheet liquidity creation, and GTA = gross total assets. Each liquidity creation variable is scaled by GTA. The t-statistic level is reported in parentheses. Significance levels of 0.10, 0.05, and 0.01 are indicated by *, **, and ***, respectively. The appendix defines the variables.

	(1)	(2)	(3)	(4)	(5)	(6)
	LC/GTA	LC/GTA	LC_BS/GTA	LC_BS/GTA	LC_OFF/GTA	LC_OFF/GTA
Trust in banks t	0.169*** (4.587)	0.101*** (5.800)	0.119*** (3.746)	0.082*** (5.371)	0.049*** (4.758)	0.019*** (3.084)
Log(GTA) $t-1$	5.197*** (66.434)	5.391*** (24.713)	2.896*** (42.719)	3.559*** (18.559)	2.301*** (104.401)	1.832*** (24.016)
Equity / GTA $t-1$	-152.660*** (-56.580)	-36.946*** (-15.201)	-145.260*** (-62.121)	-41.695*** (-19.516)	-7.400*** (-9.735)	4.750*** (5.588)
Z-score $t-1$	-0.002*** (-4.182)	-0.000 (-1.016)	-0.002*** (-3.979)	-0.000 (-0.900)	-0.000*** (-2.605)	-0.000 (-0.642)
GDP growth t	-0.013 (-0.193)	-0.236*** (-7.499)	0.154*** (2.594)	-0.120*** (-4.328)	-0.167*** (-8.666)	-0.116*** (-10.562)
Market capitalization t	0.000*** (11.328)	0.000*** (22.539)	0.000*** (12.321)	0.000*** (22.303)	0.000** (2.306)	0.000*** (8.388)
Inflation rate t	-0.436*** (-4.274)	-0.034 (-0.717)	-0.353*** (-3.995)	-0.028 (-0.656)	-0.083*** (-2.883)	-0.007 (-0.400)
Unemployment rate t	-0.417*** (-4.409)	-0.310*** (-6.842)	-0.273*** (-3.336)	-0.105*** (-2.638)	-0.144*** (-5.389)	-0.205*** (-12.934)
Herfindahl-Hirschman index t	-0.002*** (-6.498)	-0.002*** (-17.812)	-0.002*** (-9.645)	-0.002*** (-22.415)	0.000*** (6.605)	0.000*** (5.409)
Constant	-17.370*** (-11.381)	-31.64*** (-12.350)	3.030** (2.291)	-15.797*** (-7.014)	-20.400*** (-47.448)	-15.844*** (-17.683)
Quarter fixed effects	No	Yes	No	Yes	No	Yes
Banks fixed effects	No	Yes	No	Yes	No	Yes
Observations	38,218	38,218	38,218	38,218	38,218	38,218
F	1,010.89	327.88	761.36	277.39	1,307.49	213.76
R ²	0.192	0.078	0.152	0.067	0.235	0.053
Adjusted R ²	0.192	-0.016	0.152	-0.029	0.235	-0.045

Table 5. Size Analysis

For these panel fixed effect regressions, the dependent variable is listed in the second row. LC = liquidity creation, LC_BS = on-balance sheet liquidity creation, LC_OFF = off-balance sheet liquidity creation, and GTA = gross total assets. Each liquidity creation variable is scaled by GTA. The t-statistic level is reported in parentheses. Significance levels of 0.10, 0.05, and 0.01 are indicated by *, **, and ***, respectively. The appendix defines the variables.

	Small			Medium			Large		
	(1) LC/GTA	(2) LC_BS/GTA	(3) LC_OFF/GTA	(4) LC/GTA	(5) LC_BS/GTA	(6) LC_OFF/GTA	(7) LC/GTA	(8) LC_BS/GTA	(9) LC_OFF/GTA
Trust in banks t	0.101*** (5.730)	0.081*** (5.162)	0.020*** (3.495)	-0.231 (-1.581)	0.058 (0.590)	-0.289*** (-3.393)	-0.022 (-0.154)	0.018 (0.194)	-0.039 (-0.394)
Log(GTA) $t-1$	5.136*** (22.961)	3.394*** (17.090)	1.742*** (23.711)	7.852*** (3.122)	1.690 (0.995)	6.162*** (4.200)	8.493*** (3.481)	0.708 (0.445)	7.785*** (4.496)
Equity / GTA $t-1$	-38.363*** (-15.676)	-42.395*** (-19.513)	4.032*** (5.015)	-31.955 (-1.013)	-57.414*** (-2.695)	25.459 (1.384)	26.733 (0.955)	-20.891 (-1.146)	47.624** (2.397)
Z-score $t-1$	-0.000 (-0.953)	-0.000 (-0.840)	-0.000 (-0.631)	-0.123*** (-3.778)	-0.105*** (-4.770)	-0.018 (-0.954)	0.009 (0.443)	0.001 (0.066)	0.008 (0.563)
GDP growth t	-0.220*** (-6.868)	-0.123*** (-4.311)	-0.097*** (-9.257)	-0.570** (-2.074)	0.129 (0.695)	-0.700*** (-4.360)	-0.515** (-2.032)	0.137 (0.828)	-0.652*** (-3.624)
Market capitalization t	0.000*** (22.296)	0.000*** (22.015)	0.000*** (8.376)	0.000 (0.555)	-0.000 (-0.948)	0.000** (2.049)	0.000*** (2.845)	0.000*** (3.635)	0.000 (0.674)
Inflation rate t	-0.052 (-1.078)	-0.046 (-1.057)	-0.007 (-0.425)	-0.001 (-0.001)	-0.028 (-0.065)	0.027 (0.074)	0.814 (1.395)	1.180*** (3.103)	-0.365 (-0.881)
Unemployment rate t	-0.309*** (-6.786)	-0.105*** (-2.592)	-0.204*** (-13.650)	-1.705** (-2.358)	-0.881* (-1.803)	-0.825* (-1.955)	-0.719 (-1.110)	0.296 (0.703)	-1.016** (-2.209)
Herfindahl-Hirschman index t	-0.002*** (-17.864)	-0.002*** (-21.915)	0.000*** (4.843)	-0.001 (-0.955)	-0.001 (-1.055)	-0.000 (-0.416)	0.002 (0.948)	-0.000 (-0.375)	0.002* (1.680)
Constant	-28.362*** (-10.943)	-13.442*** (-5.842)	-14.921*** (-17.522)	-51.949 (-1.402)	16.280 (0.651)	-68.229*** (-3.157)	-92.305** (-2.373)	8.881 (0.351)	-101.186*** (-3.665)
Quarter fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Banks fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	36,591	36,591	36,591	806	806	806	821	821	821
F	308.794	261.903	210.898	5.929	6.190	10.182	8.442	2.945	9.354
R ²	0.077	0.066	0.054	0.075	0.078	0.123	0.097	0.036	0.107
Adjusted R ²	-0.016	-0.028	-0.042	-0.136	-0.133	-0.078	-0.049	-0.119	-0.038

Table 6. Banks' Charters

For these panel fixed effect regressions, the dependent variable is listed in the second row. LC = liquidity creation, LC_BS = on-balance sheet liquidity creation, LC_OFF = off-balance sheet liquidity creation, and GTA = gross total assets. Each liquidity creation variable is scaled by GTA. The t-statistic level is reported in parentheses. Significance levels of 0.10, 0.05, and 0.01 are indicated by *, **, and ***, respectively. The appendix defines the variables.

	National-Chartered			State-Chartered		
	(1) LC/GTA	(2) LC_BS/GTA	(3) LC_OFF/GTA	(4) LC/GTA	(5) LC_BS/GTA	(6) LC_OFF/GTA
Trust in banks t	0.013 (0.545)	0.033 (1.595)	-0.020*** (-2.583)	0.056* (1.776)	0.110*** (4.085)	-0.054*** (-4.177)
Log(GTA) $t-1$	5.350*** (18.467)	3.502*** (13.612)	1.849*** (18.922)	5.396*** (12.927)	3.933*** (11.068)	1.463*** (8.602)
Equity / GTA $t-1$	-36.471*** (-10.618)	-37.624*** (-12.336)	1.154 (0.996)	-30.357*** (-6.672)	-40.663*** (-10.499)	10.307*** (5.560)
Z-score $t-1$	-0.001 (-0.841)	-0.000 (-0.547)	-0.000 (-1.055)	0.000 (0.202)	0.000 (0.110)	0.000 (0.265)
GDP growth t	-0.262*** (-6.539)	-0.153*** (-4.293)	-0.109*** (-8.087)	-0.085 (-1.564)	0.008 (0.174)	-0.093*** (-4.202)
Market capitalization t	0.000*** (23.547)	0.000*** (19.714)	0.000*** (17.915)	0.000*** (13.500)	0.000*** (12.304)	0.000*** (7.426)
Inflation rate t	0.071 (1.100)	0.075 (1.309)	-0.004 (-0.185)	0.246*** (2.655)	0.261*** (3.310)	-0.015 (-0.398)
Unemployment rate t	-0.091 (-1.374)	0.133** (2.265)	-0.224*** (-10.037)	-0.128 (-1.284)	0.118 (1.392)	-0.246*** (-6.059)
Herfindahl-Hirschman index t	-0.002*** (-13.132)	-0.002*** (-14.987)	0.000 (0.523)	-0.002*** (-9.854)	-0.003*** (-12.434)	0.000* (1.792)
Constant	-31.853*** (-9.267)	-16.245*** (-5.323)	-15.607*** (-13.466)	-35.479*** (-7.024)	-24.647*** (-5.732)	-10.832*** (-5.263)
Quarter fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Banks fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	20,497	20,497	20,497	11,921	11,921	11,921
F	222.283	155.615	212.705	86.447	83.592	54.824
R ²	0.097	0.070	0.093	0.067	0.065	0.044
Adjusted R ²	0.007	-0.023	0.003	-0.032	-0.034	-0.058

Table 7. Business Cycle

For these panel fixed effect regressions, the dependent variable is listed in the second row. LC = liquidity creation, LC_BS = on-balance sheet liquidity creation, LC_OFF = off-balance sheet liquidity creation, and GTA = gross total assets. Each liquidity creation variable is scaled by GTA. The t-statistic level is reported in parentheses. Significance levels of 0.10, 0.05, and 0.01 are indicated by *, **, and ***, respectively. The appendix defines the variables.

	Output Gap < 0			Output Gap ≥ 0		
	(1)	(2)	(3)	(4)	(5)	(6)
	LC/GTA	LC_BS/GTA	LC_OFF/GTA	LC/GTA	LC_BS/GTA	LC_OFF/GTA
Trust in banks t	0.093*** (5.184)	0.074*** (4.646)	0.019*** (3.156)	-0.214 (-0.898)	0.028 (0.144)	-0.242** (-2.075)
Log(GTA) $t-1$	5.293*** (21.646)	3.378*** (15.588)	1.915*** (23.165)	5.671*** (7.921)	3.913*** (6.658)	1.758*** (5.014)
Equity / GTA $t-1$	-35.106*** (-13.262)	-41.833*** (-17.835)	6.727*** (7.516)	-21.388*** (-3.293)	-14.599*** (-2.738)	-6.789** (-2.134)
Z-score $t-1$	-0.000 (-0.931)	-0.000 (-0.911)	-0.000 (-0.367)	-0.004** (-1.977)	-0.003 (-1.426)	-0.002* (-1.647)
GDP growth t	-0.125*** (-3.709)	0.011 (0.382)	-0.136*** (-11.971)	0.438 (0.903)	-0.259 (-0.651)	0.697*** (2.934)
Market capitalization t	0.000*** (17.178)	0.000*** (16.667)	0.000*** (7.126)	0.000*** (4.790)	0.000*** (3.761)	0.000*** (3.475)
Inflation rate t	-0.297*** (-5.798)	-0.333*** (-7.340)	0.036** (2.088)	1.619*** (10.731)	1.619*** (13.079)	-0.001 (-0.011)
Unemployment rate t	-0.430*** (-8.845)	-0.264*** (-6.126)	-0.166*** (-10.103)	2.022* (1.946)	1.032 (1.210)	0.990* (1.944)
Herfindahl-Hirschman index t	-0.002*** (-12.977)	-0.002*** (-15.722)	0.000*** (2.823)	-0.001*** (-2.952)	-0.001*** (-3.113)	-0.000 (-0.808)
Constant	-28.683*** (-9.982)	-11.393*** (-4.474)	-17.290*** (-17.795)	-58.155*** (-5.623)	-36.442*** (-4.292)	-21.712*** (-4.286)
Quarter fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Banks fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	32,061	32,061	32,061	6,157	6,157	6,157
F	242.364	206.616	169.007	105.702	115.169	17.739
R ²	0.071	0.061	0.050	0.161	0.173	0.031
Adjusted R ²	-0.039	-0.050	-0.062	-0.044	-0.029	-0.206

Table 8 – Robustness Indicators

For these panel fixed effect regressions, the dependent variable is listed in the second row. LC = liquidity creation, LC_BS = on-balance sheet liquidity creation, LC_OFF = off-balance sheet liquidity creation, and GTA = gross total assets. Each liquidity creation variable is scaled by GTA. The t-statistic level is reported in parentheses. Significance levels of 0.10, 0.05, and 0.01 are indicated by *, **, and ***, respectively. The appendix defines the variables.

	Bank Crisis			Market Crisis			Bank Failure Rate			Madoff Victims	
	(1) LC/GTA	(2) LC_BS/GTA	(3) LC_OFF/GTA A	(1) LC/GTA	(2) LC_BS/GTA	(3) LC_OFF/GTA A	(1) LC/GTA	(2) LC_BS/GTA	(3) LC_OFF/GTA A	(1) LC/GTA	(2) LC_BS/GTA
Bank crisis	-0.507*** (-3.819)	-0.953*** (-8.171)	0.446*** (5.376)								
Market crisis				0.535*** (3.759)	0.761*** (6.084)	-0.226** (-2.519)					
Bank failure rate $t-1$							-2.857*** (-3.370)	-2.927*** (-4.010)	0.069 (0.289)		
Madoff victims t										-0.488* (1.921)	0.728 (1.086)
Log(GTA) $t-1$	5.418*** (24.831)	3.586*** (18.713)	1.832*** (6.736)	5.392*** (24.702)	3.546*** (18.490)	1.845*** (6.776)	-0.001 (-1.206)	-0.000 (-1.269)	-0.000 (-1.061)	-0.001 (-1.201)	-0.000 (-1.261)
Equity / GTA $t-1$	-36.516*** (-15.032)	-41.654*** (-19.523)	5.138** (2.283)	-36.357*** (-14.973)	-41.296*** (-19.354)	4.939** (2.207)	-40.788*** (-12.467)	-38.168*** (-3.598)	-2.620 (-0.934)	-40.613*** (-12.402)	-37.877*** (-3.610)
Z-score $t-1$	-0.000 (-1.005)	-0.000 (-0.891)	-0.000 (-1.009)	-0.000 (-1.007)	-0.000 (-0.894)	-0.000 (-1.014)	5.044*** (16.036)	3.610*** (3.352)	1.434*** (4.052)	5.054*** (16.064)	3.626*** (3.366)
GDP growth t	-0.256*** (-6.938)	-0.226*** (-6.986)	-0.030 (-1.535)	-0.157*** (-5.284)	-0.047* (-1.786)	-0.110*** (-5.366)	-0.495*** (-12.428)	-0.479*** (-5.521)	-0.017 (-0.583)	-0.470*** (-11.811)	-0.449*** (-5.045)
Market capitalization t	0.000*** (21.344)	0.000*** (20.491)	0.000*** (2.836)	0.000*** (22.484)	0.000*** (22.574)	0.000** (2.188)	0.000*** (19.700)	0.000*** (5.258)	0.000** (2.450)	0.000*** (19.472)	0.000*** (5.182)
Inflation rate t	0.007 (0.145)	0.030 (0.712)	-0.023 (-0.720)	0.009 (0.191)	0.023 (0.541)	-0.014 (-0.412)	0.735*** (10.660)	0.711*** (6.079)	0.024 (0.665)	0.743*** (10.769)	0.720*** (6.155)
Unemployment rate t	-0.463*** (-12.233)	-0.238*** (-7.170)	-0.225*** (-7.020)	-0.428*** (-11.142)	-0.185*** (-5.485)	-0.243*** (-7.659)	-0.298*** (-6.610)	0.007 (0.058)	-0.306*** (-6.981)	-0.324*** (-6.864)	-0.031 (-0.231)
Herfindahl-Hirschman index t	-0.002*** (-19.610)	-0.003*** (-23.880)	0.000* (1.915)	-0.003*** (-20.351)	-0.003*** (-25.421)	0.000*** (2.586)	-0.002*** (-17.750)	-0.002*** (-8.650)	-0.000** (-2.300)	-0.002*** (-17.877)	-0.002*** (-8.731)
Constant	-29.418*** (-11.564)	-13.613*** (-6.092)	-15.805*** (-5.357)	-29.858*** (-11.744)	-14.399*** (-6.445)	-15.459*** (-5.242)	-27.906*** (-7.779)	-18.203 (-1.486)	-9.702*** (-2.625)	-27.990*** (-7.801)	-18.284 (-1.494)
Quarter fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Banks fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	38,218	38,218	38,218	38,218	38,218	38,218	20,799	20,799	20,799	20,799	20,799
F	325.587	281.903	33.651	325.532	278.361	37.563	224.343	22.625	16.984	223.399	19.518
R ²	0.078	0.068	0.055	0.078	0.067	0.053	0.098	0.091	0.048	0.097	0.091
Adjusted R ²	-0.017	-0.028	0.055	-0.017	-0.028	0.053	-0.006	0.091	0.047	-0.006	0.091

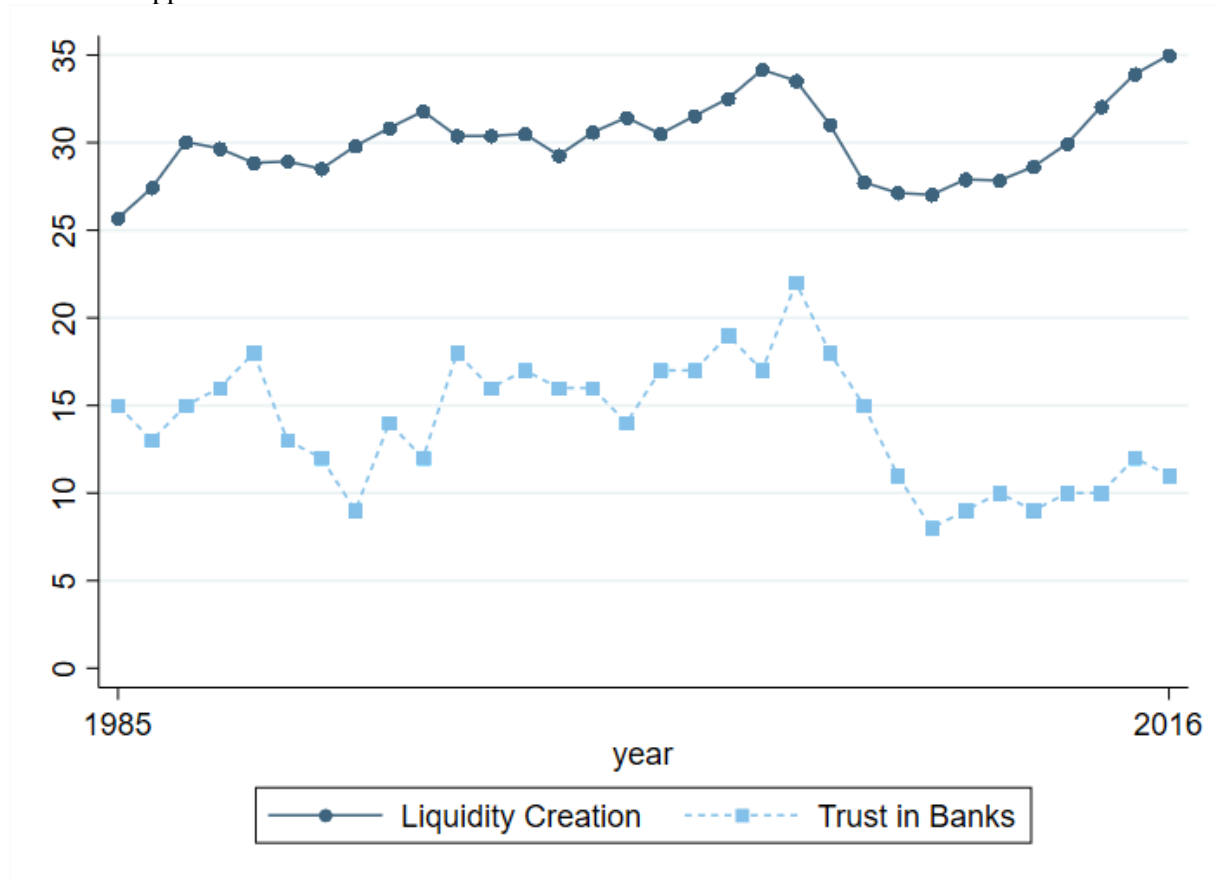
Table 9. Instrumental Variables

For these instrumental variable panel fixed effect regressions, the dependent variable is listed in the second row. Trust in banks is the instrumented variable, and the instruments are electoral turnout and trust in Congress. LC = liquidity creation, LC_BS = on-balance sheet liquidity creation, LC_OFF = off-balance sheet liquidity creation, and GTA = gross total assets. Each liquidity creation variable is scaled by GTA. The t-statistic level is reported in parentheses. Significance levels of 0.10, 0.05, and 0.01 are indicated by *, **, and ***, respectively. The appendix defines the variables.

	First Stage	Instrumented Regression		
	(1) Trust in Banks	(2) LC/GTA	(3) LC_BS/GTA	(4) LC_OFF/GTA
Electoral turnout	-0.003*** (-2.906)			
Trust in Congress	0.657*** (112.324)			
Trust in banks t		0.166*** (-4.935)	0.171*** (-5.771)	0.009 (0.804)
Log(GTA) $t-1$	0.032 (0.555)	5.526*** (25.156)	3.674*** (19.023)	2.033*** (42.952)
Equity / GTA $t-1$	8.186*** (12.727)	-35.260*** (-14.397)	-40.095*** (-18.622)	4.562*** (5.578)
Z-score $t-1$	0.000 (0.016)	-0.000 (-0.911)	-0.000 (-0.791)	-0.000 (-1.360)
GDP growth t	0.695*** (89.070)	-0.065* (-1.759)	0.043 (1.329)	-0.106*** (-8.252)
Market capitalization t	0.000*** (20.647)	0.000*** (21.640)	0.000*** (21.374)	0.000*** (6.942)
Inflation rate t	0.071*** (5.545)	0.029 (0.605)	0.033 (0.778)	-0.010 (-0.586)
Unemployment rate t	-1.198*** (-116.973)	-0.686*** (-11.148)	-0.462*** (-8.536)	-0.224*** (-10.378)
Herfindahl-Hirschman index t	-0.002*** (-68.853)	-0.003*** (-20.348)	-0.003*** (-24.886)	0.000*** (5.257)
Constant	13.122*** (19.384)	-27.654*** (-10.497)	-11.883*** (-5.131)	-17.730*** (-28.306)
Quarter fixed effects	Yes	Yes	Yes	Yes
Banks fixed effects	Yes	Yes	Yes	Yes
Observations	38,097	38,097	38,097	38,097
R ²	0.584	0.0738	0.0615	0.0526
Adjusted R ²	0.542			
F	4,855***	52.70***	51.00***	30.73***
Hansen test		0.495	0.478	0.511

Figure 1. Variation of Liquidity Creation and Trust in Banks

This graph plots the average annual (1985–2016) liquidity creation as a percentage (LC/GTA) and the annual trust in banks, measured as the percentage of respondents who state that they trust banks a “great deal.” The appendix A defines the variables.



Appendix. Variables and Definitions

Variable Name	Description	Source
Dependent variables		
LC/GTA	The cat fat measure in Berger and Bouwman (2009) divided by GTA.	Christa Bouwman
LC_BS/GTA	The on-balance sheet part of the cat fat measure divided by GTA.	Christa Bouwman
LC_OFF/GTA	The off-balance sheet part of the cat fat measure divided by GTA.	Christa Bouwman
Independent variables		
Trust in banks	Percentage of people who respond "great deal" to the question "Please tell me how much confidence you, yourself, have in banks," conducted at the beginning of each calendar year.	Gallup
Log(GTA)	Natural logarithm of GTA.	FR Y-9C, Call Reports
Equity / GTA	Total equity capital as a proportion of GTA.	FR Y-9C, Call Reports
Z-score	Bank's return on assets plus the equity capital/GTA ratio divided by the standard deviation of the return on assets.	FR Y-9C, Call Reports
GDP growth	GDP growth by year.	World Bank
Market capitalization	Market capitalization by year.	World Bank
Inflation rate	Inflation rate by year.	World Bank
Unemployment rate	Unemployment rate by year and by state.	World Bank
Herfindahl-Hirschman index	Index calculated with each bank's loans by quarter and by state.	FR Y-9C, Call Reports
Robustness variables		
Bank failure rate	Bank failure rate at a state level and by year.	FDIC
Banking crisis	= 1 if the period is a banking crisis, 0 otherwise. Periods of bank crisis: 1990Q1 to 1992Q4 and 2007Q3 to 2009Q4	Berger and Bouwman (2013)
Market crisis	= 1 if the period is a market crisis, 0 otherwise. Periods of market crisis: 1987Q4, 1998Q3 to 1998Q4 and 2000Q2 to 2002Q3.	Berger and Bouwman (2013)
Madoff victims	Number of investors that suffered losses due to the Madoff scam, reported in thousands.	Luigi Guiso
Electoral turnout	Percentage of people voting during the last election	Electproject
Trust in Congress	Percentage of people who respond "great deal" to the question "Please tell me how much confidence you, yourself, have in Congress."	Gallup
Split variables		
State-chartered	= 1 if the bank is chartered at the state level; 0 otherwise.	FR Y-9C, Call Reports
Output gap	Difference between the gross GDP and potential GDP by year.	BIS
Size	Set of dummy variables (small, medium, large), equal to 1 if bank has gross total assets (GTA) up to \$1 billion, between \$1 and \$3 billion, or exceeding \$3 billion, respectively; 0 otherwise.	Berger and Bouwman (2009)