Trust and Liquidity Creation

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Abstract

The role of trust on liquidity creation is at the heart of banking theory. While Diamond and Dybvig (1983) argue for a positive effect of trust on deposits, which would result in more liquidity creation, Diamond and Rajan (2001) posit that it is because banks should elicit trust through a fragile capital structure that liquidity is created. From that perspective, excessive trust would undermine liquidity creation. We investigate the impact of a change in trust on liquidity creation. We employ Berger and Bouwman's (2009) liquidity creation measure and Gallup survey data to measure trust. Our results support a positive effect of trust on liquidity creation. This is especially the case when trust plays a crucial role, for small banks, state-chartered banks, and during economic downturn Our results are robust to alternative measures of trust and potential endogeneity concerns.

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1. Introduction

Liquidity creation is one of the key functions performed by banks (*e.g.* Bhattacharya and Thakor 1993). 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 long been demonstrated theoretically (e.g. Diamond and Dybvig, 1983; Kashyap, Rajan, and Stein, 2002). More recently, Berger and Bouwman (2009) offered a measure of bank liquidity creation, that allows for further empirical investigation. A large literature utilises Berger and Bouwman's measure to assess the relationship between bank liquidity creation and various economic outcomes (e.g. Fidrmuc, Fungáčová, and Weill (2015), Berger and Seduno, 2017; Casu, Pietro and Ponce, 2018).

While there exist different factors that affect liquidity creation, such as competition (e.g. Horvath, Seidler and Weill, 2016; Jiang, Levine and Lin, 2016), capital regulation (eg. Caso, Pietro and Ponce, 2018; Berger, Bouwman, Kick and Schaeck, 2016) or deposit insurance (e.g. Weill, Fungacova and Zhou), liquidity creation seems to be intrinsically dependant of one key factor: trust.

Trust plays an essential role in economic transactions. The role of trust on economic growth (Algan and Cahuc, 2010), financial development (Guiso, Sapienza, and Zingales, 2004), stock markets development (Guiso, Sapienza, and Zingales, 2008), corporations (Lins, Servaes, and Tamayo, 2017), among others areas, has largely been documented. In credit markets, trust is also an essential component. A vast literature shows the positive role trust exert on credit market development (Becchetti and Conzo, 2011), access to credit (Moro and Fink, 2013; Tang, Deng, and Moro, 2017) and lending terms (Kim, Surroca, and Tribó, 2014).

The role of trust is also at the heart of banks' activities. Diamond and Rajan's (2001) model posits trust as the keystone of banks' economic activity and balance sheet structure. Trust is essential to collect and retain deposits (Saparito, Chen, and Sapienza, 2004). Trust in banks also reduces the risk of depositor runs, which is one of the main risks faced by banks when creating liquidity (Diamond and Dybvig, 1983). Previous research has also identified the role of trust on bank lending (e.g. Bolton et al., 2016) and in the interbank market interbank market (Bräuning and Fecht, 2017).

In this paper, we document the link between trust and bank liquidity creation. Theoretical literature posits trust as a crucial factor affecting liquidity creation. However, it identifies two

opposite effects. On one hand, trust in banks eases the collection of deposits and reduces the costs associated with liquidity mismatch, when banks are forced to liquid assets to face depositors' demands (e.g. Allen and Santomero, 1997; Allen and Gale, 2004). Trust in banks also reduces the costs of switching depositors and the risks of runs (Saparito, Chen, and Sapienza, 2004). This increases the resilience of banks and facilitate their activities of transforming maturities. Hence, this first view posits a positive link between trust and liquidity creation. On the other side, accrued trust in banks limits the *incentives* of banks to create liquidity. Diamond and Rajan (2000, 2001) models consider that financial fragility is instrumental in explaining banks' liquidity creation. It is because of the discipline depositors exert on banks that banks find the incentives to monitor loans and decide to allocate loans to risky borrowers. Myers and Rajan (1998) also show that liquidity creation can be used as a signal by banks to demonstrate that they act in the interest of their depositors. Banks do so by lending in the long-run, which notably prevents them from substituting assets (Flannery, 1994). From this perspective, an increased trust would reduce the creation of liquidity from banks, as they do not have to demonstrate their trustworthiness.

Our objective in this study is to identify which channel is at work and if trust in banks is conducive or obstruct liquidity creation. We employ quarterly US bank data, obtained from the Federal Reserve Call Reports. Our time period spans from 1985 to 2016. We use Berger and Bouwman's (2009) bank liquidity creation measure. We estimate the effect of trust on the overall liquidity creation and then distinguish between on- and off-balance-sheet liquidity creation. To estimate trust, we use the annual value of "Trust in Banks" reported by the Gallup survey. We run panel fixed-effect regressions with banks and macroeconomic controls.

We document additional elements, by exploring situations where trust is likely to play a critical role. First, we explore how the relation between trust and liquidity creation evolves along bank size classes. Bank size has turned to play a critical role in liquidity creation, which large banks producing most of the liquidity (Berger and Bouwman, 2009). Bank size also affects the relationship between equity and liquidity creation, positive for small banks and negative for large banks (Berger and Bouwman, 2009). Berger and Bouwman (2012) show the impact of size on monetary policy transmission, Jiang, Levine, and Lin (2016) on competition, and Berger and Sedunov (2017) on economic output. In our case, size is also likely to affect the relationship between trust and liquidity creation. Porta et al. (1996) show how trust favours the development of large firms. Small banks and large banks may react differently to a modification of trust, as they do not have access to the same pool of depositors and rely on different lending

technologies. Big banks that are too-big-too fail also benefit from an implicit state guarantee that is likely to affect the relationship between trust and liquidity creation.

Second, we explore the impact of banks' charters. As state and national-charters may reflect different level of proximity between the banks and their customers, it is likely to affect the relationship between trust and liquidity creation. Last, both trust (Stevenson and Wolfers, 2011) and liquidity creation (Berger and Bouwman, 2012) are affected by the business cycle. Trust turns to be a critical ingredient during economic downturn, while liquidity creation is usually hampered during recession periods (Berger and Bouwman, 2015). We document these effects by estimating how the relationship between liquidity creation and trust evolves over the business cycle.

Last, we provide numerous robustness tests to ascertain the validity of our results. We employ four alternative indicators of trust that tackle potential issues associated with our survey-based variable. First, we use the occurrence of a financial crisis as an exogeneous drop in trust. This approach has notably be employed by Sapienza and Zingales (2012). We refine this measure by distinguishing financial and banking crisis, as in Berger and Bouwman (2013). Second, we follow Jansen, Mosch, and Cruijsen (2015) and Van der Cruijsen, de Haan, and Jansen (2016) and use experience of bank failures as a state-specific drop in trust. Third, we follow Guiso (2010) approach and use the victims of Madoff's scam as an exogeneous fall in trust. State-level variables notably allow us to provide more granularity, while shocks in trust shelter us from potential endogeneity issues. We further address endogeneity concerns with instrumental variables regressions, using two different instruments. Robustness analyses confirm our main findings.

Our main result is a positive relationship between trust and liquidity creation. This is the case for overall, as well as on- and off-balance sheet liquidity creation. This positive relationship is confirmed across different specifications, main and alternative trust variables and instrumented regressions. We also find that the relation is positive and significant essentially when trust plays a critical role: this is the case for small banks, state-chartered banks, and during economic downturn.

Overall, our work contributes to two strands of the literature. Our findings support the literature on trust as a crucial economic factor. As Berger and Sedunov (2017) identify liquidity creation as being a better estimate of total bank output, we can add that trust plays a crucial role in increasing this output. We also contribute to the literature on liquidity creation. We provide a

conclusive answer to contradictory predictions that are the roots of banking intermediation theories.

The remainder of the paper is as follow: section 2 develops the literature and the hypothesis. Section 3 presents the data and methodology. Section 4 discusses the results and section 5 offers robustness analyses. Last, section 6 concludes.

2. Literature and Hypothesis

In this section, we discuss the related literature and develop the hypothesis. We focus the discussion on the two opposite channels that can explain a relationship between trust and liquidity creation.

2.1. The Positive Effect of Trust on Liquidity Creation

An increase in trust can have a positive effect on liquidity creation, essentially by reducing liquidity mismatch concerns and by fostering banks' financial soundness. First, trust in banks reduces the risk of unexpected liquidity mismatch. More trustworthy depositors are less likely to remove their funds with short notice, or to switch across institutions (Saparito, Chen, and Sapienza, 2004). Allen and Santomero (1998) and Allen and Gale (2004) document the costs associated with liquidity mismatch for banks. Banks that face an unexpected shortage of deposits are forced to fire sale assets, which induces substantial costs. By mitigating the risks of unexpected deposit withdrawals, trust from depositors reduces the occurrence of liquidity mismatch and the associated costs. It can encourage banks to engage more in liquidity transformation. Following this view, trust would enhance liquidity creation.

Second, trust from depositors increases the resilience of banks to financial shocks. Runs are triggered by a sudden and common fear that the bank will not be able to refund depositors (Chari and Jagannathan, 1988). Runs usually find their root in a severe drop in bank's financial soundness, threatening its ability to refund deposits (e.g. Shin, 2009). However, Chari and Jagannathan (1988) show that a bank run exists even without adverse information. Depositor run is one potential outcome of deposit contracts (Diamond and Dybvig, 1983), even without an exogeneous event occurring (Postlewaite and Vives, 1987). The trigger is essential a damaged *perception* of bank's ability to refund deposits, which sparks a shared fear among depositors that annihilates trust in the institution. Even without an effective drop in bank's financial stability beforehand, run fears are self-realising. On the opposite, the famous example

of A.P Giannini stopping the Bank of America's run in the early 1906 by piling up the gold reserves on the street front shows how restoring trust by demonstrating the institution's soundness can stop the panic and avoid bankruptcy (Berger, Molyneux, and Wilson, 2014, p. 121).

More trust in financial institutions reduces the likelihood of depositors' runs and reinforces banks' financial stability. This expands banks' risk-bearing capacity (e.g. Repullo, 2004), as capital is less likely to be soaked up by a run. Following this view, banks may then be able to lend more, and so, to create more liquidity.

Overall, this first view posits that trust mitigates costs associated with liquidity mismatch and fosters banks' financial soundness. This allows banks to further transform maturities and to take more risks, generating more loans and exerting a positive effect on liquidity creation.

2.2. The Negative Effect of Trust on Liquidity Creation

On the opposite, a decrease in trust can reduce banks' liquidity creation by reducing banks' incentives to fund long-term loans. Two main views support this channel. First, for Diamond and Rajan (2001), financial fragility is the key reason why banks fund long-term loans with short-term deposits – i.e., create liquidity. Their reasoning is that lenders face an issue of credibility when lending to entrepreneurs. It is unlikely that lenders will fire-sale assets early in case of a liquidity need, as they will do it at a high cost. This in turn affects adversely the term of the loans between the lender and the entrepreneur. To avoid this situation, the lender should have a credible reason to fire-sale a project – i.e., not liquidating the project would outweigh liquidation costs. The solution is a very liquid type of funding, such as deposits. As runs threatens the very existence of the lender, it gives her all the credibility to fire-sale assets in case of liquidity need. Consequently, the bank can negotiate better lending terms with entrepreneurs, while also ensuring a low and stable cost of funding, as depositors know that the bank has brought its very existence into play. The whole equilibrium is based on the credibility financial instability gives to the bank.

From this perspective, it is financial instability that is the root of liquidity creation. Excessive trust in that case can play an adverse effect. If depositors trust banks unconditionally, it reduces the threat of a run. This in turn affect the credibility of the bank to fire-sale assets in case of a liquidity need and reduces the bargaining position of the bank towards entrepreneurs. Down the

line, it can reduce the incentives of the bank to fund long-term loans and to create liquidity. This logic may require a word of caution. The reasoning that high trust in banks may hamper liquidity creation is only valid for a high exogeneous trust in banks. Banks do not face a run because depositors trust their actions and do not withdraw deposits – this is the core of Diamond and Rajan's (2001) credibility perspective. It is only excessive exogeneous trust, or not conditional on bank's behaviour, that may threaten liquidity creation, by reducing bank's credibility towards entrepreneurs.

Second, accrued trust in banks may reduce banks' need to demonstrate their trustworthiness. From Myers and Rajan's (1998) perspective, liquidity creation is the raison d'être of banks because, it allows them to demonstrate that their act in the best interest of their clients. Depositors may be concerned that banks misuse deposits. Bankers may face moral hazard when using deposits to fund investment projects. They may substitute assets, by taking excessive risk or by diverting 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 a credible signal to depositors. Bankers put themselves at risk and demonstrate their goodwill to depositors. Based on this view, liquidity creation is the best solution to mitigate banker's moral hazard.

An accrued trust in banks, that again is exogeneous to the bank's behaviour, can seize up this mechanism. If public puts a strong trust in banks that is not conditional on their behaviour, it reduces bankers' incentives to demonstrate their good will, by lending in the long-run. Consequently, it can negatively affect banks' liquidity creation.

3. Data and Methodology

In this section, we present our data and the methodology we employ to carry the analysis.

3.1. Data

We use bank data from quarterly Call Reports on all U.S. banks, over the period 1986Q1 to 2016Q4. We cleaned Call Report data as in Berger and Bouwman (2009). Our final sample comprises 38,218 observations on 3,555 U.S. banks, over the 1985-2016 period.

To estimate banks' liquidity creation, we employ Berger and Bouwman's (2009) "cat fat" measure (*LC*). Data are obtained from Christia Bouwman's website.[5] This measure includes both on- and off-balance sheet items. It classifies each item and gives a weight in term of liquidity created. Liquid liabilities and illiquid assets obtain a weight of 0.5, illiquid liabilities and liquid assets a weight of -0.5, with some items having a 0-weight. The overall liquidity creation is calculated by multiplying the value of each item by its weight and then sum them up. The measure gives a value in USD of the liquidity created by the bank. To shed more light on the effect of trust on the different components of liquidity creation, we subsequently break the "cat fat" measure between on- and off-balance sheet components (respectively, *LC_BS* and *LC_OFF*). Because "cat fat" measures the dollar amount of liquidity creation, we follow the literature (e.g. Berger and Bouwman 2009;2013) and normalise all liquidity creation measures by banks' gross total assets (GTA).

We now move to our measure of trust. In our main analysis, we use the measure of trust in banks (*Trust in Banks*) provided on an annual basis by Gallup surveys. Gallup collects answers to the following question: "Please tell me how much confidence you, yourself, have in banks – a great deal, quite a lot, some, or very little?". The measure represents the percentage of answers "Great deal" to the question.[6] The use of survey data to account for trust in banks has the advantage to provide a direct estimate of trust, that is not based on proxies. This approach has notably been adopted by Knell and Stix (2015), Jansen, Mosch, and van der Cruijsen (2015), and Stevenson and Wolfers (2011).

Table 1 presents the summary statistics of the variables. The average LC/GTA is 29.17% and the average LC_BS/GTA and LC_OFF/GTA are 23.98% and 5.19%, respectively. The average trust in banks reaches 14%. Figure 1 details the evolution of trust in banks and liquidity creation over the period in Figure 1. Both trends follow a similar pattern, with a positive correlation. Liquidity creation steadily increases from 26% to almost 35% over the 1985-2004 period. The 2008-2009 financial crisis took its toll on liquidity creation, that falls sharply to 27% in 2009. It then recovers progressively, increasing back to 35% in 2016. Similarly, trust in banks hits a highest of 22% in 2006 to then sharply decrease to 8% in 2009. Recovery of trust is slower than liquidity creation, reaching only 11% in 2016. Trust in banks also show a greater volatility over

[5] http://web.mit.edu/cbouwman/www/data.html, last visited on 14/01/2019.
[6] We obtain qualitatively similar results using both Great Deal and Quite a Lot.

the period. While liquidity creation follows quite stable trends, trust varies more widely from year-to-year.

3.2. Methodology

To examine the relationship between liquidity creation and trust, we employ the following panel fixed-effects OLS regression:

$$LIQCREAT_{i,t} = \beta_0 + \beta_1 Trust\ in\ banks_t + \boldsymbol{\gamma}' \boldsymbol{Z}_{i,t-1} + \boldsymbol{\vartheta}' \boldsymbol{W}_{i,t} + v_i + \mu_t + \varepsilon_{i,t}$$

i denotes the bank and *t* the quarter. $LIQCREAT_{i,t}$ is a 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.

$\boldsymbol{Z}_{i,t-1}$is a vector of bank controls, with the associated vector of coefficients, $\boldsymbol{\gamma}$. We use the lag of these variables to avoid endogeneity concerns. We take into account 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 as equity over GTA. Last, we control for bank's default risk using the z-score (e.g. Laeven and Levine, 2009). Z-score is defined as return-on-assets plus the ratio of equity capital to GTA, divided by the standard deviation of return-on-assets. A higher z-score implies a lower default probability. Data are obtained from Call Reports.

Second, we control for general economic conditions. $\boldsymbol{W}_{\boldsymbol{i,t}}$ represents a vector of macroeconomic variables, with the associated vector of coefficients, $\boldsymbol{\vartheta}$**.** We employ the annual GDP growth, the market capitalization, the inflation rate, and the unemployment rate. We retrieve these variables from the World Bank. We control for competition at the state-level using Herfindhal-Hirschman index, which measures the loan market concentration. Table 1 provides summary statistics and Appendix A gives a definition of the variables, along with their sources.

Last, v_i and μ_t are the bank and time fixed effects if included, and $\varepsilon_{i,t}$ is the random error.

4. Results

This section presents our results. We first focus on the main specification for the full sample, and then move to subsamples.

4.1. Main Results

We first turn on the relationship between trust and liquidity creation. Table 3 provides the results. In the first two columns, we estimate the relationship between *Trust in Banks* and *LC/GTA*. The second column includes quarters and banks fixed-effects. In each case, there is a positive relationship between trust and liquidity creation. An increase of one percent point of people that report having a great trust in banks is associated with an increase of 0.169 of the ratio of liquidity creation to total assets. The relationship is lower when banks and quarters fixed-effects are included but remains positive.

The impact of control variables on liquidity creation confirms previous results in the literature. Bank size is positively associated with liquidity creation, as in Berger and Bouwman (2009). The effect of the capital ratio is negative as in Casu, di Pietro, and Trujillo-Ponce (2018). Risk negatively affect liquidity creation, as in Berger and Bouwman (2009). Last, higher competition negatively affects liquidity creation, as in Horvath, Seidler, and Weill (2016).

This first results gives some weight to the view that an increase in trust fosters liquidity creation. Banks can more easily attract depositors and benefit from a more stable source of funding. This is likely to reduce the risk of maturity mismatch and allows banks to engage more in maturity transformation. By tempering the risk of runs, trustworthy depositors also reinforce banks' financial strength. This is likely to allow banks to lend to riskier borrowers and to create more liquidity.

We now refine our results by distinguishing the effect between on- and off-balance sheet liquidity creation. While on-balance sheet liquidity creation essential encompasses deposits and long-term loans, off-balance sheet liquidity creation stem from banks' activities such as guarantees, commitments, derivatives and participations (Berger and Bouwman, 2009). This second aspect of liquidity creation is non trivial for the economy. Berger and Sedunov (2017) point out that off-balance sheet liquidity creation accounts for 50% of US banks liquidity creation.

Trust may affect differently on- and off-balance sheet liquidity creation. For instance, Jansen, Mosch, and Cruijsen (2015) show a negative relationship between the public trust and the use

of opaque products, such as special purpose vehicles and derivatives. As a consequence, the relationship between trust and liquidity creation may be different between on- and off-balance sheet items.

Columns 3 to 6 reports the estimations, distinguishing between on- and off-balance sheet liquidity creation. In both cases, trust exerts a positive impact on liquidity creation. This is also the case when controlling for quarters and banks fixed-effects. While the coefficient of *Trust in Banks* is positive and coefficients in each case, it is worth noticing that the magnitude is different. Depending on the specification, the effect of trust on liquidity creation is 3 to 4 times stronger for on-balance sheet items. This gives some credit to the view that trust in banks primarily foster depositors' trusts and allow banks to grant more illiquid loans.

4.2. Subsample Analysis

We now aim to shed more light on our results by documenting the relationship between trust and liquidity creation through three angles: size, charter, and business cycle. Each approach entails potential consequences for the relationship between trust and liquidity creation. In each case, we introduce the different hypothesis and comment the results.

4.2.1 Banks' Size

We first focus on the role of size. Size has proved to play a crucial role in liquidity creation (e.g. Berger and Bouwman, 2009, 2013; Jiang, Levine and Lin, 2016). Big banks are the main creators of liquidity: Berger and Bouwman (2009) note that, while they represent 2% of US banks in number, they create 81% of the liquidity. They also generate more off-balance sheet liquidity. There are reasons to believe that the relationship between trust and liquidity creation differs across banks size. Big banks tend to use more transactional approach in lending (e.g. Berger and Udell, 2002), with a reduced role of monitoring. On the opposite, small banks are more focused on relationship lending, that is more sensible to trust (e.g. Saparito, Chen, and Sapienza, 2004).

Second, small banks and big banks do not have access to the same kind of deposits. While large banks tend to rely on national and international depositors, smaller banks are dependent on more local ones. Because trust is essentially an interpersonal element, small banks may be more sensible in a change of depositors' trusts. Another element that may generate differences across banks size is that large banks tend to be implicitly guaranteed by the state, as Systemically Important Financial Institutions (SIFI). This reduces the risk of bankruptcy, implicitly guarantees the deposits (e.g. O'hara and Shaw, 1990) and is likely to temper the role of

depositors' trust on liquidity creation. Last, large banks tend to rely more heavily on derivatives to create liquidity. The relationship between trust and off-balance sheet liquidity creation may also be affected by size.

We follow Berger and Bouwman's (2009) thresholds to create size classes: large banks possess gross total assets above $US 3 billion, medium banks have GTA between $1 billion and $3 billion, while small banks have GTA below $1 billion. In each case, we estimate the relationship between trust, liquidity creation and on- and off-balance sheet liquidity creation. Table 4 reports the estimations. Results show that the positive relationship between trust and liquidity creation is only valid for small banks. On the contrary, the relationship is non-significant for medium and large banks. These results support the view that trust primarily matters for small banks. Because they mainly source their deposits locally, they are also more affected by changes in trust. They also do not possess a too-big-to-fail status, which reinforces the role of trust.

These results hold for both on- and off-balance sheet liquidity creation. The positive relationship between trust and on- and off-balance sheet creation is only valid for small banks. On the opposite, for medium banks, the relationship is negative for off-balance sheet liquidity creation. This is in line with the view that more trust leads banks to reduce their use of off-balance sheet items, but only for medium banks. This is be more specifically linked to the use of derivatives by medium banks, while small banks reinforce their use of commitment and engagement to local firms.

4.2.2. Banks' Charters

Second, we divide the sample based on banks' charters. In the US banking system, banks can either be chartered at the state-level (state-chartered) or at the federal level (national-chartered). Several historical reasons explain this dual-banking system, that requires from banks to be either state or nation-wide chartered (White, 2011). While deregulation of the banking market since the 1980's has eroded the distinction between state and national charters (Blair and Kushmeider, 2006), notably allowing a fiercer competition across states (Stiroh and Strahan, 2003), there still exist substantial differences between the two types of banks, that affect their ability to exercise their activities in different states (Johnson and Rice, 2008).

Our aim is to estimate the impact for a bank of being state- or nation-chartered, on the relationship between trust and liquidity creation. The key reason is that the effect of trust is closely related to proximity. As state-chartered banks have access to a more local pool of depositors, we expect them to be more dependent on trust to create liquidity. They are also

likely to mostly lend to state-level borrowers, which would reinforce the role of trust in lending. On the contrary, national banks can more easily diversify their source of funding, making them less dependent on depositors' trust to create liquidity.

We explore this possibility by estimating the model for each subsample. Table 5 reports the results. Essentially, the relationship between liquidity and trust is only significant and positive for state-chartered banks. For national-chartered bank, the relationship is positive but non-significant. This result supports the view that proximity, proxied through banks type of charters, plays a key role in the relationship between trust and liquidity creation. Banks that source their deposits locally are the one for which trust fosters liquidity creation. This result is in line with the role of bank size and emphasise the interpersonal role of trust in contributing to liquidity creation. When exploring the effect on on-balance sheet liquidity creation, we find similar results, with only a significant effect for state-chartered banks. Results for off-balance sheet liquidity creation are more mixed, with a similar negative effect for the two types of banks.

4.2.3. Business Cycle

Last, we focus on the role of the business cycle on the relationship between trust and liquidity creation. Trust plays a crucial role during economic downturns for firms (e.g. Lins, Servaes, and Tamayo, 2017). Firms compensate some of the negative effects of recessions by taking advantage of the trust relationships they have put in place during expansion periods. For instance, it allows them to expand their use of trade-credit (e.g. Wu, Firth, and Rui, 2014). Similar mechanisms operate in the banking industry. Banks build relationship ties with their clients and depositors that allow them to maintain their activities during bad times. This is for instance the case in the interbank market (Bräuning and Fecht, 2017) and in retail banking (e.g. Bolton et al., 2016).

In our case, we expect trust to be more important for liquidity creation during an economic downturn. The reason is that a greater trust during downturns favours a flight-to-quality (e.g. Gatev and Strahan, 2006), allowing banks to collect and retain deposits more easily. This fosters their financial strength and reduces their risk of liquidity mismatch, enabling them to expand their lending. This is especially the case for banks that primarily use relationship lending as a lending technology (Beatriz, Coffinet, and Nicolas, 2018). To test the effect of the business cycle on the relationship between trust and liquidity creation, we split the sample based on the output gap. Output gap is a common measure of business cycle in the literature, that is also related with inflation expectation and monetary policy (Orphanides and van Norden, 2005). We

obtain data from the Bank of International Settlements. Output gap is calculated as the difference between realised and expected GDP (i.e. a negative output gap means that growth is below the expected trend).

Table 6 reports the results. The first three columns estimate the relationship between trust and liquidity creation with a negative output gap, and the next three columns report the results for a positive output gap. Results show that the positive impact of trust on liquidity creation is only valid when the output gap is negative, i.e. during the recessive part of the business cycle. On the contrary, the relationship is non-significant when the output gap is positive. This emphasises the crucial role played by trust during downturns. Higher trust allows banks to create more liquidity during these periods, by facilitating deposit collection, as well as long-term lending.

This is also the case for on- and off-balance sheet liquidity creation. The positive effect of trust in only present during downturns. On the contrary, there is a negative relationship between trust and off-balance sheet liquidity creation during economic booms. This can be linked to the model of Thakor (2005), who shows that banks create more liquidity off-balance sheet during economic booms to avoid not honouring their previous engagements and damaging their reputation. They do so even if interest rates are then higher and they may be interested in changing their lending terms. If banks benefit from a higher trust in general, they may be less concerned by damaging their reputation, which results in a lower liquidity creation off-balance sheet.

5. Robustness Analysis

We perform two types of robustness tests to ascertain the validity of our results. First, we provide four alternative measures of trust in banks that allows to tackle potential issues associated with our main measure. Second, we employ two different instruments to specifically address the endogeneity issues associated with our main measure of trust.

5.1. Alternative Measures of Trust

Our main measure of trust is based on the answer to Gallup Survey on how much respondents trust banks. Surveys provides a convenient estimate of trust. It is often used as a first indicator, as it proxies closely the level of trust (e.g. Stevenson and Wolfers, 2011). However, it entails potential issues, such as endogeneity and granularity. To take into account these limitations, this section offers alternative measures.

First, we use the occurrence of a financial crisis. Financial crises deeply undermine confidence in the financial and banking system (Knell and Stix, 2015). Experience of financial crisis also affect trust at the individual level (van der Cruijsen, de Haan, and Jansen, 2016). Financial crisis occurrence has been employed as a shock in trust that entails long-lasting effects. For instance, Lins, Servaes, and Tamayo (2017) use the Great Financial Crisis as an exogeneous shock in trust that affect firms. We follow this logic and use the occurrence of financial crises as a shock in trust. For banks, this shock in trust can be positive or negative, depending on the type of crisis. Berger and Bouwman (2013) distinguish two different types of crisis that affect differently banks: banking and market crisis. Because banking crises originate from a failure in the banking system, they are likely to hamper trust in banks. On the opposite, market crises originate outside of the banking system, and are likely to foster their trust in banking institutions compared with the market, generating a flight-to-quality of depositors to banks (e.g. Gatev and Strahan, 2006).

In the columns 1 to 6 of table 7, we employ Banking Crisis and Market Crisis as alternative measures of trusts. We follow Berger and Bouwman's (2013) classification of crises and crisis periods. Results are consistent. An occurrence of a banking crisis is associated with a reduction in liquidity creation, in line with a drop in trust in banks. On the opposite, a market crisis is associated with an increase in liquidity creation, in line with a reinforcement of trust in banking institutions. This is the case for global liquidity creation, as well as on- and off-balance sheet liquidity creation.

Second, we use the number of bank failures as an alternative measure of trust. Knell and Stix (2015) show that a low number of banking failures is associated with a higher trust in banks. Jansen, Mosch, and Cruijsen (2015) and van der Cruijsen, de Haan, and Jansen (2016) notably use the previous experience of bank failures to measure a loss of trust in financial institutions. We follow this logic and use the number of bank failures per state and per year as an alternative measure of trust. This measure entails two advantages compared with our main measure. First, it is available at the state-level, which increases the granularity of our estimations. Second, even if high liquidity creation affects the probability of bank failure (Fungáčová, Turk-Ariss, and Weill, 2015), number of bank failures remain relatively low over the period, tempering endogeneity concerns.

Columns 7 to 9 in table 7 report the results, using the bank failure rate (number of bank failures divided by the number of banks) as a proxy of trust in banking institutions. We use the failure

rate of the previous year to isolate the effect on liquidity creation of banks that did not fail and rule out any mechanical effect. We obtain the data from the FDIC. Results support our main findings. An increase in the lagged bank failure rate is associated with a decrease in liquidity creation. This can be view as the effect of a decrease in trust in banks. This is the case for general liquidity creation as well as on- and off-balance sheet liquidity creation.

Last, we follow Guiso (2010) and Bertsch et al. (2018) and use the number of victims of the Madoff scam as an alternative measure of a drop in trust. Compared with our main measure, this measure entails two main advantages. First, it is available at the state-level, which gives more granularity to our estimate. Second, it can be viewed as an exogenous shock in trust that is not impacted by liquidity creation, tackling potential issues associated with reverse causality. Columns 10 to 12 in table 7 provides the estimations, using this new proxy as a measure of drop in trust. Results are consistent. We observe that liquidity creation decreases with the number of victims of Madoff scam. This is the case for global and off-balance sheet liquidity creation. This confirms our main results that a fall in public trust towards financial institutions diminishes banks' liquidity creation.

5.2. Instrumental-Variables

A critical aspect of our model is to ensure that variations in trusts are exogeneous. In this section, we use two variables to instrument *Trust in Banks* to make sure we isolate the effect of exogeneous variations in trust.

Following notably Guiso, Sapienza, and Zingales (2004), we employ electoral turnout as our first instrument. Electoral turnout measures other aspects of trust in society, such as public engagement and trust in institutions (Putnam, 1993). Compared with answers from a survey, electoral turnout provides a more objective measure of public engagement. However, it may also be related to elements that are not directly linked to trust, such as moral values or group appurtenance. In our case, electoral turnout is likely to constitute a reliable instrument for Trust in Banks. It is unlikely to directly affect liquidity creation, while it is likely to be at least partially linked with trust in society and in banks.

Electoral Turnout is obtained from the United States Electoral Project. Data are available every two years, at the state-level. To compensate the fact that data are not available on an annual basis, we employ a second instrument to capture the exogenous aspect of trust in banks: Trust

in Congress. Trust in Congress is obtained from Gallup Surveys and available on an annual basis. This second instrument allows to capture more precisely the general trust in institutions that is likely to affect trust in banks. While Trust in Congress may affect liquidity creation, it is unlikely to do so but through Trust in Banks.

Table 8 reports the estimations. The first column provides the first stage regression and the next three columns the regressions with Trust in Banks instrumented by Electoral Turnout and Trust in Congress. The first-stage regression confirms the existence of a relationship between the instruments and the instrumented variable. An increase in Electoral Turnout is associated with a decrease in Trust in Banks while an increase in Trust in Congress increases Trust in Banks. Both coefficients are significant. Opposite signs emphasise that the two variables measure different aspects of trust. A high R^2 and a significant F-test give additional support to this specification.

In the second-stage, we instrument Trust in Banks employing the residuals from the first regression. We estimate the impact of the instrumented variable on overall, on- and off-balance sheet liquidity creation. We find supportive results. The relationship between the instrumented variable Trust in Banks and liquidity creation is positive and significant. The magnitude is slightly higher but close to the one estimated in the main model. The model is also correctly specified. R^2 is high, F-test is significant and the Hansen-test is non-significant. The relationship is also positive and significant for on-balance sheet liquidity creation. While we do not observe a significant estimate for off-balance sheet liquidity creation, the sign of the coefficient remains positive. This does not support our main results but may stem from the choice of instruments.

6. Conclusions

In this paper, we have explored the relationship between trust and liquidity creation. Liquidity creation is one of the two key functions exert by banks, and is essential for a well-functioning economy. While many factors can explain the extent of liquidity creation, the role of trust seems primordial. Trust enables banks to collect deposits, and to provide long-term lending. It is at the heart of banks' activities and its role is emphasised by a substantial theoretical literature (e.g. Diamond and Dybvig, 1983; Diamond and Rajan, 2001).

So far, two opposite effects were predicted by theoretical models. Trust could foster liquidity creation, by reinforcing banks' deposit stability, reducing liquidity mismatch costs, and by

reducing the risk of runs, allowing banks to take additional risks (Diamond and Dybvig, 1983; Allen and Gale, 2004; Repullo, 2004). On the opposite, higher trust could also reduce banks' liquidity creation, by reducing the incentives of banks to signal their trustworthiness (Diamond and Rajan, 2001; Myers and Rajan, 1998; Flannery, 1994).

We find that trust promotes liquidity creation. This is the case for both overall, on- and off-balance sheet liquidity creation. Conducting subsample analyses, we observe this effect primarily for small banks, state-chartered banks, and during economic downturn. This confirms that trust is the most intensively needed when interpersonal relations play a crucial role. We conduct several robustness tests to tackle potential flaws in our approach. We test the relationship using four alternative variables that notably address granularity and endogeneity issues. We also conduct instrumental-variables regression, to ensure we isolate the exogenous variation in trust that affects liquidity creation. We obtain consistent results that confirm the positive relationship between trust and liquidity creation.

Our paper answers to a critical question on the role of trust on core banks' functions. It follows the view that liquidity creation is a more precise estimate of banks' output for the economy (Berger and Sedunov, 2017). Further work may pursue this approach to tackle critical questions in the banking literature.

References

Algan, Yann, and Pierre Cahuc, 2010, Inherited Trust and Growth, *The American Economic Review* 100, 2060–2092.

Allen, Franklin, and Douglas Gale, 2004, Financial Intermediaries and Markets, *Econometrica* 72, 1023–1061.

Allen, Franklin, and Anthony M Santomero, 1997, The theory of financial intermediation, *Journal of Banking & Finance* 21, 1461–1485.

Beatriz, Mikael, Jérôme Coffinet, and Théo Nicolas, 2018, Relationship lending and SMEs' funding costs over the cycle: Why diversification of borrowing matters, *Journal of Banking & Finance*.

Becchetti, Leonardo, and Pierluigi Conzo, 2011, Enhancing capabilities through credit access: Creditworthiness as a signal of trustworthiness under asymmetric information, *Journal of Public Economics* 95. New Directions in the Economics of Welfare: Special Issue Celebrating Nobel Laureate Amartya Sen's 75th Birthday, 265–278.

Berger, Allen N., and Christa Bouwman, 2015, *Bank Liquidity Creation and Financial Crises* (Academic Press).

Berger, Allen N., and Christa H. S. Bouwman, 2009, Bank Liquidity Creation, *The Review of Financial Studies* 22, 3779–3837.

Berger, Allen N., and Christa H. S. Bouwman, 2012, Bank Liquidity Creation, Monetary Policy, and Financial Crises. SSRN Scholarly Paper, Social Science Research Network, Rochester, NY.

Berger, Allen N., and Christa H. S. Bouwman, 2013, How does capital affect bank performance during financial crises?, *Journal of Financial Economics* 109, 146–176.

Berger, Allen N., Philip Molyneux, and John O. S. Wilson, 2014, *The Oxford Handbook of Banking, Second Edition* (OUP Oxford).

Berger, Allen N., and John Sedunov, 2017, Bank liquidity creation and real economic output, *Journal of Banking & Finance* 81, 1–19.

Berger, Allen N., and Gregory F. Udell, 2002, Small Business Credit Availability and Relationship Lending: The Importance of Bank Organisational Structure, *The Economic Journal* 112, F32–F53.

Bertsch, Christoph, Yingjie Qi, Isaiah Hull, and Xin Zhang, 2018, The Role of Trust in Online Lending, *Unpublished Working Paper*, 54.

Blair, Christine E., and Rose M. Kushmeider, 2006, Challenges to the Dual Banking System: The Funding of Bank Supervision, *FDIC Banking Review* 18, 1–22.

Bolton, Patrick, Xavier Freixas, Leonardo Gambacorta, and Paolo Emilio Mistrulli, 2016, Relationship and Transaction Lending in a Crisis, *The Review of Financial Studies* 29, 2643–2676.

Bräuning, Falk, and Falko Fecht, 2017, Relationship Lending in the Interbank Market and the Price of Liquidity, *Review of Finance* 21, 33–75.

Casu, Barbara, Filippo di Pietro, and Antonio Trujillo-Ponce, 2018, Liquidity Creation and Bank Capital, *Journal of Financial Services Research*.

Chari, V. V., and Ravi Jagannathan, 1988, Banking Panics, Information, and Rational Expectations Equilibrium, *The Journal of Finance* 43, 749–761.

Diamond, Douglas W., and Philip H. Dybvig, 1983, Bank Runs, Deposit Insurance, and Liquidity, *Journal of Political Economy* 91, 401–419.

Diamond, Douglas W., and Raghuram G. Rajan, 2001, Liquidity Risk, Liquidity Creation, and Financial Fragility: A Theory of Banking, *Journal of Political Economy* 109, 287–327.

Fidrmuc, Jarko, Zuzana Fungáčová, and Laurent Weill, 2015, Does Bank Liquidity Creation Contribute to Economic Growth? Evidence from Russia, *Open Economies Review* 26, 479–496.

Fungáčová, Zuzana, Rima Turk-Ariss, and Laurent Weill, 2015, High Liquidity Creation and Bank Failures, *IMF Working Paper* 15.

Gatev, Evan, and Philip E. Strahan, 2006, Banks' Advantage in Hedging Liquidity Risk: Theory and Evidence from the Commercial Paper Market, *The Journal of Finance* 61, 867–892.

Guiso, Luigi, 2010, A trust-driven financial crisis. Implications for the future of financial markets, *EUI Working Papers*.

Guiso, Luigi, Paola Sapienza, and Luigi Zingales, 2004, The Role of Social Capital in Financial Development, *American Economic Review* 94, 526–556.

Guiso, Luigi, Paola Sapienza, and Luigi Zingales, 2008, Trusting the Stock Market, *The Journal of Finance* 63, 2557–2600.

Horvath, Roman, Jakub Seidler, and Laurent Weill, 2016, How bank competition influences liquidity creation, *Economic Modelling* 52. Special Issue on Recent Developments in Decision-Making, Monetary Policy and Financial Markets, 155–161.

Jansen, David-Jan, Robert H. J. Mosch, and Carin A. B. van der Cruijsen, 2015, When Does the General Public Lose Trust in Banks?, *Journal of Financial Services Research* 48, 127–141.

Jiang, Liangliang, Ross Levine, and Chen Lin, 2016, Competition and Bank Liquidity Creation. Working Paper, National Bureau of Economic Research.

Johnson, Christian A., and Tara Rice, 2008, Assessing a Decade of Interstate Bank Branching, *Washington and Lee Law Review* 65, 73–128.

Kim, Moshe, Jordi Surroca, and Josep A. Tribó, 2014, Impact of ethical behavior on syndicated loan rates, *Journal of Banking & Finance* 38, 122–144.

Knell, Markus, and Helmut Stix, 2015, Trust in Banks during Normal and Crisis Times—Evidence from Survey Data, *Economica* 82, 995–1020.

Laeven, Luc, and Ross Levine, 2009, Bank governance, regulation and risk taking, *Journal of Financial Economics* 93, 259–275.

Lins, Karl V., Henri Servaes, and Ane Tamayo, 2017, Social Capital, Trust, and Firm Performance: The Value of Corporate Social Responsibility during the Financial Crisis, *The Journal of Finance* 72, 1785–1824.

Moro, Andrea, and Matthias Fink, 2013, Loan managers' trust and credit access for SMEs, *Journal of Banking & Finance* 37, 927–936.

O'hara, Maureen, and Wayne Shaw, 1990, Deposit Insurance and Wealth Effects: The Value of Being "Too Big to Fail," *The Journal of Finance* 45, 1587–1600.

Orphanides, Athanasios, and Simon van Norden, 2005, The Reliability of Inflation Forecasts Based on Output Gap Estimates in Real Time, *Journal of Money, Credit and Banking* 37, 583–601.

Porta, Rafael La, Florencio Lopez-de-Silane, Andrei Shleifer, and Robert W. Vishny, 1996, Trust in Large Organizations. Working Paper, National Bureau of Economic Research.

Postlewaite, Andrew, and Xavier Vives, 1987, Bank Runs as an Equilibrium Phenomenon, *Journal of Political Economy* 95, 485–491.

Putnam, Robert, 1993, Making democracy work: Civic traditions in modern Italy, *Princenton University Press*.

Repullo, Rafael, 2004, Capital requirements, market power, and risk-taking in banking, *Journal of Financial Intermediation* 13. Bank Capital Adequacy Regulation under the New Basel Accord, 156–182.

Saparito, Patrick A., Chao C. Chen, and Harry J. Sapienza, 2004, The Role of Relational Trust in Bank–Small Firm Relationships, *Academy of Management Journal* 47, 400–410.

Sapienza, Paola, and Luigi Zingales, 2012, A Trust Crisis, *International Review of Finance* 12, 123–131.

Shin, Hyun Song, 2009, Reflections on Northern Rock: The Bank Run That Heralded the Global Financial Crisis, *Journal of Economic Perspectives* 23, 101–119.

Stevenson, Betsey, and Justin Wolfers, 2011, Trust in Public Institutions over the Business Cycle, *American Economic Review* 101, 281–87.

Stiroh, Kevin J., and Philip E. Strahan, 2003, Competitive Dynamics of Deregulation: Evidence from U.S. Banking, *Journal of Money, Credit and Banking* 35, 801–828.

Tang, Ying, Chao Deng, and Andrea Moro, 2017, Firm-bank trusting relationship and discouraged borrowers, *Review of Managerial Science* 11, 519–541.

Thakor, Anjan V., 2005, Do Loan Commitments Cause Overlending?, *Journal of Money, Credit and Banking* 37, 1067–1099.

van der Cruijsen, Carin, Jakob de Haan, and David-Jan Jansen, 2016, Trust and Financial Crisis Experiences, *Social Indicators Research* 127, 577–600.

White, Eugene N., 2011, “To Establish a More Effective Supervision of Banking”: How the Birth of the Fed Altered Bank Supervision, *National Bureau of Economic Research Working Paper Series*.

Wu, Wenfeng, Michael Firth, and Oliver M. Rui, 2014, Trust and the provision of trade credit, *Journal of Banking & Finance* 39, 146–159.

Table 1 – Descriptive Statistics

This table provides descriptive statistics for the variables in the study. Appendix A provides the definitions of variables.

	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
HHI	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 2 – Correlation Matrix

The table below displays the pairwise correlation between the main variables. The significance level at 0.10, 0.05 and 0.01 is 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	
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 3 – Main Results

Panel FE regressions. The dependent variable is stated at the top of each model. The t-statistic level is reported in parentheses. *, **, and *** denote an estimate significantly different from 0 at the 10%, 5%, and 1% level, respectively. Appendix A gives the definition of 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***	0.101***	0.119***	0.082***	0.049***	0.019***
	(4.587)	(5.800)	(3.746)	(5.371)	(4.758)	(3.084)
Log(GTA)$_{t-1}$	5.197***	5.391***	2.896***	3.559***	2.301***	1.832***
	(66.434)	(24.713)	(42.719)	(18.559)	(104.401)	(24.016)
Equity / GTA $_{t-1}$	-152.660***	-36.946***	-145.260***	-41.695***	-7.400***	4.750***
	(-56.580)	(-15.201)	(-62.121)	(-19.516)	(-9.735)	(5.588)
Z-Score $_{t-1}$	-0.002***	-0.000	-0.002***	-0.000	-0.000***	-0.000
	(-4.182)	(-1.016)	(-3.979)	(-0.900)	(-2.605)	(-0.642)
GDP Growth$_t$	-0.013	-0.236***	0.154***	-0.120***	-0.167***	-0.116***
	(-0.193)	(-7.499)	(2.594)	(-4.328)	(-8.666)	(-10.562)
Market Capitalization$_t$	0.000***	0.000***	0.000***	0.000***	0.000**	0.000***
	(11.328)	(22.539)	(12.321)	(22.303)	(2.306)	(8.388)
Inflation Rate$_t$	-0.436***	-0.034	-0.353***	-0.028	-0.083***	-0.007
	(-4.274)	(-0.717)	(-3.995)	(-0.656)	(-2.883)	(-0.400)
Unemployment Rate$_t$	-0.417***	-0.310***	-0.273***	-0.105***	-0.144***	-0.205***
	(-4.409)	(-6.842)	(-3.336)	(-2.638)	(-5.389)	(-12.934)
HHI$_t$	-0.002***	-0.002***	-0.002***	-0.002***	0.000***	0.000***
	(-6.498)	(-17.812)	(-9.645)	(-22.415)	(6.605)	(5.409)
Constant	-17.370***	-31.64***	3.030**	-15.797***	-20.400***	-15.844***
	(-11.381)	(-12.350)	(2.291)	(-7.014)	(-47.448)	(-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	1,010.9***	327.9***	761.4***	277.4***	1,307.5***	213.8***
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 4 – Size Analysis

Panel FE regressions. The dependent variable is stated at the top of each model. The t-statistic level is reported in parentheses. *, **, and *** denote an estimate significantly different from 0 at the 10%, 5%, and 1% level, respectively. Appendix A gives the definition of the variables.

	Small			**Medium**			**Large**		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	LC/GTA	LC_BS/GTA	LC_OFF/GTA	LC/GTA	LC_BS/GTA	LC_OFF/GTA	LC/GTA	LC_BS/GTA	LC_OFF/GTA
Trust in Banks$_t$	0.101***	0.081***	0.020***	-0.231	0.058	-0.289***	-0.022	0.018	-0.039
	(5.730)	(5.162)	(3.495)	(-1.581)	(0.590)	(-3.393)	(-0.154)	(0.194)	(-0.394)
Log(GTA)$_{t-1}$	5.136***	3.394***	1.742***	7.852***	1.690	6.162***	8.493***	0.708	7.785***
	(22.961)	(17.090)	(23.711)	(3.122)	(0.995)	(4.200)	(3.481)	(0.445)	(4.496)
Equity / GTA $_{t-1}$	-38.363***	-42.395***	4.032***	-31.955	-57.414***	25.459	26.733	-20.891	47.624**
	(-15.676)	(-19.513)	(5.015)	(-1.013)	(-2.695)	(1.384)	(0.955)	(-1.146)	(2.397)
Z-Score $_{t-1}$	-0.000	-0.000	-0.000	-0.123***	-0.105***	-0.018	0.009	0.001	0.008
	(-0.953)	(-0.840)	(-0.631)	(-3.778)	(-4.770)	(-0.954)	(0.443)	(0.066)	(0.563)
GDP Growth$_t$	-0.220***	-0.123***	-0.097***	-0.570**	0.129	-0.700***	-0.515**	0.137	-0.652***
	(-6.868)	(-4.311)	(-9.257)	(-2.074)	(0.695)	(-4.360)	(-2.032)	(0.828)	(-3.624)
Market Capitalization$_t$	0.000***	0.000***	0.000***	0.000	-0.000	0.000**	0.000***	0.000***	0.000
	(22.296)	(22.015)	(8.376)	(0.555)	(-0.948)	(2.049)	(2.845)	(3.635)	(0.674)
Inflation Rate$_t$	-0.052	-0.046	-0.007	-0.001	-0.028	0.027	0.814	1.180***	-0.365
	(-1.078)	(-1.057)	(-0.425)	(-0.001)	(-0.065)	(0.074)	(1.395)	(3.103)	(-0.881)
Unemployment Rate$_t$	-0.309***	-0.105***	-0.204***	-1.705**	-0.881*	-0.825*	-0.719	0.296	-1.016**
	(-6.786)	(-2.592)	(-13.650)	(-2.358)	(-1.803)	(-1.955)	(-1.110)	(0.703)	(-2.209)
HHI$_t$	-0.002***	-0.002***	0.000***	-0.001	-0.001	-0.000	0.002	-0.000	0.002*
	(-17.864)	(-21.915)	(4.843)	(-0.955)	(-1.055)	(-0.416)	(0.948)	(-0.375)	(1.680)
Constant	-28.362***	-13.442***	-14.921***	-51.949	16.280	-68.229***	-92.305**	8.881	-101.186***
	(-10.943)	(-5.842)	(-17.522)	(-1.402)	(0.651)	(-3.157)	(-2.373)	(0.351)	(-3.665)
Quarter Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	36,591	36,591	36,591	806	806	806	821	821	821
F	308.8***	261.9***	210.9***	5.93***	6.19***	10.18***	8.44***	2.95***	9.35***
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 5 – Banks' Charters

Panel FE regressions. The dependent variable is stated at the top of each model. The t-statistic level is reported in parentheses. *, **, and *** denote an estimate significantly different from 0 at the 10%, 5%, and 1% level, respectively. Appendix A gives the definition of the variables.

	National-Chartered			**State-Chartered**		
	(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$_t$	0.013	0.033	-0.020***	0.056*	0.110***	-0.054***
	(0.545)	(1.595)	(-2.583)	(1.776)	(4.085)	(-4.177)
Log(GTA)$_{t-1}$	5.350***	3.502***	1.849***	5.396***	3.933***	1.463***
	(18.467)	(13.612)	(18.922)	(12.927)	(11.068)	(8.602)
Equity / GTA $_{t-1}$	-36.471***	-37.624***	1.154	-30.357***	-40.663***	10.307***
	(-10.618)	(-12.336)	(0.996)	(-6.672)	(-10.499)	(5.560)
Z-Score $_{t-1}$	-0.001	-0.000	-0.000	0.000	0.000	0.000
	(-0.841)	(-0.547)	(-1.055)	(0.202)	(0.110)	(0.265)
GDP Growth$_t$	-0.262***	-0.153***	-0.109***	-0.085	0.008	-0.093***
	(-6.539)	(-4.293)	(-8.087)	(-1.564)	(0.174)	(-4.202)
Market Capitalization$_t$	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(23.547)	(19.714)	(17.915)	(13.500)	(12.304)	(7.426)
Inflation Rate$_t$	0.071	0.075	-0.004	0.246***	0.261***	-0.015
	(1.100)	(1.309)	(-0.185)	(2.655)	(3.310)	(-0.398)
Unemployment Rate$_t$	-0.091	0.133**	-0.224***	-0.128	0.118	-0.246***
	(-1.374)	(2.265)	(-10.037)	(-1.284)	(1.392)	(-6.059)
HHI$_t$	-0.002***	-0.002***	0.000	-0.002***	-0.003***	0.000*
	(-13.132)	(-14.987)	(0.523)	(-9.854)	(-12.434)	(1.792)
Constant	-31.853***	-16.245***	-15.607***	-35.479***	-24.647***	-10.832***
	(-9.267)	(-5.323)	(-13.466)	(-7.024)	(-5.732)	(-5.263)
Quarter Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	20,497	20,497	20,497	11,921	11,921	11,921
F	222.3***	155.6***	212.7***	86.5***	83.6***	54.8***
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 6 –Business Cycle

Panel FE regressions. The dependent variable is stated at the top of each model. The t-statistic level is reported in parentheses. *, **, and *** denote an estimate significantly different from 0 at the 10%, 5%, and 1% level, respectively. Appendix A gives the definition of 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***	0.074***	0.019***	-0.214	0.028	-0.242**
	(5.184)	(4.646)	(3.156)	(-0.898)	(0.144)	(-2.075)
Log(GTA)$_{t-1}$	5.293***	3.378***	1.915***	5.671***	3.913***	1.758***
	(21.646)	(15.588)	(23.165)	(7.921)	(6.658)	(5.014)
Equity / GTA $_{t-1}$	-35.106***	-41.833***	6.727***	-21.388***	-14.599***	-6.789**
	(-13.262)	(-17.835)	(7.516)	(-3.293)	(-2.738)	(-2.134)
Z-Score $_{t-1}$	-0.000	-0.000	-0.000	-0.004**	-0.003	-0.002*
	(-0.931)	(-0.911)	(-0.367)	(-1.977)	(-1.426)	(-1.647)
GDP Growth$_t$	-0.125***	0.011	-0.136***	0.438	-0.259	0.697***
	(-3.709)	(0.382)	(-11.971)	(0.903)	(-0.651)	(2.934)
Market Capitalization$_t$	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(17.178)	(16.667)	(7.126)	(4.790)	(3.761)	(3.475)
Inflation Rate$_t$	-0.297***	-0.333***	0.036**	1.619***	1.619***	-0.001
	(-5.798)	(-7.340)	(2.088)	(10.731)	(13.079)	(-0.011)
Unemployment Rate$_t$	-0.430***	-0.264***	-0.166***	2.022*	1.032	0.990*
	(-8.845)	(-6.126)	(-10.103)	(1.946)	(1.210)	(1.944)
HHI$_t$	-0.002***	-0.002***	0.000***	-0.001***	-0.001***	-0.000
	(-12.977)	(-15.722)	(2.823)	(-2.952)	(-3.113)	(-0.808)
Constant	-28.683***	-11.393***	-17.290***	-58.155***	-36.442***	-21.712***
	(-9.982)	(-4.474)	(-17.795)	(-5.623)	(-4.292)	(-4.286)
Quarter Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	32,061	32,061	32,061	6,157	6,157	6,157
F	242.4***	206.6***	169***	105.7***	115.2***	17.7***
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 7 – Robustness Indicators

Panel FE regressions. The dependent variable is stated at the top of each model. The t-statistic level is reported in parentheses. *, **, and *** denote an estimate significantly different from 0 at the 10%, 5%, and 1% level, respectively. Appendix A gives the definition of the variables.

	Bank Crisis			**Market Crisis**			**Bank Failure Rate**			**Madoff Victims**		
	(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
	LC/GTA	LC_BS/GTA	LC_OFF/GTA	LC/GTA	LC_BS/GTA	LC_OFF/GTA	LC/GTA	LC_BS/GTA	LC_OFF/GTA	LC/GTA	LC_BS/GTA	LC_OFF/GTA
Bank Crisis	-0.507***	-0.953***	0.446***									
	(-3.819)	(-8.171)	(5.376)									
Market Crisis				0.535***	0.761***	-0.226**						
				(3.759)	(6.084)	(-2.519)						
Bank Failure Rate$_{t-1}$							-4.469***	-3.353***	-1.116***			
							(-7.212)	(-3.077)	(-3.667)			
Madoff Victims $_t$										-0.446*	0.284	-0.730***
										(-1.939)	(0.395)	(-3.278)
Log(GTA) $_{t-1}$	5.418***	3.586***	1.832***	5.392***	3.546***	1.845***	5.424***	3.585***	1.839***	5.405***	3.582***	1.823***
	(24.831)	(18.713)	(6.736)	(24.702)	(18.490)	(6.776)	(24.872)	(4.868)	(6.769)	(24.762)	(4.865)	(6.677)
Equity / GTA $_{t-1}$	-36.516***	-41.654***	5.138**	-36.357***	-41.296***	4.939**	-36.233***	-41.115***	4.882**	-36.360***	-41.025***	4.665**
	(-15.032)	(-19.523)	(2.283)	(-14.973)	(-19.354)	(2.207)	(-14.931)	(-4.542)	(2.178)	(-14.967)	(-4.549)	(2.064)
Z-Score $_{t-1}$	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(-1.005)	(-0.891)	(-1.009)	(-1.007)	(-0.894)	(-1.014)	(-1.009)	(-1.352)	(-1.017)	(-1.000)	(-1.348)	(-0.986)
GDP Growth $_t$	-0.256***	-0.226***	-0.030	-0.157***	-0.047*	-0.110***	-0.191***	-0.082	-0.109***	-0.175***	-0.064	-0.111***
	(-6.938)	(-6.986)	(-1.535)	(-5.284)	(-1.786)	(-5.366)	(-6.481)	(-1.504)	(-5.302)	(-5.944)	(-1.151)	(-5.337)
Market Capitalization $_t$	0.000***	0.000***	0.000***	0.000***	0.000***	0.000**	0.000***	0.000***	0.000**	0.000***	0.000***	0.000***
	(21.344)	(20.491)	(2.836)	(22.484)	(22.574)	(2.188)	(21.630)	(4.667)	(2.294)	(22.208)	(4.736)	(2.749)
Inflation Rate $_t$	0.007	0.030	-0.023	0.009	0.023	-0.014	0.013	0.009	0.004	-0.018	-0.011	-0.007
	(0.145)	(0.712)	(-0.720)	(0.191)	(0.541)	(-0.412)	(0.274)	(0.099)	(0.124)	(-0.370)	(-0.119)	(-0.204)
Unemployment rate $_t$	-0.463***	-0.238***	-0.225***	-0.428***	-0.185***	-0.243***	-0.457***	-0.225**	-0.232***	-0.437***	-0.234**	-0.203***
	(-12.233)	(-7.170)	(-7.020)	(-11.142)	(-5.485)	(-7.659)	(-12.103)	(-2.312)	(-7.331)	(-11.257)	(-2.340)	(-6.122)
HHI_t	-0.002***	-0.003***	0.000*	-0.003***	-0.003***	0.000***	-0.002***	-0.003***	0.000**	-0.002***	-0.003***	0.000**
	(-19.610)	(-23.880)	(1.915)	(-20.351)	(-25.421)	(2.586)	(-20.082)	(-11.032)	(2.265)	(-19.923)	(-11.024)	(2.465)
Constant	-29.418***	-13.613***	-15.805***	-29.858***	-14.399***	-15.459***	-29.755***	-14.263*	-15.492***	-29.774***	-14.270*	-15.504***
	(-11.564)	(-6.092)	(-5.357)	(-11.744)	(-6.445)	(-5.242)	(-11.710)	(-1.683)	(-5.259)	(-11.710)	(-1.682)	(-5.256)
Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	38,218	38,218	38,218	38,218	38,218	38,218	38,218	38,218	38,218	38,218	38,218	38,218
F	325.6***	281.9***	33.7***	325.5***	278.4***	37.6***	330***	31***	30.8***	324.3***	30.4***	31***
R^2	0.078	0.068	0.055	0.078	0.067	0.053	0.079	0.067	0.053	0.078	0.066	0.055
Adjusted R^2	-0.017	-0.028	0.055	-0.017	-0.028	0.053	-0.016	0.067	0.053	-0.017	0.066	0.054

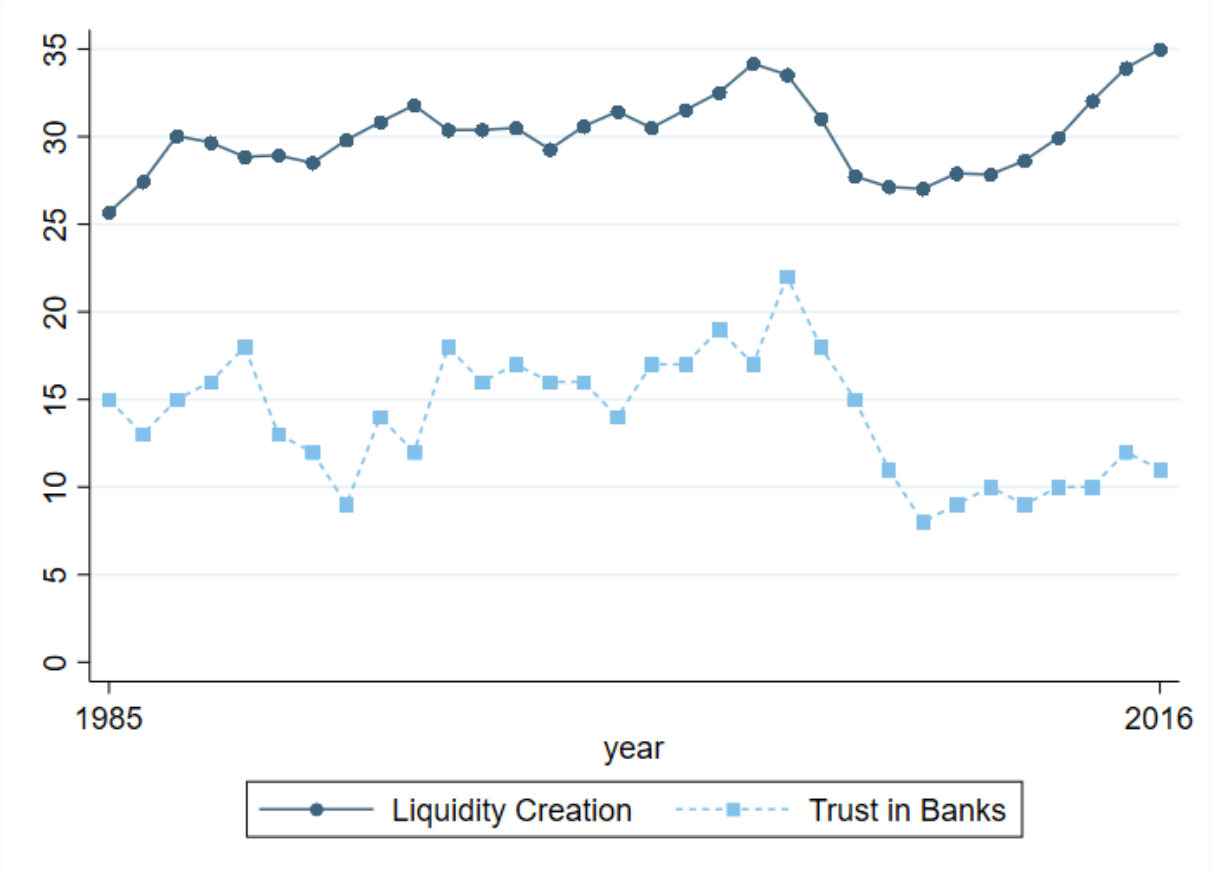
Table 8 –Instrumental Variables

Instrumental-Variable Panel FE regressions. The dependent variable is stated at the top of each model. *Trust in* Banks is the instrumented variable. Instruments are *Electoral Turnout* and *Trust in Congress.* The t-statistic level is reported in parentheses. *, **, and *** denote an estimate significantly different from 0 at the 10%, 5%, and 1% level, respectively. Appendix A gives the definition of the variables.

	First Stage	**Instrumented Regression**		
	(1)	(2)	(3)	(4)
	Trust in Banks	LC/GTA	LC_BS/GTA	LC_OFF/GTA
Electoral Turnout	-0.003***			
	(-2.906)			
Trust in Congress	0.657***			
	(112.324)			
Trust in Banks$_t$		0.166***	0.171***	0.009
		(-4.935)	(-5.771)	(0.804)
Log(GTA)$_{t-1}$	0.032	5.526***	3.674***	2.033***
	(0.555)	(25.156)	(19.023)	(42.952)
Equity / GTA $_{t-1}$	8.186***	-35.260***	-40.095***	4.562***
	(12.727)	(-14.397)	(-18.622)	(5.578)
Z-Score $_{t-1}$	0.000	-0.000	-0.000	-0.000
	(0.016)	(-0.911)	(-0.791)	(-1.360)
GDP Growth$_t$	0.695***	-0.065*	0.043	-0.106***
	(89.070)	(-1.759)	(1.329)	(-8.252)
Market Capitalization$_t$	0.000***	0.000***	0.000***	0.000***
	(20.647)	(21.640)	(21.374)	(6.942)
Inflation Rate$_t$	0.071***	0.029	0.033	-0.010
	(5.545)	(0.605)	(0.778)	(-0.586)
Unemployment Rate$_t$	-1.198***	-0.686***	-0.462***	-0.224***
	(-116.973)	(-11.148)	(-8.536)	(-10.378)
HHI$_t$	-0.002***	-0.003***	-0.003***	0.000***
	(-68.853)	(-20.348)	(-24.886)	(5.257)
Constant	13.122***	-27.654***	-11.883***	-17.730***
	(19.384)	(-10.497)	(-5.131)	(-28.306)
Quarter Fixed Effect	Yes	Yes	Yes	Yes
Bank Fixed Effect	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		0.495	0.478	0.511

Figure 1 – Variation of Liquidity Creation and Trust in Banks

This graph plots the average annual liquidity creation (LC/GTA) and the annual trust in banks, over the 1985-2016 period. Appendix A gives the definition of the variables.



Appendix A – Variables and Definitions

The table below provides the description of the variables employed throughout the study.

Variable Name	Description	Source
Dependent variables		
LC/GTA	The cat fat measure in Berger and Bouwman (2009) divided by GTA.	Christia Bouwman
LC_BS/GTA	The on-balance-sheet part of the cat fat measure divided by GTA.	Christia Bouwman
LC_OFF/GTA	The off-balance-sheet part of the cat fat measure divided by GTA.	Christia Bouwman
Independent variables		
Trust in Banks	% of people who responds: "Great deal" to the question "Please tell me how much confidence you, yourself, have in banks"	Gallup
Log(GTA)	Natural Logarithm of GTA.	FR Y-9C, Call Reports
Equity / GTA	Total equity capital as a proportion of GTA. (source: FR Y-9C, Call Reports)	FR Y-9C, Call Reports
Z-Score	A bank's return on assets plus the equity capital/GTA ratio divided by the standard deviation of the return on assets. (source: FR Y-9C, Call Reports)	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
HHI	HHI calculated with each bank's loans by quarter and by State. (source: FR Y-9C, Call Reports)	FR Y-9C, Call Reports
Robustness variables		
Bank Failure Rate	Bank failure rate at a State level and by year.	FDIC
Bank 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 Scandal. Reported in thousands.	Luigi Guiso
Electoral Turnout	% of people voting during the last election	Electproject
Trust in Congress	% of people who responds: "Great deal" to the question "Please tell me how much confidence you, yourself, have in Congress"	Gallup
Splitting variables		
Supervised	1 if the bank is supervised by the FED; 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 and Large) equal to 1 if bank has its gross total asset (GTA) respectively up to $1 billion, between $1 and $3 billion and exceeding $3 billion; 0 otherwise.	Berger and Bouwman (2009)