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Working Paper

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Staff Report, No. 760

Provided in Cooperation with:
Federal Reserve Bank of New York

Suggested Citation: Choi, Dong Beom; Velasquez, Ulysses (2016) : Hidden cost of better bank services: Carefree depositors in riskier banks?, Staff Report, No. 760, Federal Reserve Bank of New York, New York, NY

This Version is available at:
<https://hdl.handle.net/10419/130629>

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Federal Reserve Bank of New York
Staff Reports

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JEL classification: G20, G21

Abstract

Better customer service provisions by banks—such as more branches and ATMs, longer business hours, and more personalized services—help attract more core deposits and increase funding stickiness by raising depositors' switching costs and enhancing their loyalty. Funding stickiness from depositor loyalty, however, could impair market discipline and lead to excessive risk taking or lax lending standards in banks. We find that, compared to banks that spend less on customer services, banks providing better services attract more core deposits, pay less for their funding, and are exposed to lower funding outflow risks. At the same time, these banks have worse loan quality and lower Z-scores. We argue that this contradictory finding of low asset quality and low funding cost stems from the lack of risk monitoring by carefree depositors, which exacerbates agency problems; funding cost is less sensitive to the risk characteristics of banks providing better services.

Key words: bank liability, funding cost, liquidity risk, risk taking, market discipline

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1. Introduction

Certain banks are better than others at providing “services” to depositors; for instance, they may have longer business hours, hire more employees, or have a more expansive branch network with a higher density of ATMs. Like in other industries, these services help attract new customers and retain current ones by bolstering customer loyalty. However, unlike other industries, bank depositors are not just buyers of services or products; they are also lenders to banks. Customers may very well choose their bank based on the satisfactory services that it provides, but in doing so, they could relatively overlook the importance of its financial soundness. This kind of oversight might lead to lax market discipline, thus inducing banks to take excessive risk. In this paper, we study the bright and dark sides of bank services, analyzing whether a bank’s service quality is associated with its (i) funding structure, (ii) funding cost and liquidity risk, and (iii) asset quality and soundness, which is novel in the banking literature.

[Figure 1 here]

Core deposits, sourced from customers in the bank’s local market, are the primary funding source for banks. Core deposits represent 70% of total liabilities for small “community” banks (below \$1 billion in assets), though they represent a relatively smaller share for larger banks with easier access to wholesale market funding (see Figure 1). Raised from a bank’s traditional and regular customer base, they are considered cheaper in terms of funding costs (Berlin and Mester 1999, DeYoung and Rice 2004), and are more stable (“sticky”) in terms of funding outflow risks (Flannery and James 1984, Cornett, McNutt, Strahan, and Tehranian 2011). Banks could thus lower their funding cost and liquidity risk by acquiring more core deposits, which would allow them to direct more funds to lending and promote profits.

Since core deposits mainly reflect transactional or storage purposes of depositors, they have lower interest rate-elasticity than other funding sources such as large time deposits or short-term wholesale funding (Amel and Hannan 1999). Moreover, core depositors also value various non-pecuniary “quality” benefits (Flannery 1982, Kiser 2002a, Berger and Dick 2007, Dick 2007, 2008). As such, it would be very costly for banks on the margin to raise the interest rates

offered to attract more core deposits from their local markets, so instead, a bank would opt to provide better “services” (Harvey and Spong 2001). These services may include conveniently located branches, a large ATM network, and any other services or added convenience that would allow the bank to better appeal to its customer base,¹ which would also make the switching costs of depositors higher (Kiser 2002b, DeYoung and Hunter 2003).² These non-pecuniary benefits would be implemented by incurring higher operating costs, and as a result, a bank might need to substitute lower interest expenses with higher non-interest expenses in the pursuit of more core deposits.

[Figure 2 here]

This “bright” side of better bank services clearly shows up in the data. We measure the “quality” of bank services from regulatory Call report forms, using a relevant subset of non-interest expenses normalized by total assets.³ The idea is to capture the “intensity” of services per dollar of assets. Examining how this variable associates with other bank characteristics cross-sectionally, Figure 2 indicates that a bank with better service quality attracts more core deposits, pays less for its funding, and holds fewer liquid assets. Surprisingly, however, its asset quality (measured by non-performing loans or net charge offs) is lower while its asset yield is higher, indicating increased asset risk-taking or lax lending standards. It also tends to hold less capital.

At first glance, this relationship is puzzling since funding cost is usually higher for riskier banks with fewer liquid assets, worse quality loans, or higher leverage—there is thus something missing with the risk evaluation of these banks. The banking literature suggests that there are fair reasons for banks to be exposed to the funding outflow risks.⁴ Following the theoretical argument, our hypothesis is that there is lax market discipline (risk monitoring) imposed on these

¹ For instance, a bilingual employee could help broaden the customer base in certain areas.

² FDIC Risk Management Manual (FDIC 2015) suggests that “Convenient branch locations, superior customer service, extensive ATM networks, and low or no fee accounts are factors that contribute to the stability of the deposits.”

³ Main components of our non-interest expense measure are salaries, expenses of premises and fixed assets, along with other operating expenses, which include, among others, corporate overhead, information technology and data processing fees, and advertising/marketing expenses. See Section 3.

⁴ See Calomiris and Kahn (1991), and Diamond and Rajan (2001) for the theoretical discussion on the relationship between funding liquidity risk and the discipline effect.

high service-quality banks. This could arise through two channels. First, as a bank acquires more core deposits, a larger fraction of its borrowed funds gets protected by deposit insurance, which impairs overall creditor surveillance imposed on the bank⁵ (funding composition effect); and second, even within core-depositors, there could be less surveillance due to customer satisfaction arising from the non-pecuniary benefits of better bank services, which could make depositors less likely to switch banks (increasing funding stickiness). In sum, our conjecture is that banks with better service quality could benefit from more access to core deposits, as well as from enhanced loyalty of the existing core deposits, which would lower their funding cost and liquidity risks. However, this could also lead to less creditor surveillance (e.g., through less sensitive risk pricing) and thus less market discipline, which would exacerbate the agency problem and impair financial stability.

We conduct our empirical analysis using quarterly panel data from Call Reports between 1995 and 2014. On top of the basic bank controls, we also include time and state (or MSA) fixed effects, or state (MSA)-time fixed effects, where the former is used to control time-invariant local market characteristics and macroeconomic factors, and the latter is used to control any local characteristics that could affect our results, such as local competition and demand factors. Furthermore, we limit our sample to similarly sized “community” banks that are likely to operate in a single state (or MSA), in an attempt to alleviate any confounding problems.⁶ Thus, our identification is based on the comparison of small local banks within the same local market (i.e., state/MSA) in a certain time period. We find that banks providing better quality service do have higher core deposit ratios (to total assets) and lower funding costs. Interestingly, they also pay lower interest rates for core deposits as well, even though they attract more of them. This is clear evidence of non-pecuniary benefits being appreciated by core depositors, if the supply of core deposits is upward sloping.

We then test whether banks that provide better services are exposed to lower funding liquidity risks. Our analysis suggests that they hold fewer liquid assets and allocate more funds to lending, reflecting lower ex-ante perceived funding outflow risk. This is also the case when we control for

⁵ See Billett, Garfinkel, and O’Neal (1998), and Ioannidou and Penas (2010) for the empirical evidence.

⁶ We also control for bank business models using loan composition variables.

the level of core deposit ratios. We interpret this result as evidence of incremental core deposit “stickiness” when providing better services. We also find that the core deposit growth rates of better-service-banks fluctuate less. We further test how service quality affects the bank lending channel of monetary policy. Kashyap and Stein (2000) argue that monetary tightening drains bank deposits, and thus bank lending decreases if a bank is unable to substitute the deposit loss. Augmenting their argument, our conjecture is that lending of better-service-banks would be less sensitive to a monetary tightening, since their funding is stickier and less sensitive to interest rate changes. Again, two channels could contribute to this heterogeneous lending response: (i) more reliance on core deposits (extensive margin), which are relatively insensitive to monetary tightening (Black, Hancock, and Passmore 2007 on lending channel, Hannan and Berger 1991 on upward price stickiness), and (ii) core depositors themselves become more “loyal” and sticky (intensive margin). We document that better-service banks could mitigate the bank lending channel of monetary policy, and their core-deposit volumes are indeed less affected by the changes in the monetary policy stance.

Examining the relationship between service quality and asset quality (or financial soundness of a bank), we find that better-service banks have lower quality loans and higher loan yields. Namely, these banks have more non-performing loans, higher net-charge offs, larger loan loss provisions, and lower Z-score and ROA. The higher loan yield, coupled with these poor performance metrics, indicate that high service-quality banks take more risks relative to their low service-quality counterparts. We find that this loan-quality deterioration effect, in response to the service quality, is mitigated when a bank holds more capital, indicating a possibility of the agency problem (Park and Peristiani 2007). We then examine the risk pricing of bank liabilities and how its sensitivity to bank risk characteristics varies when a bank provides better services. We document that, with more service provisions, funding cost becomes less sensitive to underlying risks, for not only the total liability funding cost, but also the core deposit interest rate. Since core deposits are mostly insured, our result from the core deposit interest rate already accounts for the deposit insurance effect and suggests that depositors could become less attentive to bank risk taking, purely through the non-pecuniary benefits of service provision. We thus conclude that risks have not been accurately priced by these creditors and less surveillance has been imposed, which leads to more risk-taking and less stability.

Note that our analysis considers neither the optimal level of service provision for a bank nor any causality; rather, our modest goal is to assess the cross-sectional associations of certain variables that we should observe in equilibrium when taking the service quality of the banks as given, so as to examine novel theoretical predictions unstudied previously. Furthermore, the possibility of reverse causality would not impair our main argument; it could be the case that worse performing banks try to provide more services to improve funding acquisition, but this still implicitly indicates that a bank could mitigate market surveillance through better service provision. Nonetheless, we try to mitigate this endogeneity problem by using alternative measures, or comparing banks operating in markets with different demographic (age) characteristics.

The importance of stable funding has been widely emphasized after the financial crisis (e.g. Net Stable Funding Ratio of Basel III). One of the policy implications of our result is that there might be an undesirable side effect of stable funding. Calomiris and Kahn (1991), and Diamond and Rajan (2001) argue that funding liquidity risk is a necessary device for disciplining bank managers. Our analysis suggests that better service provisions could lower funding liquidity risks, which could impair the asset quality via lax discipline. We also find that this is less of a problem for better capitalized banks, thus suggesting that liquidity regulation should be imposed jointly with capital regulation to mitigate the agency problem.

This paper is related to several strands of literature. Our paper focuses on the role of core deposits; what factors affect their supply; and how they affect bank performance through various channels. Flannery (1982), Dick (2007, 2008), and Kiser (2002a, b) study the effect of location and service quality on the customers' choice of banks. Kiser (2002b), and Kim, Klinger, and Vale (2003) document the effect of service provisions on the customers' switching cost. Acharya and Mora (2015), and Egan, Hortascu, and Matvos (2015) study the substitution between core and non-core funding during times of bank stress. Focusing on lending, Berlin and Mester (1999) document that banks provide more rate smoothing for their loans when using more core deposits, and Black, Hancock, and Passmore (2007) study how reliance on core deposits affects the bank lending channel of monetary policy. We also study bank liquidity risk management, particularly

relating to the funding structure. Cornett, McNutt, Strahan, and Tehranian (2011) show that banks that relied more on core deposits were less affected by the financial crisis in 2007 – 09. Strahan and Loutskina (2009), and Loutskina (2011) study how changes in asset liquidity affect bank behavior.

Our paper is also related to the literature on market discipline and its relation to bank funding structure. Calomiris and Kahn (1991), and Diamond and Rajan (2001) discuss the importance of funding liquidity risks for disciplining bank managers. Billett, Garfinkel, and O’Neal (1998), Demirgüç-Kunt and Huizinga (2004), Ioannidou and Penas (2010), and Karas, Pyle and Schoors (2013) study how deposit insurance affects market discipline. Other papers on depositor discipline include Park and Peristiani (1998), Goldberg and Hudgins (2002), Martinez Peria and Schmukler (2001).

The remainder of this paper is organized as follows. Section 2 presents the theoretical framework and develops hypotheses. Section 3 discusses our data. Section 4 discusses our empirical results. Section 5 discusses robustness of our results and Section 6 concludes.

2. Economic argument and hypotheses

2.1. The Bright side: service quality, funding cost, and liquidity risks

Bank funding can typically be divided into two sources, core deposits and non-core funding. Core deposits, collected from the local geographic market, reflect transactional or storage purposes of depositors. Non-core funding includes large time deposits, as well as other wholesale funding. Core deposits are the primary source of funding for banks, especially for small banks that have limited access to wholesale funding markets. Figure 1 describes the liability structure of large (50 billion ~), medium (1 billion ~ 50 billion), and small banks (less than 1 billion).

Core deposits have several advantages compared to non-core funding. They represent funding from a bank’s traditional and regular customer base, and as such, are considered to be more stable (i.e. lower funding liquidity risks) funding sources. Acquiring more core deposits implies more loyalty from customers, and a higher share of core deposits makes the bank funding less sensitive to interest rate changes. Its funding cost is also lower than other funding sources, as the

primary purpose of the core depositor is to have access to financial services rather than to seek for yield, so the supply of core deposits is less elastic to price changes. Thus, banks with more core deposit access could lower their funding cost as well as liquidity risks, which would enable them to allocate more funds to profitable lending opportunities.

As the interest rate elasticity of core deposit supply is low, and liquidity and payment “services” are one of the primary factors in a depositor’s choice of bank, a bank could more efficiently attract core deposits on the margin by providing better services rather than offering higher interest rates relative to local market competitors.⁷ Services may include expansive branch networks, more ATMs, longer business hours, or more employees, all of which provide non-pecuniary benefits that core depositors appreciate (Harvey and Spong 2001, Dick 2007, 2008, Kiser 2002a). These non-pecuniary benefits are implemented by incurring higher operating costs, potentially making banks trade lower interest expenses for higher non-interest expenses.

Prediction 1. A better-service bank acquires more core deposits compared to its counterparts in the local market.

Prediction 2. A better-service bank (a) faces lower funding cost and (b) pays lower interest to its (core) depositors compared to its counterparts in the local market, also (c) pays less to its (core) depositors compared to its wholesale creditors

Note that funding cost could become lower through two channels, when offering more services: (i) by acquiring more (cheaper) core deposits (extensive margin); (ii) by offering non-pecuniary benefits to the existing (core) depositors (intensive margin). Unlike Prediction 2 (a) which doesn’t separate the two, Prediction 2 (b) tries to isolate the second channel by explicitly focusing on the funding cost that is independent of compositional effects and deposit insurance subsidy effects.⁸ Prediction 2 (c) directly examines the cost saving driven by the service provision, assuming that wholesale creditors charge accurate costs reflecting underlying risks of a bank.

⁷ This is particularly the case since price discrimination among depositors is limited due to the very short maturity; for an acquisition of marginal deposits, a bank also needs to offer higher rates to other incumbent depositors instead of paying more only to the additional depositor.

⁸ We implicitly assume here that all core deposits are insured.

Better-quality service could also affect the funding liquidity (outflow) risks if it increases depositors' switching costs and makes them less willing to withdraw their funding. Again, overall bank funding could become "stickier" through two channels: (i) more acquisition of core deposits, which are considered to be stickier than non-core funding (Flannery and James 1984) and (ii) core deposits themselves become stickier due to better services. This lower funding liquidity risk would result in (core) deposits fluctuating less and would allow banks to hold fewer liquid assets and assign more funds to lending.

Prediction 3. A better-service-bank is exposed to lower funding liquidity risk compared to its counterparts in the local market.

If better services make bank funding stickier, this could also mitigate the impact of monetary policy on bank lending. Monetary tightening decreases the amount of (core) deposits in the banking sector, and banks would need to reduce their lending unless they attract alternative funding sources or consume liquid assets (Kashyap and Stein 2000). A bank providing better services could increase its deposit stickiness and retain more funding during monetary tightening. Thus, their lending would be less affected.

Prediction 4. A better-service-bank could better mitigate the monetary policy impact on its lending than its counterparts in the local market.

3.2. The dark side: service quality, bank risks, and missing market discipline

We now discuss the dark side of better bank services, focusing on how service quality could relate to lending quality and bank soundness. Univariate analysis in Figure 2 indicates a positive cross-sectional relationship between the proxy of service quality and the asset yield (interest income divided by interest earning assets). Higher asset yields could imply better asset performance, but it could simply come from more risk taking. Economically, both explanations are plausible; there could be a synergy between asset side management and services on the liability side (more employees help screen and monitor loans, and more branches with geographic proximity provide better information), so a positive association between asset

performance and service quality could arise, reflecting better asset management.⁹ But better services could also lead to laxer market discipline and more risk taking if the agency problem prevails. Again, there are two possible channels contributing to attenuated creditor surveillance and a pronounced agency problem: (i) more core deposit acquisition implies more deposit insurance protection, impairing overall surveillance (Billett, Garfinkel, and O’Neal 1998, Ioannidou and Penas 2010, Karas, Pyle and Schoors 2013); and (ii) even putting aside the incremental deposit insurance coverage, stable bank funding and lower liquidity risks result in less market discipline (Calomiris and Kahn 1991, Diamond and Rajan 2001). The first channel comes from the changes in liability composition, while the second comes from the enhanced funding stickiness within liability classes.

In this paper, we focus on the agency problem and claim that better service quality is associated with more risk taking. We empirically verify that this is the case. If banks with better service quality have worse quality loans, then this would undermine the better-asset-management argument. Therefore, our hypothesis is as follow.

Prediction 5. A better-service-bank takes more asset risks or adopts lax lending standards, i.e. has higher asset yields, but worse loan performance and lower *Z*-score. This relationship would be weaker if a bank is better capitalized.

We then analyze the underlying mechanism driving these relationships. In particular, we look for evidence of decreased overall surveillance by creditors, which could contribute to the excessive risk taking in the context of lax market discipline.¹⁰ If the creditors provided proper monitoring, underlying risks would be correctly incorporated into the funding costs and we would expect to observe fewer agency problems due to market discipline. We examine if risk pricing becomes less sensitive to changes in bank risk characteristics when banks provide better quality services. Prediction 2 focuses on whether service provision changes the *level* of funding cost, while we

⁹ Alternatively, better service provision lowers the funding cost, which could help in alleviating the risk shifting problem and improve lending quality. This would be the case if the efficiency (intensity) of overall (average) creditor surveillance on a bank is fixed, while we argue that this overall surveillance could be decreased in response to the service provision.

¹⁰ Here, we only examine the surveillance aspect using risk pricing. See Bliss and Flannery (2002), and Kishan and Opiela (2012) for the discussion on the distinction between risk pricing (surveillance) and influencing (disciplining).

now claim that it also affects the *sensitivity* of this cost in response to the changes in bank risk characteristics (*soundness*).

Prediction 6. Funding cost of a better-service-bank is less sensitive to its risk characteristics compared to its counterparts.

As previously discussed, aggregate funding cost can't differentiate between the effect of enhanced funding stickiness (i.e., depositor loyalty) from that of more deposit insurance protection; risk pricing sensitivity could change simply by the changes in funding composition. For instance, the sensitivity could become lower because a bank switches from uninsured deposits to insured deposits, irrespective of whether there is a change in surveillance intensity within liability classes. We could mitigate this concern by analyzing the risk pricing for (insured) core deposits, which would be mostly driven by the heterogeneous depositor loyalties among banks with different service qualities – whether core depositors become less sensitive to bank risk-taking when provided better services.¹¹

3. Data

We retrieve quarterly bank-level characteristics from the Federal Reserve's Consolidated Reports of Condition and Income (henceforth, Call reports) from 1995 Q1 to 2014 Q4. Call reports include balance sheet and income statement data on a quarterly basis for all U.S. commercial banks, which allow us to form a bank-quarter panel dataset. We also retrieve demographic variables from the Census annual population estimate, and relevant macroeconomic variables, such as GDP and the federal funds rate data from the U.S. Bureau of Economic Analysis, Organization for Economic Co-operation and Development, and from the Board of Governors of the Federal Reserve System. We cut our panel pre-1995 to mitigate effects stemming from regulatory changes regarding interstate banking. Moreover, to ensure robustness to outliers, we eliminate all entities that are non-banks, defined as entities whose mean share of deposits or

¹¹ There could also be an effect from the compositional change within the core depositors. Suppose that there are two types of core depositors, A and B. Type A depositors relatively care more about the services than the bank soundness compared to Type B. When offering more services, a bank could tilt their core deposit acquisition to Type A from Type B, which could lower the overall surveillance from the core depositors.

loans, as a percentage of total assets, is less than fifty percent over the time series. Along these same lines, non-interest expense ratio observations are trimmed each quarter at the 0.5% level. Sample is further trimmed by removing extreme outliers (0.5% level of entire time series) of several bank characteristics in Table 1.

Since our focus is on service quality and its effect on traditional banking activity, and since we attempt to compare otherwise similar banks within a local market, we keep only community banks (below 1 billion) whose main source of funding is local core deposits and who are likely to operate within a single state (or MSA).¹² We exclude all bank-quarter observations in which assets fall below 250 million, to mitigate issues caused by a scale economy in operating expenses (Kovner et al. 2014). We also drop all bank-quarter observations that have a quarterly asset growth rate of greater than 10% (M&A effect), and the final bank-quarter observation for banks that do not survive for the entirety of the time series (bank failure). After applying these filters, the entire sample consists of 72,219 bank-quarters.

We measure the bank-level service quality (“*ServiceQuality*”) from Call Reports using the amount of relevant non-interest expenses divided by total assets. Our choice of non-interest expenses includes expenses due to salaries (e.g. reflecting the number and quality of employees, RIAD4135), premises and fixed asset expenses (e.g. reflecting branch network, etc. RIAD4217), and “other” noninterest expenses (RIAD 4092).¹³ We capture the service “intensity” by normalizing by total assets, which is our preferred measure of the service quality of a bank. Figure 3 presents the decomposition of noninterest expenses based on the aggregate amount across our sample banks; salaries account for 53.5%; premises and fixed assets expenses for 13.8%, and “other” expenses for 32.7% of total non-interest expenses. We also define core deposits as total deposits net of large time deposits (>100K) as in Berlin and Mester (1999); thorough descriptions of variable constructions can be found in the Data Appendix. Table 1 presents summary statistics for the bank-specific variables used in our empirical analysis.

[Table 1 here]

¹² We found similar empirical results when including larger banks and using FR Y-9C holding company data.

¹³ This category includes, for instance, data processing expenses, advertising expenses, postage, and ATM expenses. See Section 5 for more discussion and alternative measures of service quality.

4. Empirical results

4.1. Service quality and bank funding

We first examine the relationship between service quality and (i) core deposit ratio which is defined as core deposits divided by total assets, as well as (ii) funding cost. Our hypothesis is that banks with better service quality raise more core deposits compared to their counterparts in the local market, and have a lower cost of funding (Prediction 1 and 2). To be concrete, we run the following panel regressions for bank i in state s at time t :

$$CoreDepositRatio_{ist} = \alpha_s + \delta_t + \beta ServiceQuality_{ist-1} + \gamma X_{ist-1} + \varepsilon_{ist} \quad (1)$$

$$FundingCost_{ist} = \alpha_s + \delta_t + \beta ServiceQuality_{ist-1} + \gamma X_{ist-1} + \varepsilon_{ist} \quad (2)$$

where X_{ist-1} is relevant bank controls, and α_s and δ_t are state and time fixed effects, respectively. We lagged control variables to mitigate the simultaneity problem, and standard errors are clustered on entity.

Our regression result would be biased if there are omitted confounding variables. For instance, heterogeneity among the banking markets could induce a statistically significant relationship between the service related expenses and the funding costs; banks in more competitive markets might need to provide better services while their funding costs are higher compared to those in less competitive markets. Heterogeneity in borrowing demand between different local markets could also make these variables correlated. In order to mitigate these problems, we include state or state-time fixed effects.¹⁴ Since we restrict our samples to small “community” banks that are likely to operate in a single state, our analysis in this case thus compares similarly sized banks within a local market (same state) at a certain point in time. We further add relevant bank variables to control different business models (e.g. C&I loan ratio, real estate loan ratio, and bank size). This comparison of relatively homogeneous local banks within a local market would

¹⁴ We do not include bank fixed effects since our focus is on the cross-bank comparison within a market.

help us mitigate any effects from heterogeneous and time varying local market characteristics or demand.

We analyze three different funding costs: (i) total liability interest rate focusing on the funding cost of a bank as a whole (using total interest expenses divided by total liabilities), (ii) deposit interest rate specifically focusing on the deposit funding cost (using total interest expenses on deposits divided by total deposits), and (iii) core deposit interest rate (excluding large time deposits from total deposits), to exclusively focus on the price paid to the core depositors (presumably protected by the FDIC). We expect $\beta > 0$ in regression (1), and $\beta < 0$ in regression (2). Recall that there could be two channels driving the lower cost: (i) acquisition of more (cheap) core deposits (funding composition effect, substitution between core deposit and non-core funding); (ii) provision of additional non-pecuniary benefits are appreciated by core depositors, making them willing to accept a lower interest rate. A negative β for the core deposit rate implies the second channel is operative, independent of the funding composition effect.¹⁵

Table 2 reports the estimation results of Regression (1). Service quality is positively associated with the core deposit ratio with a 1% significance level, which corresponds to our hypothesis that a bank providing better services acquires more core deposits. This is still the case even after controlling for a bank's business model (share of C&I loans and real estate loans out of total loans), interest rates offered to depositors, and time varying local factors using state*quarter fixed effects.

[Table 2 here]

We then examine the relationship between service quality and funding costs. Table 3 presents our estimation results for three different funding costs: total liability interest rate (Panel A), deposit interest rate (Panel B), and core deposit interest rate (Panel C). All three funding costs are negatively correlated with service quality with a 1% significance level, even after controlling for bank characteristics that affect the borrowing cost, such as size, capital, liquidity, and loan performance variables. Surprisingly, even the core deposit interest rate is negatively correlated

¹⁵ If the fraction of core deposits protected by FDIC is the same, this regression could control any cost reduction effect through the expanded deposit insurance coverage. In our argument, we implicitly assume that most of the core deposits are insured.

with service quality; better-service banks pay less to their (core) depositors while attracting more of them as previously shown in Table 2. This supports our hypothesis that the (core) depositors appreciate non-pecuniary benefits and become willing to accept a lower interest rate. In Panel D, we further examine the cost differential between market funding (large CDs in this case) and (core) deposit funding that a bank faces. Our prediction is that this would be positively associated with service quality—if the cost of market funding correctly captures the underlying risks of a bank and is independent of the service quality, larger deviation between the two costs would imply additional cost savings for a bank when borrowing from its core depositors. We could observe a significant discount in all specifications of Panel D for better-service-quality banks.

[Table 3 here]

4.2. Service quality and liquidity risk

We next analyze how service quality affects bank liquidity risk (Prediction 3). We first examine its effect on funding risks in banks by looking at the liquid asset holdings, which focuses on the *ex-ante* perception of funding liquidity outflow risks. We thus test the following:

$$LiquidAssetRatio_{ist} = \alpha_s + \delta_t + \beta ServiceQuality_{ist-1} + \gamma X_{ist-1} + \varepsilon_{ist} \quad (3)$$

where *LiquidAssetRatio* is the ratio of liquid assets (cash, reverse repo and fed funds lending, and securities) to total assets. We expect β to be negative, implying banks decide to hold fewer liquid assets due to lower funding liquidity risks, stemming from the provision of better services. We also test a specification controlling for the core deposit ratio, to test whether the second channel discussed in Section 3.1 is operative. We therefore examine whether banks with better service quality hold fewer liquid assets in their book even when they have the same core deposit ratios, to exclusively analyze stickiness within the core deposit category. The panel regression results are reported in Table 4. As anticipated, banks with better service quality hold significantly less liquid assets in all specifications, even when controlling for the core deposit ratio. Again, this indicates the existence of two potential channels for lower funding liquidity risks: (i) more reliance on core deposits that is a relatively stickier funding source, and (ii) core deposits

themselves become stickier as depositors are less willing to switch banks due to the better service quality.

[Table 4 here]

Note that our Regression (3) tests how banks *perceive* a potential liquidity shock (*ex ante* sense) by looking at their choices of liquidity cushion on the asset side. We now test how service quality affects the *ex post* responses of banks to liquidity shocks. We specifically analyze how service quality affects the bank lending channel of monetary policy. The bank lending channel is operative if a bank loses its deposits in response to a monetary tightening and cannot replace the lost funds, forcing it to reduce lending. As in Prediction 4, a bank with better service quality could mitigate the impact of monetary policy on its lending if its funds are stickier.

We implement the following two-step regression based on Kashyap and Stein (2000). In the first step, we estimate β_t for each period from the following regression:

$$\Delta \log(L_{ist}) = \sum_{j=1}^4 \gamma_j \Delta \log(L_{ist-j}) + \alpha_s + \beta_t \text{ServiceQuality}_{ist-1} + \varepsilon_{ist} \quad (4)$$

where α_s is the state-fixed effect. This gives us a time series of $\{\beta_t\}$. We then estimate the following:

$$\beta_t = \alpha + \sum_{j=1}^4 \mu_j \Delta FF_{t-j} + \delta \text{Time}_t + u_t \quad (5)$$

where FF_t is the federal funds rate, and Time_t is the time trend. In an alternative specification, we also include 4 lags of changes in real GDP as a macroeconomic control. We expect $\sum_{j=1}^4 \mu_j > 0$, which indicates a bank providing better services could lend more compared to its counterparts in the same state during monetary tightening.

In an alternative specification, we also control for certain banks characteristics in the first stage regression (4), including the liquid asset ratio, asset size, and core deposit ratio. It is widely documented that banks that hold more liquid assets (Kashyan and Stein 2000, Gambacorta 2005) or are larger (better access to alternative funding sources, Kashyap and Stein 1995, 2000,

Kishan and Opiela 2000), are less affected by a monetary policy tightening. Regarding core deposit reliance, ex ante, it is not clear how this would affect the lending channel; core deposits are considered to be a stable and sticky funding source (Cornett, McNutt, Strahan, and Tehranian 2011), so a higher ratio implies a weaker lending channel (Berlin and Mester 1999, Black, Hancock, and Passmore 2007). At the same time, the observed ratio could be capturing the accessibility to the wholesale funding market, whereby a bank might have a high ratio since it was not able to raise more wholesale funding (Choi and Choi 2015). This latter case would suggest a stronger lending channel. In addition, core deposit rates are upward sticky in response to policy rate changes (Hannan and Allen 1991), so this price rigidity would make the lending channel weaker. In any case, we attempt to compare banks with different service quality aside from these additional effects, by controlling for the core deposit ratio.

In addition to the continuous measure of service quality based on the non-interest expense to asset ratio, we also estimate the same specification using the discrete measure. In each quarter, we divide banks into two subgroups; $ServiceQuality_{ist} = 1$ if bank i 's non-interest expense to asset ratio is beyond the median among all the sample banks, and 0 otherwise.

Table 5 reports the regression analysis of the lending channel. We limit our samples prior to the Great Recession ($< 2007:Q3$) to exclude any crisis related factors and periods with no target rate variation. Signs for the sum of μ_j are positive and significant for the total loan growth and real estate loan growth, as anticipated. However, we don't find significant results for C&I loan growth. This could be due to the fact that we only analyze small community banks whose main focus is on real estate lending, so C&I lending accounts for only a small fraction of their total lending. Table 1 indicates that for our sample, the median of real estate loan to total loan ratio is 75% while that of C&I loan to total loan ratio is only 14%.

[Table 5 here]

We now test whether core deposits of better-service-banks fluctuate less compared to their counterparts. We first examine the fluctuations of core deposits in response to monetary policy regimes:

$$\begin{aligned} \Delta \log(\text{CoreDeposit}_{ist}) = & \alpha_s + \sum_{j=0}^4 \mu_j \Delta FF_{t-j} + \beta \text{ServiceQuality}_{ist-1} \\ & + \sum_{j=0}^4 \lambda_j (\text{ServiceQuality}_{ist-1} * \Delta FF_{t-j}) + \varepsilon_{ist} \end{aligned} \quad (6)$$

where α_s is a state or bank fixed effect. We would expect positive $\sum_{j=0}^4 \mu_j$ and negative $\sum_{j=0}^4 \lambda_j$, which implies that better-service-quality banks could mitigate the (core) deposit outflows during monetary tightening. We further compare the core deposit volatilities across banks following the method of Morgan, Rime, and Strahan (2004). Specifically, we estimate

$$\text{Fluctuation}_{ist} = \alpha_s + \delta_t + \beta \text{ServiceQuality}_{ist-1} + \varepsilon_{ist} \quad (7)$$

where Fluctuation_{ist} is from the residual of the first stage estimation:

$$\Delta \log(\text{CoreDeposit}_{ist}) = \alpha'_s + \delta'_t + v_{ist}$$

which gives

$$\text{Fluctuation}_{ist} = |v_{ist}|.$$

Here α_s, α'_s are state (or bank) fixed effects and δ_t, δ'_t are time fixed effects. We expect $\beta < 0$ in (7).

Table 6 presents the estimation results using the continuous and discrete measures of service quality as in Table 5. Panel A presents the results for (6); the sum of interaction terms $\sum_{j=0}^4 \mu_j$ is positive and significant in all the specification except column 1 based on the continuous *ServiceQuality* measure with state fixed effects. Panel B presents the result for (7); signs are as anticipated in all specifications such that core deposits fluctuate less for banks with higher *ServiceQuality*, although the coefficient is significant only when using the continuous *ServiceQuality* measure along with the bank fixed effects (specification (2)), and the discrete *ServiceQuality* measure based on the cross-sectional median and the state fixed effects (specification (3)).

4.3. Service quality and lending quality

We next examine Prediction 5, the relationship between service quality and asset-side risk-taking (loan quality). Specifically, we test whether β_1 in the following specifications are positive:

$$\begin{aligned}
AssetInterestRate_{ist} &= \alpha_s + \delta_t + \beta_1 ServiceQuality_{ist-1} \\
&\quad + \beta_2 ServiceQuality_{ist-1} * CapitalRatio_{ist-1} + \gamma X_{ist-1} + \varepsilon_{ist} \\
LoanQuality_{ist} &= \alpha_s + \delta_t + \beta_1 ServiceQuality_{ist-1} \\
&\quad + \beta_2 ServiceQuality_{ist-1} * CapitalRatio_{ist-1} + \gamma X_{ist-1} + \varepsilon_{ist}
\end{aligned}$$

where asset interest rate is defined by interest income divided by interest-earning assets, and loan quality variables include non-performing loan ratio, net charge-off ratio, and loan loss provision ratio, all normalized by total loans.

The positive β_1 for the loan quality regressions implies worse quality lending and more risk-taking when combined with the positive β_1 for the asset interest rate regression. We also test whether this is related to the agency problem. This agency problem should be less severe if the bank is well capitalized. We try to capture this effect through the interaction term of service quality and capital ratio, and we expect β_2 to be negative.¹⁶

Table 7 presents the estimation results. As can be seen in Panel A, service quality is positively correlated with the asset interest rate, which, when combined with the lower funding cost, indeed improves the net interest margin (not reported in the paper). Our results in Panel B, C, and D of Table 7 imply that this higher yield might be a product of more risk-taking rather than better asset management; service quality is also positively correlated with (negative) measures of lending quality: non-performing loan ratio (Panel B), net charge-off rates (Panel C), and loan loss provision ratio (Panel D), and this relationship is stronger when we control for different bank lending models. We also find similar deterioration effects on Z-score (Panel E) and ROA (not reported), indicating a negative correlation between the service quality and overall bank soundness.

[Table 7 here]

¹⁶ Note that if the intensity of creditor surveillance is unchanged, the asset substitution problem is more severe when the funding cost is higher which is associated with lower service quality. In sum, we should observe negative β_1 and positive β_2 if service quality only affects the funding cost but not the overall monitoring intensity.

Note that this relationship weakens for a more capitalized bank, evidenced by the negative coefficients of the interaction term between service quality and capital ratio, which are significant for all specifications in Panel A and D. In Panel C, the signs of the coefficients are as anticipated for all specifications but only significant in one specification, while the results are less clear in Panel B. Thus, we interpret this result as an indication of low quality lending due to the agency problem. Specifically, we conjecture that there is less market discipline imposed on a bank that provides better customer service or higher service quality. Again, this could come from two channels: (i) less market discipline due to changes in funding composition, arising from more insured funding reliance (i.e. core deposits), and (ii) core deposits themselves become less sensitive to bank risk-taking, since depositors appreciate extra services and as a result, become less willing to switch banks. This decreased surveillance could lead to excessive risk-taking, but a higher capital ratio could mitigate this problem. To delve into this problem, we now look at the risk pricing of bank funding and its relationship to service quality.

4.4. Service quality and risk pricing

In examining Prediction 6, we estimate the following:

$$FundingCost_{ist} - Tbill\ rate_t = \alpha_{si} + \beta_1 ServiceQuality_{ist-1} + \beta_2 Soundness_{ist-1} + \beta_3 ServiceQuality_{ist-1} * Soundness_{ist-1} + YX_{ist-1} + \varepsilon_{ist}$$

where $Tbill\ rate_t$ is a 6-month T-bill rate at time t , and $Soundness$ includes bank-level soundness characteristics (Tier 1 capital ratio, NPL ratio, standard deviation of ROA based on previous 8 quarters, and ROA). We focus on the sign of β_2 and β_3 , examining whether high service quality alleviates sensitivity of risk pricing (and thus risk monitoring). Again, we examine three different funding costs: (i) total liability interest rate, (ii) deposit interest rate, and (iii) core deposit interest rate. The first case examines how the funding cost of the bank as a whole varies in order to capture the monitoring intensity at the entity level.¹⁷ The last case looks at the more homogeneous funding class exclusively, aside from the composition effect, which is a more direct test on whether core depositors become less concerned with bank soundness when

¹⁷ In this case, we don't consider any differences in monitoring intensity at the creditor level. All we try to capture is whether risk pricing becomes less sensitive when spending more on service provisions, regardless of the underlying mechanism (e.g. substitution of uninsured deposits with insured deposits, less reliance on wholesale funding).

provided better quality services. We include bank fixed effects as we now focus on within a bank variation of its funding cost, rather than comparison to local counterparts.

[Table 8 here]

Table 8 presents our estimation results of risk pricing sensitivity. Funding cost – measured as a risk premium over the 6-month T-bill rate – increases if a bank holds more non-performing loans, has lower ROA, or has a higher volatility in ROA, but price sensitivity of risk becomes attenuated for banks providing better services. Our estimation results suggest that this is the case when using the NPL ratio, ROA, and the rolling eight-quarter standard deviation of ROA as the risk characteristics – the coefficients of the interaction terms with service quality are as anticipated and significant. This is true even for the core deposit interest rate, controlling for the funding composition or deposit insurance protection effect, implying that core depositors impose less surveillance when better services are provided. The price sensitivity is also attenuated when considering the capital ratio as a risk characteristic, namely the coefficients of the interaction terms are of the right sign; however, these same coefficients are not statistically significant.

5. Discussion

5.1. Alternative measures of bank service quality

In this subsection, we adopt alternative measures of service quality. Recall that our preferred choice of service-related-expense includes salaries, premises and fixed asset expenses, and “other” non-interest expenses. Although we don’t have more granular information on “other” expenses for all banks, memoranda of Schedule RI-E in Call Reports provides some information of its decomposition.¹⁸ Among those, we only pick up entries directly related to services, i.e., advertising (RIAD0497), ATM (RIADF558), and postage expenses (RIAD8403), instead of using total “other” non-interest expenses. The downside is that for each of these subcategories,

¹⁸ The limitation is that banks are required to report these granular expenses only if the amount of that subcategory is greater than \$25,000 and exceeds 3 percent of total “other” non-interest expenses. Kovner, Vickery, and Zhou (2014) analyze the FR-Y9C data from 2008 to 2012 and report the decomposition of “other noninterest expenses” by manually classifying them into subcategories. According to their calculations, corporate overhead (18.63%), information technology and data processing (12.63%), consulting and advisory (11.07%) are the top 3 classified components of “other noninterest expense” for the industry aggregate, while 33.80% were “Unclassified”. Note that they don’t limit their samples to small community banks, unlike our analysis.

approximately 70% of our sample lists it as 0. For those bank-quarter samples that have non-zero values for the aforementioned entries, the correlation between our preferred measure of service quality and this alternative measure of service quality is 0.95, which implies that we wouldn't lose much generality by assuming that "other" expenses reflect service-related expenses. Our empirical results are similar when we use this more narrowly-defined measure of service quality (See Panel A of Table 9, Column 1,4,7,10,11 for the subset of the results).

Salaries might not be a good measure if this reflects the different loan quality or different business models. For instance, a bank might need to hire more employees simply to monitor its non-performing loans, rather than providing better services. In order to mitigate this concern, we further exclude salary expenses from the above measure; thus service quality is now defined by the ratio of narrower service-related-expenses (i.e., premises and fixed asset, advertising, ATM, and postage expenses) to total assets. Our empirical results are still similar when we instead adopt this new measure of service quality (See Panel A of Table 9, Column 2,5,8,12,13 for the subset of the results).

5.2. MSA fixed effects

Our empirical analysis has been based on the cross-sectional comparison of small banks within a state. In order to capture the local market characteristics more tightly, we include MSA or MSA-time fixed effects instead. The downside is that we lose close to 20% of our sample as these banks are not headquartered in MSA areas. Our results remain the same (See Panel A of Table 9, Column 3,6,9,14,15 for the subset of the results).

5.3. Differential effects with demographic variation

In this section, we exploit the demographic variation across the regions to better identify the existence of our mechanism, focusing on the difference in the fraction of seniors (older than 65) across MSAs. Our argument is as follows. Seniors, who mostly consume their accumulated savings as retirees, use bank deposit accounts primarily for the purpose of "storage" compared to non-seniors, who would be more sensitive to "investment" incentives and thus more yield-seeking. This implies that in MSAs with more seniors, service quality (e.g. proximity to a branch or ATM) would matter more to potential customers and thus our predicted effects would be more

evident. Again, our underlying assumption is that a bank in our sample operates in a single MSA in which its headquarters is located.

Panel B of Table 9 reports our estimation results. Our main term of interest is the interaction of the fraction of seniors and the service quality (“Senior Share*Service Quality”). As anticipated, better-quality-service is associated with larger core deposit ratios, lower funding cost (core deposit interest rates), and fewer liquid assets, particularly in MSAs with more seniors. However, we don’t find a significant difference in case of the loan quality.

6. Conclusion

Our paper provides a novel economic argument on how the service quality of a bank could affect its funding structure, funding cost, funding liquidity risks, and financial stability. Using the panel data of community banks, we document the cross-sectional relationship that our hypotheses predict: banks spending more on services acquire more core deposits, pay less for their funding (both for total liabilities and for core deposits, exclusively), are exposed to lower liquidity risks, and hold lower-quality loans. We further argue that the last result is due to the agency problem being exacerbated by the decreased surveillance by creditors. Overall, this result suggests that “too stable” funding could impair the market discipline imposed on bank managers.

Note that our empirical results are on correlations rather than causality, though our economic argument does not preclude the existence of a causal relationship. Our empirical analysis thus provides a cross-sectional snapshot of a certain banking market (i.e. what types of relationships one would observe between certain variables in equilibrium). There could be a reverse causality driving the positive relationship between service expenditures and worse asset quality; rather than missing market discipline – from better service provisions – inducing bank risk-taking, it could be that a less-sound bank chooses to provide better services to attract more core deposits since its funding cost in the wholesale market is very high. However, this does not contradict our underlying argument that creditor surveillance as a whole could become weaker when more non-pecuniary benefits are provided. Another limitation is regarding the measurement of our proxy for service quality. Those additional costs that we interpret as better services could be simply

reflecting operational inefficiencies.¹⁹ However, the inefficiency argument alone does not explain how inefficient banks could attract more core deposits with lower funding costs, nor does it provide any implications on funding stickiness; on the other hand, this paper clearly discusses the tradeoff between these expenses and corresponding benefits, as well as the implications on financial stability. Improving these limitations for a clearer identification would be the goal for future research.

¹⁹ See the literature on bank cost efficiency (e.g., Berger, Hunter, and Timme 1993, Berger and Humphrey 1991, Berger and Mester 1997, Berger and DeYoung 1997) in which operating expenses including our service expenditures are considered as an “input” in the input/output analysis.

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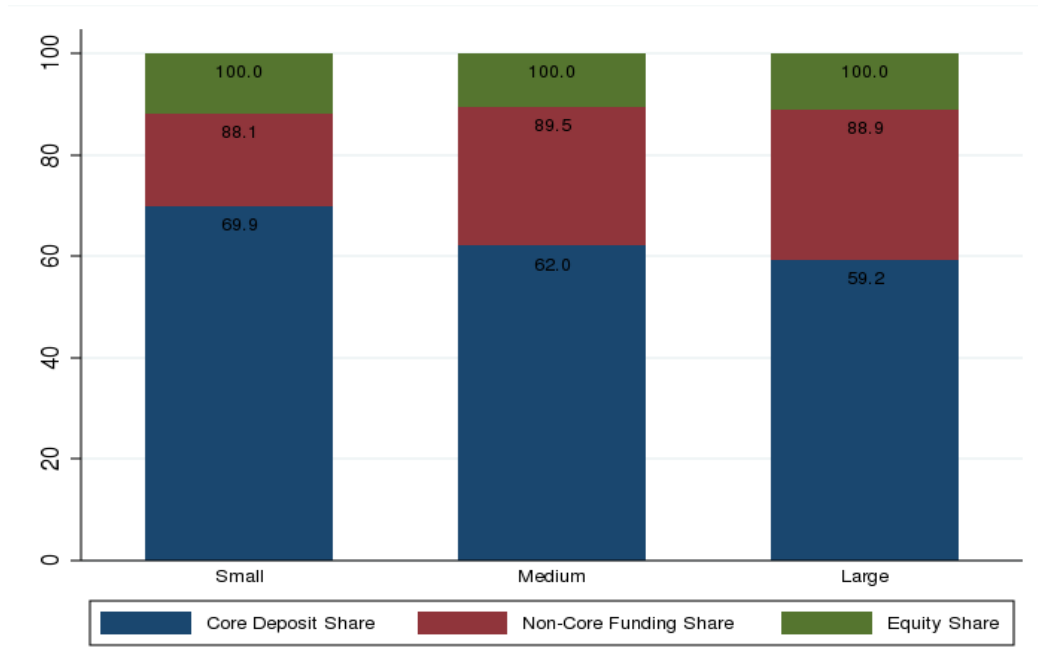
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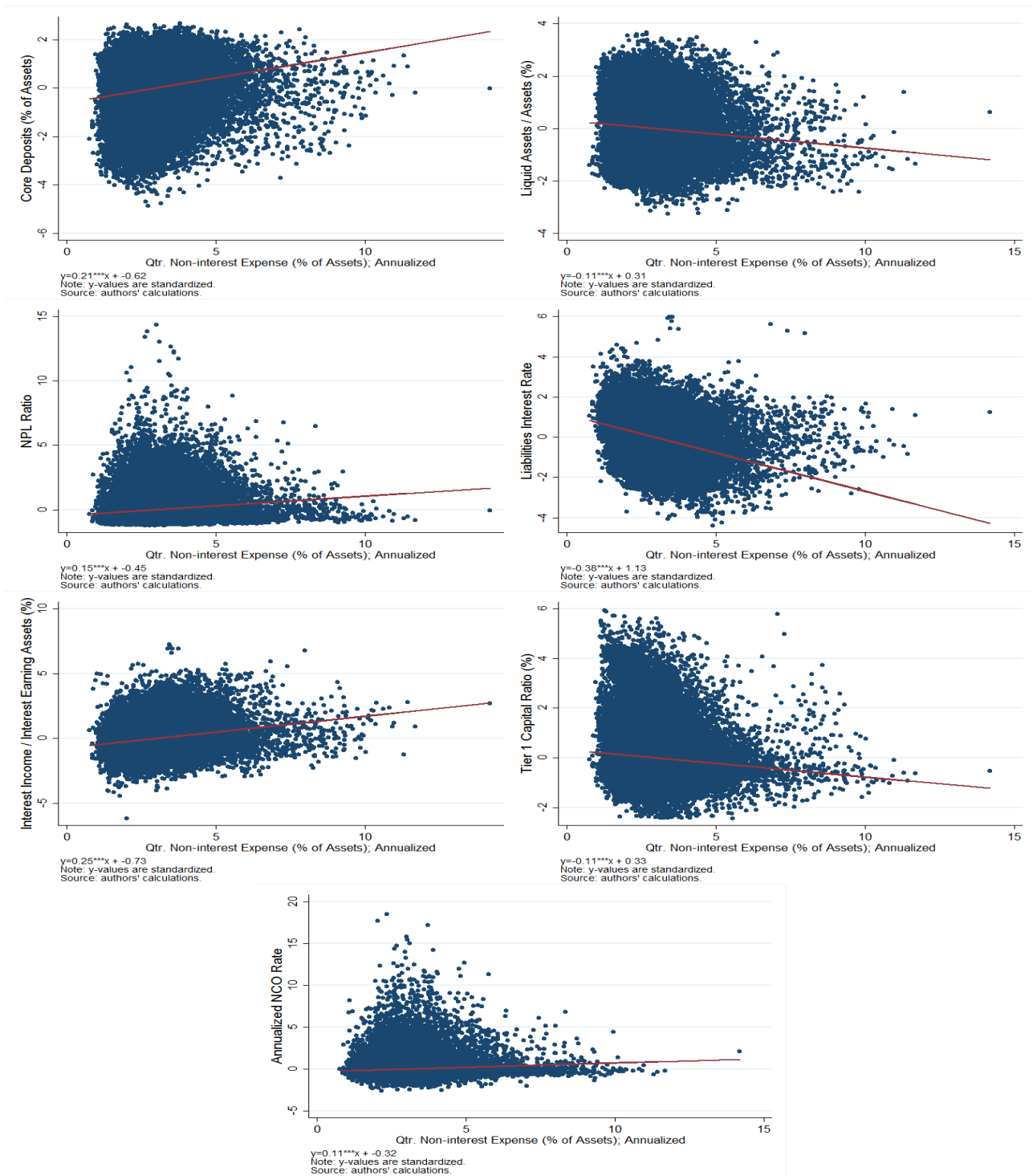
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Figure 1: Bank liability decomposition (aggregated)



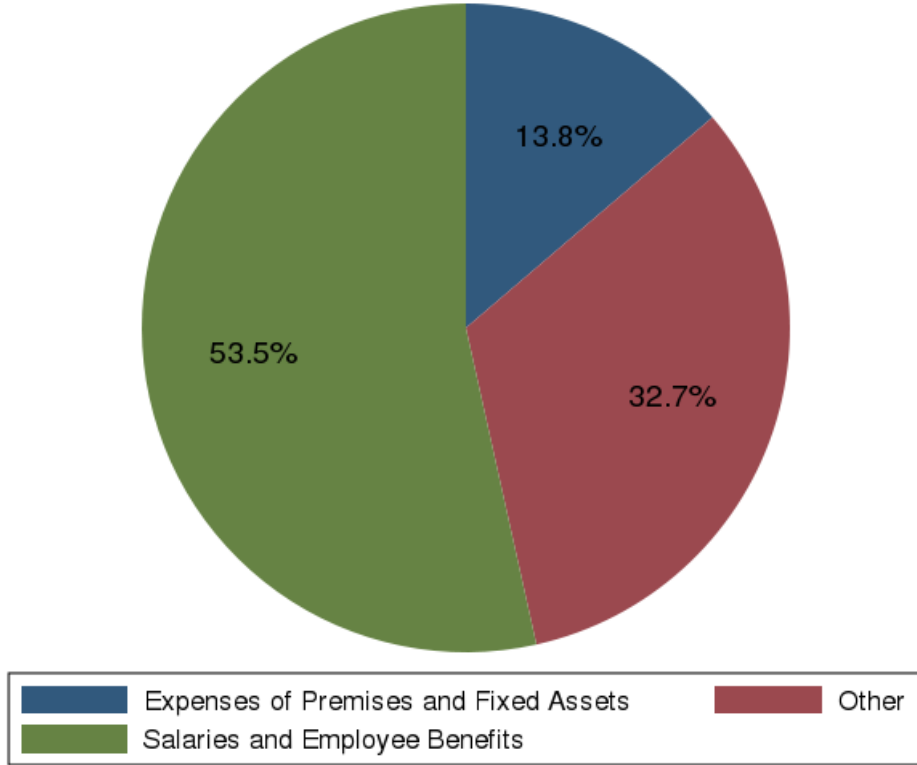
Note: This figure presents bank funding decomposition by size category. All shares are calculated by taking the average shares of all entities from 1995 to 2014, by size category. Shares are based on a percentage of total liabilities, which includes equity and noncontrolling interest. Core Deposits are measured as total deposits net of large time deposits (>\$100k). Equity is measured as book equity and noncontrolling interest. Non-Core Funding is measured as total liabilities net of core deposits and equity. Small Banks are considered to be those that are under 1 billion of assets; Medium Banks are those that are between 1 billion and 50 billion in assets; and Large Banks are those that are in excess of 50 billion in assets. Data is based on Call Reports from 1995 to 2014.

Figure 2: Cross-sectional relationship between Service Quality and Selected Bank Characteristics



Note: This figure presents univariate analysis of the relationship between bank service quality (measured by relevant non-interest expenses divided by total assets) and the following bank characteristics: (1) core deposit ratio (Top left); (2) liquid asset ratio (Top right); (3) non-performing loan ratio (2nd row left); (4) liabilities interest rate (2nd row right); (5) asset interest rate (3rd row left); (6) capital ratio (3rd row right); and (7) net charge-off ratio (bottom row). Core deposit ratio is core deposit divided by total assets. Liquid asset ratio is liquid asset holdings (cash+securities+fed funds lending and reverse-repo) divided by total assets. NPL ratio and NCO ratio are normalized by total loans. Liability interest rate is total interest expenses divided by total liabilities. Asset interest rate is interest income divided by total interest earning assets. X-axis variable is bank level service quality. Based on Call Reports of community banks with total assets between \$250 million and \$1 billion, from 1995Q1 to 2014Q4. All y variables are demeaned and standardized using the quarterly cross-sectional means and standard deviations. OLS regression results are reported and ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Figure 3: Decomposition of Non-Interest Expenses for Service Expenditures (aggregated)



Note: This figure presents decomposition of the service-related “non-interest expenses”. Component shares are the average shares of all entities from 1995Q1 to 2014Q4. Based on Call reports from 1995Q1 to 2014Q4, focusing on community banks with total assets between \$250 million and \$1 billion. “Other” includes Data processing expenses; Advertising and marketing expenses; Directors’ fees; Printing, stationery, and supplies; Postage; Legal fees and expenses; FDIC deposit insurance assessments; Accounting and auditing expenses; Consulting and advisory expenses; ATM and interchange expenses; and Telecommunications expenses.

Table 1: Summary Statistics

The statistics below describe the bank-quarter dataset from the Call reports, which encompasses all quarters between 1995 and 2014 (72,219 observations). Bank-quarter variables include: *NPL Ratio* is the ratio of non-performing loans to total loans; *Loan Loss Provision Ratio* is the ratio of quarterly loan loss provisions to total loans; *Z-score* is measured as the sum of the annualized return on assets (ROA) and the capital ratio, normalized by a rolling 9-quarter standard deviation of ROA; *NCO Rate* is the annualized quarterly net-charge offs normalized by total loans; *ROA* is the bank's return on assets, measured as annualized net income normalized by total assets; *Service Quality* is measured by the annualized ratio of noninterest expenses net of impairment losses to total assets; *Log(Assets)* is the natural logarithm of total assets; *Tier 1 Capital Ratio* is the ratio of tier 1 capital to total risk-weighted assets; *Core Deposit Ratio* is the ratio of core deposits to total assets; *Liquid Assets Ratio* is the ratio of liquid assets to total assets; *Deposit Rate* is the annualized quarterly interest expense on deposits normalized by average total deposits; *Liabilities Rate* is the annualized quarterly interest expense on liabilities normalized by average total liabilities; *Core Deposit Rate* is the annualized quarterly interest expense on core deposits normalized by average total core deposits; *Assets Interest Rate* is the annualized quarterly interest income normalized by average total assets; *Net Interest Margin* is measured as the annualized net interest income normalized by interest earning assets; *% Growth in Deposits* is the quarterly growth rate in total deposits; *Real Estate Loans (%)* is the share of real estate loans in the bank's loan portfolio; *C&I Loans(%)* is the share of commercial and industrial loans in the bank's loan portfolio.

Descriptive Statistics								
	Mean	SD	Min	p25	p50	p75	Max	N
NPL Ratio	1.4	1.8	0.0	0.4	0.8	1.7	16.9	72219
Loan Loss Provision Ratio	0.1	0.2	-1.6	0.0	0.1	0.1	3.1	72219
Z-score	54.4	39.9	0.4	24.8	46.0	74.4	236.4	71748
NCO Rate	0.4	0.7	-0.7	0.0	0.1	0.4	7.6	72219
ROA	1.0	0.7	-3.4	0.7	1.1	1.4	3.3	72219
Service Quality	3.0	0.8	0.8	2.4	2.9	3.4	14.2	72219
Log of Total Assets	13.0	0.4	12.4	12.6	12.9	13.2	13.8	72219
Tier 1 Capital Ratio	12.5	3.1	6.6	10.3	11.8	14.0	27.8	70109
Core Deposit Ratio	68.5	9.1	35.3	62.9	69.5	75.3	87.0	72219
Liquid Assets Ratio	26.5	10.2	4.3	18.8	26.0	33.7	54.6	72219
Deposit Rate	2.1	1.2	0.1	1.0	2.0	3.2	5.0	72219
Liabilities Rate	2.2	1.2	0.2	1.1	2.1	3.3	4.9	72219
Core Deposit Rate	1.9	1.2	-1.4	0.8	1.7	2.8	8.9	72219
Assets Interest Rate	6.2	1.4	3.3	5.0	6.1	7.4	10.1	72219
Net Interest Margin	4.1	0.7	2.4	3.6	4.0	4.5	6.6	72219
% Growth in Deposits	1.4	3.6	-9.8	-0.9	1.2	3.6	13.5	72218
Real Estate Loans (%)	72.8	13.9	27.5	64.3	75.0	83.4	97.4	72219
C&I Loans (%)	15.5	8.7	0.8	9.1	13.9	20.2	49.6	57041

Table 2: Funding Composition

This table presents our estimation results of Regression (1). The sample ranges from 1995:Q1 to 2014:Q4 and includes only community banks (250 million to 1 billion in assets). The dependent variable is *Core Deposit Ratio*, the ratio of core deposits to total assets. *Service Quality* is measured by the annualized ratio of relevant noninterest expenses (including salaries, premises and fixed assets, and “other” non-interest expenses) to total assets. $\text{Log}(\text{Assets})$ is the natural logarithm of total assets. *Core Deposit Interest Rate* is the annualized quarterly interest expense on core deposits normalized by average core deposits. *C&I Loans (%)* is the share of commercial and industrial loans in the bank’s loan portfolio. *Real Estate Loans (%)* is the share of real estate loans in the bank’s loan portfolio. All Bank characteristics are measured using quarterly Call Report data. All variables are lagged. Column (1) to (4) include time fixed effects, (5) to (8) include state and time fixed effect, (9) to (12) include state*time fixed effects. Standard errors are clustered on entity and reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

	Core Deposit Ratio											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Service Quality	1.941*** (0.189)	1.530*** (0.193)	1.943*** (0.200)	1.546*** (0.204)	2.070*** (0.192)	1.734*** (0.191)	2.017*** (0.202)	1.707*** (0.202)	2.082*** (0.199)	1.768*** (0.198)	1.995*** (0.211)	1.704*** (0.210)
Log(Assets)	-1.607*** (0.328)	-1.777*** (0.324)	-1.525*** (0.387)	-1.681*** (0.382)	-1.704*** (0.315)	-1.858*** (0.310)	-1.683*** (0.372)	-1.810*** (0.367)	-1.645*** (0.320)	-1.797*** (0.316)	-1.626*** (0.383)	-1.755*** (0.378)
Core Deposit Interest Rate		-2.043*** (0.287)		-2.058*** (0.320)		-2.103*** (0.290)		-2.028*** (0.322)		-2.053*** (0.311)		-1.995*** (0.347)
C&I Loans (%)			-0.136*** (0.0237)	-0.147*** (0.0235)			-0.151*** (0.0237)	-0.155*** (0.0234)			-0.152*** (0.0246)	-0.157*** (0.0242)
Real Estate Loans (%)			-0.0781*** (0.0144)	-0.0805*** (0.0142)			-0.0745*** (0.0159)	-0.0703*** (0.0156)			-0.0724*** (0.0167)	-0.0690*** (0.0164)
Observations	63,789	63,789	50,530	50,530	63,789	63,789	50,530	50,530	63,789	63,789	50,530	50,530
R ²	0.157	0.168	0.187	0.199	0.229	0.239	0.261	0.271	0.286	0.295	0.324	0.333
Adj R ²	0.156	0.167	0.186	0.197	0.227	0.238	0.259	0.269	0.240	0.250	0.269	0.278
State					Y	Y	Y	Y				
State * Quarter					Y	Y	Y	Y	Y	Y	Y	Y
Quarter FE	Y	Y	Y	Y	Y	Y	Y	Y				

Table 3: Funding Costs

This table presents our estimation results of Regression (2). The sample ranges from 1995:Q1 to 2014:Q4 and includes only community banks (250 million to 1 billion in assets). The dependent variable in Panel A is *Liabilities Rate*, the annualized quarterly interest expense on liabilities normalized by average total liabilities; the dependent variable in Panel B is *Deposit Rate*, the annualized quarterly interest expense on deposits normalized by average total deposits; the dependent variable in Panel C is *Core Deposit Rate*, the annualized quarterly interest expense on core deposits normalized by average total core deposits; and the dependent variable in Panel D is *Non-Core Deposit Rate – Core Deposit Rate*, the difference between the Non-Core Deposit Rate and the Core Deposit Rate, where the Non-Core Deposit Rate is defined as the annualized quarterly interest expense on large time deposits normalized by average total large time deposits. *Service Quality* is measured by the annualized ratio of relevant noninterest expenses (including salaries, premises and fixed assets, and “other” non-interest expenses) to total assets. *Log(Assets)* is the natural logarithm of total assets. *Tier 1 Capital Ratio* is the ratio of tier 1 capital to total risk-weighted assets. *NPL Ratio* is the ratio of non-performing loans to total loans. *NCO Rate* is the annualized quarterly net-charge offs normalized by total loans. *Liquid Assets Ratio* is the ratio of liquid assets to total assets, where liquid assets include cash, securities, reverse repo and fed funds lending. *ROA* is the bank’s return on assets, measured as annualized net income normalized by total assets. All Bank characteristics are measured using quarterly Call Report data. All variables are lagged. Column (1) to (3) include time fixed effects, (4) to (6) include state and time fixed effect, (7) to (9) include state*time fixed effects. Standard errors are clustered on entity and reported in parentheses.***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Panel A	Liabilities Rate								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Service Quality	-0.202*** (0.0120)	-0.221*** (0.0122)	-0.245*** (0.0125)	-0.165*** (0.0107)	-0.187*** (0.0110)	-0.214*** (0.0114)	-0.160*** (0.0110)	-0.182*** (0.0112)	-0.209*** (0.0116)
Log(Assets)	-0.0495*** (0.0174)	-0.0871*** (0.0168)	-0.0704*** (0.0158)	-0.0360** (0.0167)	-0.0767*** (0.0162)	-0.0597*** (0.0152)	-0.0375** (0.0171)	-0.0790*** (0.0165)	-0.0632*** (0.0156)
Tier 1 Capital Ratio		-0.0360*** (0.00260)	-0.0130*** (0.00279)		-0.0344*** (0.00245)	-0.0129*** (0.00256)		-0.0344*** (0.00251)	-0.0142*** (0.00266)
NPL Ratio		0.0299*** (0.00331)	0.0148*** (0.00331)		0.0295*** (0.00331)	0.0156*** (0.00327)		0.0298*** (0.00333)	0.0176*** (0.00332)
NCO Rate		0.0238*** (0.00446)	-0.0251*** (0.00540)		0.0141*** (0.00387)	-0.0340*** (0.00456)		0.0172*** (0.00389)	-0.0270*** (0.00466)
Liquid Assets Ratio			-0.0112*** (0.000805)			-0.0103*** (0.000738)			-0.00954*** (0.000759)
ROA			-0.168*** (0.0101)			-0.170*** (0.00929)			-0.163*** (0.00979)
Observations	63,789	61,967	61,967	63,789	61,967	61,967	63,789	61,967	61,967
R ²	0.868	0.874	0.885	0.886	0.891	0.901	0.899	0.904	0.911
Adj R ²	0.867	0.874	0.884	0.886	0.891	0.901	0.892	0.898	0.906
State				Y	Y	Y			
State * Quarter							Y	Y	Y
Quarter FE	Y	Y	Y	Y	Y	Y			

Panel B	Deposit Rate								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Service Quality	-0.199*** (0.0117)	-0.216*** (0.0119)	-0.239*** (0.0122)	-0.166*** (0.0105)	-0.186*** (0.0109)	-0.214*** (0.0111)	-0.161*** (0.0107)	-0.182*** (0.0110)	-0.209*** (0.0113)
Log(Assets)	-0.0901*** (0.0171)	-0.125*** (0.0164)	-0.108*** (0.0154)	-0.0790*** (0.0164)	-0.116*** (0.0160)	-0.0988*** (0.0149)	-0.0806*** (0.0169)	-0.118*** (0.0164)	-0.102*** (0.0154)
Tier 1 Capital Ratio		-0.0332*** (0.00261)	-0.00931*** (0.00278)		-0.0318*** (0.00245)	-0.00916*** (0.00254)		-0.0317*** (0.00251)	-0.0104*** (0.00264)
NPL Ratio		0.0273*** (0.00307)	0.0132*** (0.00308)		0.0265*** (0.00319)	0.0134*** (0.00309)		0.0265*** (0.00320)	0.0150*** (0.00314)
NCO Rate		0.0265*** (0.00443)	-0.0203*** (0.00533)		0.0143*** (0.00388)	-0.0323*** (0.00449)		0.0172*** (0.00389)	-0.0255*** (0.00456)
Liquid Assets Ratio			-0.0119*** (0.000794)			-0.0112*** (0.000731)			-0.0103*** (0.000755)
ROA			-0.160*** (0.0101)			-0.165*** (0.00911)			-0.158*** (0.00958)
Observations	63,789	61,967	61,967	63,789	61,967	61,967	63,789	61,967	61,967
R ²	0.867	0.872	0.883	0.885	0.889	0.899	0.898	0.902	0.910
Adj R ²	0.867	0.872	0.883	0.885	0.889	0.899	0.892	0.896	0.904
State				Y	Y	Y			
State * Quarter							Y	Y	Y
Quarter FE	Y	Y	Y	Y	Y	Y			

Panel C	Core Deposit Rate								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Service Quality	-0.200*** (0.0121)	-0.215*** (0.0122)	-0.237*** (0.0124)	-0.159*** (0.0105)	-0.177*** (0.0108)	-0.203*** (0.0110)	-0.151*** (0.0107)	-0.170*** (0.0109)	-0.195*** (0.0112)
Log(Assets)	-0.0826*** (0.0171)	-0.114*** (0.0165)	-0.0988*** (0.0157)	-0.0724*** (0.0162)	-0.107*** (0.0159)	-0.0910*** (0.0150)	-0.0735*** (0.0167)	-0.109*** (0.0163)	-0.0944*** (0.0155)
Tier 1 Capital Ratio		-0.0315*** (0.00258)	-0.00983*** (0.00281)		-0.0295*** (0.00237)	-0.00918*** (0.00254)		-0.0299*** (0.00242)	-0.0110*** (0.00262)
NPL Ratio		0.0245*** (0.00306)	0.0110*** (0.00311)		0.0249*** (0.00312)	0.0123*** (0.00309)		0.0235*** (0.00311)	0.0125*** (0.00313)
NCO Rate		0.0215*** (0.00456)	-0.0228*** (0.00546)		0.0131*** (0.00404)	-0.0311*** (0.00462)		0.0149*** (0.00405)	-0.0250*** (0.00470)
Liquid Assets Ratio			-0.0107*** (0.000821)			-0.00987*** (0.000757)			-0.00899*** (0.000787)
ROA			-0.152*** (0.0102)			-0.157*** (0.00921)			-0.148*** (0.00973)
Observations	63,789	61,967	61,967	63,789	61,967	61,967	63,789	61,967	61,967
R ²	0.841	0.844	0.855	0.863	0.865	0.874	0.879	0.880	0.887
Adj R ²	0.841	0.844	0.854	0.863	0.865	0.874	0.871	0.873	0.880
State				Y	Y	Y			
State * Quarter							Y	Y	Y
Quarter FE	Y	Y	Y	Y	Y	Y			

Non-Core Deposit Rate – Core Deposit Rate

Panel D	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Service Quality	0.127*** (0.0119)	0.130*** (0.0120)	0.139*** (0.0123)	0.116*** (0.0121)	0.122*** (0.0122)	0.134*** (0.0125)	0.104*** (0.0124)	0.112*** (0.0125)	0.122*** (0.0129)
Log(Assets)	0.0295 (0.0229)	0.0381* (0.0231)	0.0324 (0.0230)	0.0390* (0.0226)	0.0510** (0.0228)	0.0439* (0.0227)	0.0383* (0.0231)	0.0513** (0.0232)	0.0456** (0.0231)
Tier 1 Capital Ratio		0.00869** (0.00337)	0.00113 (0.00358)		0.00900*** (0.00319)	0.000312 (0.00335)		0.00988*** (0.00334)	0.00301 (0.00349)
NPL Ratio		-0.0143*** (0.00396)	-0.00861** (0.00408)		-0.0187*** (0.00406)	-0.0126*** (0.00410)		-0.0152*** (0.00431)	-0.0102** (0.00441)
NCO Rate		-0.00580 (0.00668)	0.0124* (0.00713)		-0.00323 (0.00645)	0.0177** (0.00691)		-0.00313 (0.00690)	0.0143* (0.00737)
Liquid Assets Ratio			0.00350*** (0.000998)			0.00405*** (0.000976)			0.00305*** (0.00103)
ROA			0.0630*** (0.0131)			0.0743*** (0.0128)			0.0645*** (0.0130)
Observations	63,785	61,963	61,963	63,785	61,963	61,963	63,785	61,963	61,963
R ²	0.291	0.299	0.301	0.305	0.313	0.316	0.357	0.362	0.364
Adj R ²	0.290	0.298	0.300	0.304	0.312	0.314	0.315	0.322	0.324
State				Y	Y	Y			
State * Quarter							Y	Y	Y
Quarter FE	Y	Y	Y	Y	Y	Y			

Table 4: Asset Liquidity

This table presents our estimation results of Regression (3). The sample ranges from 1995:Q1 to 2014:Q4 and includes only community banks (250 million to 1 billion in assets). The dependent variable is *Liquid Assets Ratio*, the ratio of liquid assets to total assets, where liquid assets include cash, securities, reverse repo and fed funds lending. *Service Quality* is measured by the annualized ratio of relevant noninterest expenses (including salaries, premises and fixed assets, and “other” non-interest expenses) to total assets. *Log(Assets)* is the natural logarithm of total assets. *Tier 1 Capital Ratio* is the ratio of tier 1 capital to total risk-weighted assets. *Unused Commitment Ratio* is the ratio of unused commitments to total assets. *Core Deposit Ratio*, the ratio of core deposits to total assets. *C&I Loans (%)* is the share of commercial and industrial loans in the bank’s loan portfolio. *Real Estate Loans (%)* is the share of real estate loans in the bank’s loan portfolio. All Bank characteristics are measured using quarterly Call Report data. All variables are lagged. Column (1) to (3) include time fixed effects, (4) to (6) include state and time fixed effect, (7) to (9) include state*time fixed effects. Standard errors are clustered on entity and reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

	Liquid Assets Ratio								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Service Quality	-0.617*** (0.201)	-0.553*** (0.175)	-0.583*** (0.185)	-0.772*** (0.200)	-0.628*** (0.175)	-0.701*** (0.184)	-0.846*** (0.207)	-0.661*** (0.181)	-0.764*** (0.193)
Log(Assets)	0.501 (0.398)	1.699*** (0.343)	4.252*** (0.552)	0.137 (0.389)	1.510*** (0.333)	3.742*** (0.537)	0.216 (0.399)	1.525*** (0.340)	3.781*** (0.546)
Tier 1 Capital Ratio		1.439*** (0.0489)	1.453*** (0.0545)		1.415*** (0.0487)	1.418*** (0.0547)		1.442*** (0.0506)	1.442*** (0.0579)
Unused Commitment Ratio	-0.334*** (0.0240)	-0.208*** (0.0206)	-3.89e-05*** (4.10e-06)	-0.335*** (0.0242)	-0.210*** (0.0204)	-3.61e-05*** (3.99e-06)	-0.341*** (0.0254)	-0.215*** (0.0212)	-3.62e-05*** (4.11e-06)
Core Deposit Ratio		0.186*** (0.0172)	0.174*** (0.0195)		0.183*** (0.0173)	0.172*** (0.0194)		0.168*** (0.0178)	0.160*** (0.0200)
C&I Loans (%)			0.0632** (0.0252)			0.0569** (0.0262)			0.0467* (0.0276)
Real Estate Loans (%)			-0.0536*** (0.0163)			-0.0534*** (0.0183)			-0.0582*** (0.0191)
Observations	63,789	61,967	48,708	63,789	61,967	48,708	63,789	61,967	48,708
R ²	0.166	0.350	0.348	0.217	0.385	0.383	0.275	0.433	0.438
Adj R ²	0.165	0.350	0.347	0.215	0.384	0.381	0.228	0.397	0.393
State				Y	Y	Y			
State * Quarter							Y	Y	Y
Quarter FE	Y	Y	Y	Y	Y	Y			

Table 5: Bank Lending Channel

The table presents the results of the regression analyses of bank loan growth in response to changes in monetary policy stances, captured by the changes in the federal funds rate. The approach is similar to the two-step regression approach from Kashyap and Stein (2000). The first-step (Regression (4), results not reported) is an autoregressive model, AR(4), in which the dependent variable is the log change of a loan category (total loan, real estate loan, or C&I loan) and the independent variables include lagged service quality (measured by the annualized ratio of relevant noninterest expenses (including salaries, premises and fixed assets, and “other” non-interest expenses) to total assets), and state fixed effects. For columns with “Continuous SQ Measure” service quality (“ $ServiceQuality_{ist-1}$ ”) is measured by the annualized ratio of relevant noninterest expenses (including salaries, premises and fixed assets, and “other” non-interest expenses) to total assets. For columns with “Discrete SQ Measure”, we use a discrete measure of bank-level service quality; $ServiceQuality_{ist} = 1$ if bank i 's non-interest expense to asset ratio is beyond the median among all the sample banks in that time period, and 0 otherwise. We also include lagged bank controls for the rows with “Bank Controls; 1st step”, which include liquid assets ratio, asset size, core deposit ratio, and the share of real estate loans. This regression is run each quarter and the coefficients on service quality are kept to form a time series. The second-step (Regression (5)) regresses these coefficients on 4 lags of the change in the federal funds rate, and on a time trend. We also include 4 lagged terms of the change in Real GDP as macroeconomic controls, for rows with “Macro Controls; 2nd step”. The panels below present estimation results for Total Loans (first panel), Real Estate Loans (second panel), and C&I Loans (third panel). Only the sum of the coefficients on the 4 lags of the change in the federal funds rate (ΔFF_{t-j} , where $j = 1, \dots, 4$) in the 2nd step are reported (i.e., $\sum_{j=1}^4 \mu_j$ in Regression (5)), as well as p-values for the two-sided t-tests using HAC standard errors in parentheses, where *, **, and *** correspond to below 10%, 5%, and 1% significance, respectively. Sample ranges from 1995:Q1 to 2007:Q2.

Panel A: monetary policy and total loan growth

		Total Loans: Sum of Federal Funds terms	
		Continuous SQ Measure	Discrete SQ Measure
No Macro Controls; 2nd step	No Bank Controls; 1st step	0.0023365**	0.003288**
	(p-value)	(0.016)	(0.010)
	Bank Controls; 1st step	0.0023479**	0.0031397**
	(p-value)	(0.020)	(0.015)
Macro Controls; 2nd step	No Bank Controls; 1st step	0.0025808**	0.003578***
	(p-value)	(0.041)	(0.003)
	Bank Controls; 1st step	0.0023764	0.003302***
	(p-value)	(0.171)	(0.003)

Panel B: monetary policy and real estate loan growth

		Real Estate Loans: Sum of Federal Funds terms	
		Continuous SQ Measure	Discrete SQ Measure
No Macro Controls; 2nd step	No Bank Controls; 1st step (p-value)	0.002612** (0.034)	0.003595*** (0.002)
	Bank Controls; 1st step (p-value)	0.002765** (0.023)	0.003941*** (0.001)
Macro Controls; 2nd step	No Bank Controls; 1st step (p-value)	0.002559 (0.359)	0.00392** (0.047)
	Bank Controls; 1st step (p-value)	0.002828 (0.279)	0.004283** (0.036)

Panel C: monetary policy and C&I loan growth

		C&I Loans: Sum of Federal Funds terms	
		Continuous SQ Measure	Discrete SQ Measure
No Macro Controls; 2nd step	No Bank Controls; 1st step (p-value)	0.001508 (0.702)	-0.00085 (0.209)
	Bank Controls; 1st step (p-value)	0.003002 (0.405)	0.000324 (0.576)
Macro Controls; 2nd step	No Bank Controls; 1st step (p-value)	0.000892 (0.737)	0.00098 (0.792)
	Bank Controls; 1st step (p-value)	0.00134 (0.343)	0.00197 (0.795)

Table 6: Deposit Stickiness

The sample ranges from 1995:Q1 to 2007:Q2 and includes only community banks (250 million to 1 billion in assets). For columns with “Continuous SQ Measure,” service quality (“ $ServiceQuality_{ist-1}$ ”) is measured by the annualized ratio of relevant noninterest expenses (including salaries, premises and fixed assets, and “other” non-interest expenses) to total assets. For columns with “Discrete SQ Measure,” we use a discrete measure of bank-level service quality; $ServiceQuality_{ist} = 1$ if bank i ’s non-interest expense to asset ratio is beyond the median among all the sample banks in that time period, and 0 otherwise. Panel A reports regression results of Regression (6):

$$\Delta \log(CoreDeposit_{ist}) = \alpha_s + \sum_{j=0}^4 \mu_j \Delta FF_{t-j} + \beta ServiceQuality_{ist-1} + \sum_{j=0}^4 \lambda_j (ServiceQuality_{ist-1} * \Delta FF_{t-j}) + \varepsilon_{ist}$$

The dependent variable in Panel A is *Core Deposit Growth Rate*, the log change in core deposits. The regression includes service quality (continuous or discrete), 4 lags of the change in the federal funds rate, as well as the contemporaneous change. The main focus is on the sum of the coefficients on the interaction terms (“Sum of Interaction Terms”, i.e., $\sum_{j=0}^4 \lambda_j$) and p-values for the two-sided t-tests on the same set of terms are also reported. The analysis shown in Panel B adopts that of Morgan, Rime, and Strahan (2004). The first-step (not shown) regresses the bank-level log change in core deposits on time and state (or bank) fixed effects. We then define “fluctuation” as the absolute value of the residuals from the first step, and regress them on service quality as well as time and state (or bank) fixed effects in the second step. We only report the coefficient on service quality in the second step (i.e. β of Regression (7)), and standard errors are clustered on entity and reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Panel A: monetary policy and core deposit growth rate

Panel A	Core Deposit Growth Rate			
	Continuous SQ Measure		Discrete SQ Measure	
	(1)	(2)	(3)	(4)
$\Delta(t)$ fed funds rate	-0.00664*** (0.00150)	-0.00742*** (0.00159)	-0.00523*** (0.000520)	-0.00572*** (0.000547)
$\Delta(t-1)$ fed funds rate	0.000808 (0.00132)	-0.000388 (0.00143)	-0.00121** (0.000483)	-0.00162*** (0.000519)
$\Delta(t-2)$ fed funds rate	-0.000249 (0.00142)	-0.00150 (0.00151)	0.00140*** (0.000505)	0.000914* (0.000527)
$\Delta(t-3)$ fed funds rate	-0.000752 (0.00151)	-0.00221 (0.00162)	-0.000540 (0.000520)	-0.00104* (0.000559)
$\Delta(t-4)$ fed funds rate	0.00136 (0.00162)	1.87e-05 (0.00171)	-0.000621 (0.000551)	-0.000989* (0.000555)
Service Quality	0.000150 (0.000407)	0.00256** (0.00102)	-0.000349 (0.000625)	0.00107 (0.00112)
Service Quality *	0.000857* (0.000479)	0.000973* (0.000513)	0.00248*** (0.000760)	0.00258*** (0.000803)
$\Delta(t)$ fed funds rate	-0.000989** (0.000416)	-0.000650 (0.000450)	-0.00204*** (0.000696)	-0.00175** (0.000739)
Service Quality *	0.000684 (0.000457)	0.00104** (0.000484)	0.000815 (0.000696)	0.00134* (0.000729)
$\Delta(t-2)$ fed funds rate	0.000151 (0.000478)	0.000562 (0.000515)	0.000541 (0.000711)	0.00102 (0.000770)
Service Quality *	-0.000787 (0.000521)	-0.000347 (0.000555)	-0.000803 (0.000778)	-0.000151 (0.000798)
Observations	21,231	21,231	21,231	21,231
R ²	0.0191	0.136	0.0195	0.136
Adj R ²	0.0163	0.0612	0.0166	0.0612
Sum of Interaction Terms	-0.0001	0.0016	0.0010	0.0030
2-sided p-value	0.04	0.05	0.00	0.00
Entity FE	N	Y	N	Y
State FE	Y	N	Y	N

Panel B: service quality and core deposit fluctuation

Panel B	Residuals (Absolute Value)			
	Continuous SQ Measure		Discrete SQ Measure	
	(1)	(2)	(3)	(4)
Service Quality	-0.000203 (0.000259)	-0.000491* (0.000287)	-0.00111*** (0.000377)	-0.000202 (0.000362)
Observations	72,218	72,218	72,218	72,218
R ²	0.0445	0.198	0.0448	0.198
Adj R ²	0.0428	0.159	0.0431	0.159
Time FE	Y	Y	Y	Y
State FE	Y		Y	
Entity FE		Y		Y

Table 7: Asset Quality

The sample ranges from 1995:Q1 to 2014:Q4 and includes only community banks (250 million to 1 billion in assets). The dependent variable in Panel A is *Assets Interest Rate*, the annualized quarterly interest income normalized by average total assets; the dependent variable in Panel B is *NPL Ratio*, the ratio of non-performing loans to total loans; the dependent variable in Panel C is *NCO Rate*, the annualized quarterly net-charge offs normalized by total loans; the dependent variable in Panel D is *Loan Loss Provision Ratio*, the ratio of quarterly loan loss provisions to total loans; and the dependent variable in Panel E is *Z-score*, measured as the sum of the annualized return on assets (ROA) and the capital ratio, normalized by a rolling 9-quarter standard deviation of ROA. *Service Quality* is measured by the annualized ratio of relevant noninterest expenses (including salaries, premises and fixed assets, and “other” non-interest expenses) to total assets. *Log(Assets)* is the natural logarithm of total assets. *Tier 1 Capital Ratio* is the ratio of tier 1 capital to total risk-weighted assets. *C&I Loans (%)* is the share of commercial and industrial loans in the bank’s loan portfolio. *Real Estate Loans (%)* is the share of real estate loans in the bank’s loan portfolio. *Core Deposit Ratio*, the ratio of core deposits to total assets. All Bank characteristics are measured using quarterly Call Report data. All variables are lagged. Column (1) to (3) include time fixed effects, (4) to (6) include state and time fixed effect, (7) to (9) include state*time fixed effects. Standard errors are clustered on entity and reported in parentheses.***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Panel A	Assets Interest Rate								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Service Quality	0.114*** (0.0128)	0.244*** (0.0466)	0.296*** (0.0499)	0.0768*** (0.0119)	0.213*** (0.0404)	0.244*** (0.0434)	0.0757*** (0.0123)	0.209*** (0.0406)	0.238*** (0.0437)
Log(Assets)	-0.164*** (0.0212)	-0.163*** (0.0212)	-0.177*** (0.0250)	-0.159*** (0.0193)	-0.158*** (0.0193)	-0.164*** (0.0228)	-0.157*** (0.0197)	-0.157*** (0.0197)	-0.164*** (0.0237)
Tier 1 Capital Ratio	-0.0406*** (0.00316)	-0.0112 (0.00982)	-0.00222 (0.0108)	-0.0433*** (0.00277)	-0.0127 (0.00845)	-0.00706 (0.00945)	-0.0426*** (0.00285)	-0.0127 (0.00839)	-0.00666 (0.00932)
C&I Loans (%)			-0.00543*** (0.00154)			-0.00446*** (0.00146)			-0.00429*** (0.00147)
Real Estate Loans (%)			-0.00283*** (0.00104)			-0.000986 (0.00110)			-0.000864 (0.00115)
Core Deposit Ratio			-0.0120*** (0.00120)			-0.00993*** (0.00112)			-0.00981*** (0.00115)
Service Quality *		-0.0106***	-0.0129***		-0.0110***	-0.0120***		-0.0108***	-0.0116***
Tier 1 Capital Ratio		(0.00363)	(0.00390)		(0.00309)	(0.00335)		(0.00304)	(0.00328)
Observations	61,967	61,967	48,708	61,967	61,967	48,708	61,967	61,967	48,708
R ²	0.852	0.852	0.869	0.870	0.870	0.885	0.884	0.884	0.899
Adj R ²	0.852	0.852	0.869	0.870	0.870	0.885	0.877	0.877	0.891
State				Y	Y	Y			
State * Quarter							Y	Y	Y
Quarter FE	Y	Y	Y	Y	Y	Y			

Panel B	NPL Ratio								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Service Quality	0.216*** (0.0247)	0.175** (0.0830)	0.262*** (0.0932)	0.241*** (0.0259)	0.197** (0.0839)	0.264*** (0.0946)	0.237*** (0.0273)	0.246*** (0.0835)	0.308*** (0.0954)
Log(Assets)	0.129** (0.0531)	0.129** (0.0531)	-0.125* (0.0687)	0.156*** (0.0514)	0.155*** (0.0514)	-0.0767 (0.0670)	0.181*** (0.0521)	0.181*** (0.0521)	-0.0339 (0.0676)
Tier 1 Capital Ratio	0.00622 (0.00690)	-0.00306 (0.0184)	0.00187 (0.0210)	0.0109* (0.00663)	0.00101 (0.0191)	0.00340 (0.0219)	0.0108 (0.00684)	0.0129 (0.0192)	0.0157 (0.0223)
C&I Loans (%)			0.00852*** (0.00299)			0.00675** (0.00306)			0.00713** (0.00321)
Real Estate Loans (%)			0.0199*** (0.00200)			0.0160*** (0.00241)			0.0160*** (0.00256)
Core Deposit Ratio			-0.0162*** (0.00278)			-0.0142*** (0.00295)			-0.0148*** (0.00308)
Service Quality * Tier 1 Capital Ratio		0.00333 (0.00671)	-0.00107 (0.00741)		0.00356 (0.00669)	0.000322 (0.00742)		-0.000742 (0.00670)	-0.00310 (0.00755)
Observations	61,967	61,967	48,708	61,967	61,967	48,708	61,967	61,967	48,708
R ²	0.227	0.227	0.267	0.262	0.262	0.294	0.346	0.346	0.382
Adj R ²	0.226	0.226	0.266	0.261	0.261	0.292	0.305	0.305	0.332
State				Y	Y	Y			
State * Quarter							Y	Y	Y
Quarter FE	Y	Y	Y	Y	Y	Y			

Panel C	NCO Rate								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Service Quality	0.0502*** (0.00742)	0.0825*** (0.0262)	0.110*** (0.0301)	0.0541*** (0.00751)	0.0767*** (0.0252)	0.0997*** (0.0296)	0.0524*** (0.00766)	0.0753*** (0.0249)	0.0969*** (0.0290)
Log(Assets)	0.0747*** (0.0147)	0.0750*** (0.0147)	0.00540 (0.0187)	0.0858*** (0.0136)	0.0860*** (0.0136)	0.0214 (0.0177)	0.0933*** (0.0138)	0.0934*** (0.0138)	0.0335* (0.0179)
Tier 1 Capital Ratio	-0.00836*** (0.00195)	-0.00110 (0.00568)	0.00211 (0.00655)	-0.00687*** (0.00177)	-0.00179 (0.00552)	0.000584 (0.00667)	-0.00682*** (0.00178)	-0.00168 (0.00552)	0.00132 (0.00651)
C&I Loans (%)			0.00210** (0.000986)			0.00189** (0.000937)			0.00234** (0.000961)
Real Estate Loans (%)			0.00106 (0.000705)			-0.000467 (0.000754)			-0.000220 (0.000768)
Core Deposit Ratio			-0.00504*** (0.000737)			-0.00343*** (0.000746)			-0.00348*** (0.000775)
Service Quality * Tier 1 Capital Ratio		-0.00261 (0.00206)	-0.00404* (0.00236)		-0.00182 (0.00195)	-0.00300 (0.00230)		-0.00185 (0.00195)	-0.00288 (0.00227)
Observations	61,967	61,967	48,708	61,967	61,967	48,708	61,967	61,967	48,708
R ²	0.134	0.134	0.148	0.156	0.156	0.169	0.238	0.238	0.261
Adj R ²	0.133	0.133	0.147	0.154	0.154	0.166	0.190	0.190	0.201
State				Y	Y	Y			
State * Quarter							Y	Y	Y
Quarter FE	Y	Y	Y	Y	Y	Y			

Panel D	Loan Loss Provision Ratio								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Service Quality	0.00474*** (0.00181)	0.0175*** (0.00641)	0.0262*** (0.00727)	0.00381** (0.00180)	0.0161*** (0.00612)	0.0232*** (0.00712)	0.00420** (0.00186)	0.0166*** (0.00613)	0.0236*** (0.00706)
Log(Assets)	0.0160*** (0.00380)	0.0161*** (0.00380)	0.00786* (0.00472)	0.0180*** (0.00350)	0.0181*** (0.00350)	0.0111** (0.00449)	0.0206*** (0.00353)	0.0207*** (0.00353)	0.0143*** (0.00452)
Tier 1 Capital Ratio	-0.00397*** (0.000490)	-0.00109 (0.00141)	0.000250 (0.00160)	-0.00367*** (0.000436)	-0.000918 (0.00137)	0.000221 (0.00161)	-0.00340*** (0.000441)	-0.000617 (0.00137)	0.000719 (0.00158)
C&I Loans (%)			0.000912*** (0.000251)			0.000814*** (0.000234)			0.000970*** (0.000241)
Real Estate Loans (%)			0.000409** (0.000182)			-5.37e-05 (0.000185)			1.70e-05 (0.000189)
Core Deposit Ratio			-0.00154*** (0.000184)			-0.00113*** (0.000187)			-0.00111*** (0.000191)
Service Quality * Tier 1 Capital Ratio		-0.00103** (0.000502)	-0.00151*** (0.000566)		-0.000990** (0.000471)	-0.00139** (0.000548)		-0.00100** (0.000471)	-0.00138** (0.000541)
Observations	61,967	61,967	48,708	61,967	61,967	48,708	61,967	61,967	48,708
R ²	0.172	0.173	0.187	0.194	0.194	0.206	0.275	0.275	0.299
Adj R ²	0.171	0.172	0.186	0.193	0.193	0.204	0.229	0.229	0.242
State				Y	Y	Y			
State * Quarter							Y	Y	Y
Quarter FE	Y	Y	Y	Y	Y	Y			

Panel E	Z-score								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Service Quality	-8.516*** (0.492)	-6.892*** (2.101)	-7.771*** (2.328)	-7.927*** (0.488)	-5.644*** (1.993)	-5.996*** (2.147)	-7.867*** (0.505)	-5.730*** (2.009)	-5.934*** (2.135)
Log(Assets)	5.505*** (1.224)	5.517*** (1.225)	8.561*** (1.513)	4.497*** (1.208)	4.514*** (1.208)	6.804*** (1.504)	4.428*** (1.227)	4.442*** (1.227)	6.315*** (1.529)
Tier 1 Capital Ratio	2.314*** (0.197)	2.679*** (0.567)	2.602*** (0.634)	2.140*** (0.191)	2.654*** (0.520)	2.704*** (0.561)	2.155*** (0.195)	2.634*** (0.521)	2.699*** (0.553)
C&I Loans (%)			-0.266*** (0.0763)			-0.182** (0.0748)			-0.208*** (0.0788)
Real Estate Loans (%)			-0.129** (0.0520)			-0.182*** (0.0569)			-0.216*** (0.0597)
Core Deposit Ratio			0.325*** (0.0620)			0.266*** (0.0603)			0.253*** (0.0633)
Service Quality * Tier 1 Capital Ratio		-0.131 (0.175)	-0.118 (0.193)		-0.185 (0.165)	-0.207 (0.178)		-0.172 (0.165)	-0.203 (0.175)
Observations	61,645	61,645	48,416	61,645	61,645	48,416	61,645	61,645	48,416
R ²	0.162	0.162	0.175	0.197	0.197	0.208	0.253	0.253	0.276
Adj R ²	0.161	0.161	0.174	0.195	0.195	0.206	0.206	0.206	0.217
State				Y	Y	Y			
State * Quarter							Y	Y	Y
Quarter FE	Y	Y	Y	Y	Y	Y			

Table 8: Risk Pricing of Bank Liabilities

The sample ranges from 1995:Q1 to 2014:Q4 and includes only community banks (250 million to 1 billion in assets). The dependent variables, from left to right, are *Core Deposit Rate - 6-month T-bill*, where *Core Deposit Rate* refers to the annualized quarterly interest expense on core deposits normalized by average total core deposits, and *6-month T-bill* refers to the secondary market rate on 6-month Treasury Bills; *Deposit Rate - 6-month T-bill*, where *Deposit Rate* refers to the annualized quarterly interest expense on deposits normalized by average total deposits, and *6-month T-bill* refers to the aforementioned; and *Liabilities Rate - 6-month T-bill*, where *Liabilities Rate* refers to the annualized quarterly interest expense on liabilities normalized by average total liabilities, and *6-month T-bill* refers to the aforementioned. *Log(Assets)* is the natural logarithm of total assets. *Tier 1 Capital Ratio* is the ratio of tier 1 capital to total risk-weighted assets. *NPL Ratio* is the ratio of non-performing loans to total loans. *8-Qtr SD of ROA* is the rolling 8-quarter standard deviation of *ROA*. *ROA* is the bank's return on assets, measured as annualized net income normalized by total assets. *Service Quality* is measured by the annualized ratio of relevant noninterest expenses (including salaries, premises and fixed assets, and "other" non-interest expenses) to total assets. Bank fixed effects are included in all specifications. All Bank characteristics are measured using quarterly Call Report data. All variables are lagged. Standard errors are clustered on entity and reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

	Core Deposit Rate - 6-month T-bill				Deposit Rate - 6-month T-bill				Liabilities Rate - 6-month T-bill			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Log(Assets)	0.992*** (0.0434)	0.989*** (0.0434)	0.994*** (0.0434)	0.993*** (0.0434)	0.935*** (0.0413)	0.932*** (0.0413)	0.937*** (0.0413)	0.936*** (0.0413)	0.954*** (0.0412)	0.952*** (0.0412)	0.956*** (0.0412)	0.956*** (0.0412)
Tier 1 Capital Ratio	-0.000863 (0.0147)	-0.00470 (0.00575)	-0.00444 (0.00574)	-0.00414 (0.00575)	-0.0146 (0.0145)	-0.0213*** (0.00562)	-0.0210*** (0.00562)	-0.0208*** (0.00562)	-0.0220 (0.0145)	-0.0262*** (0.00558)	-0.0259*** (0.00558)	-0.0257*** (0.00559)
NPL Ratio	0.158*** (0.00755)	0.237*** (0.0235)	0.158*** (0.00758)	0.156*** (0.00755)	0.142*** (0.00744)	0.220*** (0.0229)	0.142*** (0.00746)	0.141*** (0.00744)	0.140*** (0.00737)	0.218*** (0.0227)	0.140*** (0.00740)	0.139*** (0.00737)
8-Qtr SD of ROA	0.0664*** (0.0152)	0.0711*** (0.0155)	0.245*** (0.0567)	0.0684*** (0.0152)	0.0560*** (0.0150)	0.0607*** (0.0152)	0.236*** (0.0555)	0.0578*** (0.0150)	0.0618*** (0.0149)	0.0664*** (0.0150)	0.241*** (0.0552)	0.0636*** (0.0149)
ROA	-0.346*** (0.0157)	-0.347*** (0.0157)	-0.347*** (0.0157)	-0.622*** (0.0407)	-0.351*** (0.0152)	-0.351*** (0.0152)	-0.351*** (0.0153)	-0.607*** (0.0399)	-0.349*** (0.0150)	-0.349*** (0.0151)	-0.349*** (0.0151)	-0.601*** (0.0397)
Service Quality	-0.0598 (0.0657)	-0.0330 (0.0273)	-0.0406 (0.0271)	-0.132*** (0.0225)	-0.0619 (0.0641)	-0.0477* (0.0265)	-0.0543** (0.0263)	-0.142*** (0.0221)	-0.0778 (0.0636)	-0.0533** (0.0257)	-0.0599** (0.0256)	-0.147*** (0.0216)
Service Quality *	-0.00139 (0.00471)				-0.00236 (0.00462)				-0.00152 (0.00463)			
Tier 1 Capital Ratio		-0.0255*** (0.00689)				-0.0252*** (0.00675)				-0.0251*** (0.00666)		
Service Quality *			-0.0551*** (0.0178)				-0.0558*** (0.0173)				-0.0555*** (0.0171)	
8-Qtr SD of ROA				0.0862*** (0.0108)				0.0801*** (0.0106)				0.0788*** (0.0106)
Service Quality *												
ROA												
Observations	61,589	61,589	61,589	61,589	61,589	61,589	61,589	61,589	61,589	61,589	61,589	61,589
R ²	0.433	0.433	0.433	0.434	0.425	0.425	0.425	0.426	0.428	0.429	0.429	0.429
Adj R ²	0.404	0.404	0.404	0.405	0.396	0.396	0.396	0.397	0.399	0.400	0.400	0.401
Entity FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Table 9: Robustness (Alternative Measures)

The sample ranges from 1995:Q1 to 2014:Q4 and includes only community banks (250 million to 1 billion in assets). The dependent variables, from left to right, are *Core Deposit Ratio*, the ratio of core deposits to total assets; *Core Deposit Rate*, which refers to the annualized quarterly interest expense on core deposits normalized by average total core deposits; *Liquid Assets Ratio*, the ratio of liquid assets to total assets; and *NPL Ratio*, the ratio of non-performing loans to total loans. *Service Quality* is the measure of service intensity; Alternative Measure 1 reflects expenses on fixed assets, advertising, ATM, and postage; Alternative Measure 2, reflects expenses on salaries, fixed assets, advertising, ATM, and postage; MSA FE uses MSA fixed effects on regressions using our standard definition of *Service Quality*, which is measured by the annualized ratio of relevant noninterest expenses (including salaries, premises and fixed assets, and “other” non-interest expenses) to total assets. *Log(Assets)* is the natural logarithm of total assets. *Core Deposit Interest Rate* is the annualized quarterly interest expense on core deposits normalized by average core deposits. *Unused Commitment Ratio* is the ratio of unused commitments to total assets. *Tier 1 Capital Ratio* is the ratio of tier 1 capital to total risk-weighted assets. *NPL Ratio* is the ratio of non-performing loans to total loans. *NCO Rate* is the annualized quarterly net-charge offs normalized by total loans. *Liquid Assets Ratio* is the ratio of liquid assets to total assets. *ROA* is the bank’s return on assets, measured as annualized net income normalized by total assets. *Real Estate Loans (%)* is the share of real estate loans in the bank’s loan portfolio. *C&I Loans (%)* is the share of commercial and industrial loans in the bank’s loan portfolio. *Senior Share* is the share of people who are above 65 years of age in each MSA, based on Census annual population estimate. All Bank characteristics are measured using quarterly Call Report data. All variables are lagged. Standard errors are clustered on entity and reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Panel A	Core Deposit Ratio			Core Deposit Rate			Liquid Assets Ratio			NPL Ratio					
	Alt. Measure 1	Alt. Measure 2	MSA FE	Alt. Measure 1	Alt. Measure 2	MSA FE	Alt. Measure 1	Alt. Measure 2	MSA FE	Alt. Measure 1		Alt. Measure 2		MSA FE	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Service Quality	6.904*** (0.681)	2.428*** (0.255)	1.652*** (0.290)	-0.581*** (0.0413)	-0.220*** (0.0137)	-0.183*** (0.0178)	-0.621 (0.718)	-0.803*** (0.239)	-0.401 (0.308)	0.981** (0.420)	0.654* (0.348)	0.0971 (0.128)	0.0985 (0.113)	0.265** (0.107)	0.237* (0.141)
Log(Assets)	-1.884*** (0.316)	-1.734*** (0.316)	-1.232** (0.549)	-0.0831*** (0.0161)	-0.0946*** (0.0159)	-0.114*** (0.0274)	1.574*** (0.340)	1.521*** (0.340)	1.770*** (0.506)	-0.102 (0.0676)	0.165*** (0.0524)	-0.0971 (0.0676)	0.170*** (0.0524)	-0.162** (0.0808)	0.132 (0.0893)
Core Deposit Interest Rate	-2.265*** (0.302)	-2.055*** (0.305)	-2.174*** (0.492)												
Unused Commitment Ratio							-0.221*** (0.0214)	-0.216*** (0.0213)	-0.226*** (0.0300)						
Core Deposit Ratio							0.158*** (0.0177)	0.167*** (0.0178)	0.169*** (0.0268)	-0.0114*** (0.00290)		-0.0108*** (0.00294)		-0.0105*** (0.00363)	
Tier 1 Capital Ratio				-0.0105*** (0.00282)	-0.00924*** (0.00267)	-0.0158*** (0.00456)	1.457*** (0.0502)	1.451*** (0.0503)	1.368*** (0.0790)	0.0141 (0.0166)	0.0110 (0.0139)	-0.00610 (0.0221)	0.00152 (0.0196)	-0.00739 (0.0266)	-0.00733 (0.0360)
Service Quality *										-0.0348 (0.0334)	-0.0111 (0.0282)	0.00159 (0.0104)	0.00171 (0.00928)	0.000740 (0.00846)	0.00203 (0.0116)
Tier 1 Capital Ratio															
NPL Ratio				0.00603** (0.00304)	0.00608** (0.00309)	0.0177*** (0.00523)									
NCO Rate				-0.0249*** (0.00452)	-0.0283*** (0.00460)	-0.0242*** (0.00779)									
Liquid Assets Ratio				-0.00777*** (0.000832)	-0.00858*** (0.000806)	-0.00888*** (0.00136)									
ROA				-0.131*** (0.00952)	-0.131*** (0.00953)	-0.146*** (0.0178)									
Real Estate Loans (%)										0.0155*** (0.00248)		0.0159*** (0.00248)		0.0133*** (0.00295)	
C&I Loans (%)										0.00606* (0.00314)		0.00630** (0.00315)		0.00506 (0.00386)	
Observations	63,789	63,789	42,892	61,967	61,967	41,418	61,967	61,967	41,418	48,708	61,967	48,708	61,967	33,377	41,418
R ²	0.294	0.297	0.553	0.881	0.884	0.914	0.430	0.432	0.641	0.285	0.339	0.283	0.337	0.374	0.567
Adj R ²	0.249	0.252	0.256	0.873	0.877	0.858	0.395	0.397	0.407	0.283	0.297	0.281	0.296	0.366	0.285
Fixed Effects	State * Quarter	State * Quarter	MSA * Quarter	State * Quarter	State * Quarter	MSA * Quarter	State * Quarter	State * Quarter	MSA * Quarter	State	State * Quarter	State	State * Quarter	MSA	MSA * Quarter

Panel B	Core Deposit Ratio		Core Deposit Rate		Liquid Assets Ratio		NPL Ratio	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Service Quality	-1.606 (1.514)	-1.248 (0.954)	0.0281 (0.0931)	0.00753 (0.0600)	1.759 (1.546)	1.599* (0.933)	0.373* (0.206)	0.355** (0.151)
Senior Share		-43.13 (49.27)		9.794*** (2.423)		57.23 (47.73)		19.42** (7.647)
Senior Share *	27.75** (12.18)	25.72*** (7.628)	-2.107*** (0.748)	-1.931*** (0.474)	-20.13* (12.06)	-18.12** (7.224)	-1.831 (1.608)	-1.656 (1.083)
Service Quality								
Log(Assets)	-1.558** (0.756)	-1.245** (0.483)		-0.144*** (0.0222)	1.454* (0.772)	1.712*** (0.508)	-0.0754 (0.106)	-0.0856 (0.0746)
Core Deposit Interest Rate	-1.629*** (0.589)	-1.165*** (0.358)						
C&I Loans (%)	-0.223*** (0.0447)	-0.190*** (0.0290)			0.148*** (0.0440)	0.140*** (0.0291)	0.00592 (0.00455)	0.00574* (0.00320)
Real Estate Loans (%)	-0.0885*** (0.0310)	-0.0891*** (0.0204)			0.00841 (0.0348)	0.000895 (0.0224)	0.0117*** (0.00335)	0.00936*** (0.00243)
Core Deposit Ratio					0.164*** (0.0396)	0.153*** (0.0245)	-0.0111** (0.00518)	-0.00738** (0.00328)
Tier 1 Capital Ratio			-0.0192*** (0.00572)	-0.0160*** (0.00382)	1.285*** (0.108)	1.229*** (0.0700)	-0.00328 (0.0416)	0.00411 (0.0251)
Service Quality *							0.00318 (0.0135)	0.00256 (0.00851)
Tier 1 Capital Ratio								
NPL Ratio			0.0261*** (0.00783)	0.0260*** (0.00504)				
NCO Rate			-0.0374*** (0.0114)	-0.0479*** (0.00715)				
Liquid Assets Ratio			-0.0101*** (0.00172)	-0.0105*** (0.00117)				
ROA			-0.196*** (0.0236)	-0.186*** (0.0146)				
Unused Commitment Ratio					-0.268*** (0.0378)	-0.260*** (0.0245)		
Constant	97.92*** (10.74)	97.73*** (8.516)	5.331*** (0.443)	3.817*** (0.413)	-16.37 (11.32)	-17.07* (8.855)	1.516 (1.612)	-1.156 (1.356)
Observations	26,111	26,111	30,888	30,888	24,712	24,712	24,712	24,712
R ²	0.641	0.459	0.872	0.820	0.687	0.530	0.638	0.390
Adj R ²	0.343	0.450	0.787	0.817	0.431	0.523	0.342	0.380
Fixed Effects	MSA * Quarter	MSA	MSA * Quarter	MSA	MSA * Quarter	MSA	MSA * Quarter	MSA

Data Appendix

This section provides thorough descriptions of how the variables that are used for the analyses are constructed. The first table lists formulas to calculate the necessary variable transformations, which use both balance sheet and income statement data values as inputs. The second and third tables provide the mnemonics and item numbers corresponding to the Call Report data that are used as inputs to calculating the variable transformations.

Variable	Definitions
NPL Ratio	$\text{Non-Performing Loans} / \text{Total Loans} * 100$
Loan Loss Provision Ratio	$\text{Provision Expense} / \text{Total Loans} * 100$
ROA	$\text{Net Income} / \text{Assets} * 400$
Z-score	$(\text{ROA} + 100 * \text{Equity} / \text{Assets}) / \text{Rolling 9-quarter Standard Deviation of ROA}$
NCO Rate	$\text{Net-Charge Offs} / \text{Total Loans} * 400$
Service Quality	$(\text{Non-Interest Expense (NIE) due to Salaries and Employee Benefits} + \text{NIE due to Premises and Fixed Assets} + \text{Other NIE}) / \text{Assets} * 400$
Log(Assets)	Log of Total Assets
Tier 1 Capital Ratio	$\text{Tier 1 Capital} / \text{Risk-Weighted Assets} * 100$
Core Deposit Ratio	$\text{Total Deposits Net of Time Deposits of Greater Than 100K} / \text{Assets} * 100$
Liquid Assets Ratio	$(\text{Cash} + \text{Reverse Repurchase Agreements} + \text{Investment Securities}) / \text{Assets} * 100$
Deposit Rate	$(\text{Interest Expense on Domestic Deposits} + \text{Interest Expense on Foreign Deposits}) / \text{Average Total Deposits} * 400$
Liabilities Rate	$\text{Interest Expense} / \text{Average Total Liabilities} * 400$
Core Deposit Rate	$(\text{Interest Expense on Domestic Deposits} + \text{Interest Expense on Foreign Deposits} - \text{Interest Expense on Time Deposits (>$100k)}) / \text{Average Total Core Deposits} * 400$
Assets Interest Rate	$\text{Interest Income} / \text{Interest Earning Assets} * 400$
Net Interest Margin	$(\text{Interest Income} - \text{Interest Expenses}) / \text{Interest Earning Assets} * 400$
Real Estate Loans (%)	$\text{Total Real Estate Loans} / \text{Total Loans} * 100$
C&I Loans (%)	$\text{Total C\&I Loans} / \text{Total Loans} * 100$

Balance Sheet Variables

Variables	Call Report Definitions
Assets	rcfd2170
Total Liabilities	rcfd2948 - rcfd3000 + rcfd3282 [19840331 - 19961231], rcfd2948 - rcfd3000 [19970331 - 20001231], rcfd2948 [20010331 - present]
Total Loans	rcfd2122
Real Estate Loans	rcfd1410
Commercial & Industrial (C&I) Loans	rcfd1763 + rcfd1764
Total Deposits	recon6631 + recon6636 + rcfn6631 + rcfn6636
Interest Earning Assets	rcfd0071 + rcfd1754 + rcfd1773 + rcfd1350 + rcfd2122 + rcfd3545 [19940331 - 20011231], rcfd0071 + rcfd1754 + rcfd1773 + recon987 + rcf1b989 + rcfd2122 + rcfd3545 [20020331 - present]
Risk-Weighted Assets (RWA)	rcfda223 [19960331 - 20141231]
Tier 1 Capital	rcfd8274 [19940331 - 20141231]
Cash	rcfd0010
Federal Funds and Reverse Repurchase Agreements	rcfd1350, if missing after 20020331 then recon987 + rcf1b989
Investment Securities	rcfd1754 + rcfd1773
Equity	rcfd3210
Non-Performing Loans	rcfd1407 + rcfd1403
Total Time Deposits of 100K or more	recon6645 + recon6646 [19950331 - 19961231], recon2604 [19970331 - 20091231], reconj473 + reconj474 [20100331 - present]

Income Statement Variables*

Variables	Call Report Definitions
Provision Expense	riad4230
Net Income	riad4340
Net-Charge Offs	riad4635 - riad4605 [19760331 - 20010331], riad4635 + riad5523 - riad4605 [20010630 - 20011231], if riad4635 is missing and riad5523 not missing, then -riad5523 - riad4605 , else if riad5523 missing and riad4635 not missing, then riad4635 - riad4605 , else riad4635 - riad5523 - riad4605 [20020331 -
Interest Income	riad4107
Interest Expense	riad4073
Interest Expense on Domestic Deposits	riad4174 + riad4512 + riad4511 + riad4509 + riad4508 [19870331 - 19961231], riada517 + riada518 + riad4511 + riad4509 + riad4508 [19970331 - 20001231], riada517 + riada518 + riad0093 + riad4508 [20010331 - present]
Interest Expense on Foreign Deposits	riad4172
Interest Expense on Time Deposits (>\$100k)	riad4174 [19840331 - 19961231], riada517 [19970331 - present]
Non-Interest Expense due to Salaries and Employee Benefits	riad4135
Non-Interest Expense due to Premises and Fixed Assets	riad4217
Other Non-Interest Expenses	riad4092

* All variables are "quarterized" and converted to quarterly figures from YTD figures.