(How) Do depositors respond to bank's discretionary behaviors? Market discipline, deposit insurance, scale effects and crisis

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Highlights

- We examine the association between the costs of deposits and bank's earnings management, and document higher deposit rates at banks that engage more in earnings management
- Depositors monitor bank's dicretionary behaviors in a lessen extent during the crisis, but become more severe after the crisis.
- Depositors do not monitor discretionary behaviors of large banks before and during the crisis, but after the crisis.
- There is evidence of monitoring from insured depositors, but not uninsured depositors during the crisis.

Abstract

Using a large panel of US bank holding companies from 2001 to 2015, this study investigate how depositors respond to the bank's discretionary behaviors. We document evidence of a higher deposit rates for banks that engage more in earnings management, suggesting the evidence of market discipline. Depositors seem to monitor bank's discretionary behaviors at a lesser extent during the crisis time, potentially due to the governement intervention, but they become more severe after the crisis. Interestingly, there is no evidence of depositors monitoring for large banks before and during crisis, suggesting the "too-big-to-fail" perception of depositors. However, this perception is wiped out after the crisis when we observe a stronger market discipline in large banks. The study also documents evidence of monitoring from insured depositors, but not uninsured depositors during the crisis, suggesting that the deposit insurance schemes are not always fully credible. After the crisis, insured depositors seem to increase more their monitoring than uninsured depositors. Our study is of interest to regulators and policymakers who are concerns of strengthening the market discipline.

JEL Classification Codes : G21, G28, G34, G38

Keywords: *bank earnings management; market discipline; deposit rates; deposit insurance*

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1. Introduction

Over the past decades, the banking sector undergoes profound transformations. Banks become more complex, hold huge positions in highly sophisticated products on on- and off -balance-sheet, presenting then challenges to regulators to assess and to examine thoroughly their financial situations. Since their main function is intermediation, banks are subject to default risks. To shield against default, banks have to hold capital to absorb losses from their investments in risky assets. The problem arises when the solvency of banks may not take into account of the interests of depositors, and of the whole society (Nier and Baumann (2006)). And to avoid traumatic events, the standard recommendation is to strengthen regulation and supervision. However, regulators and policy makers due to their limitation of human resources, and knowledge cannot oversee thoroughly bank risk taking incentives. They are increasingly aware of the importance of the markets participants. They realize what benefits can bring from the market discipline, and then advocate market discipline as a complement tool to the traditional regulatory discipline (Meyer (1999)).

The underlying intuition of regulators is that private agents, including creditors, depositors and stockholders, may collectively provide greater, *and/or* at least a more continuous oversight than understaffed regulators (Bliss (2004)). By actively rewarding or punishing banks about their risk taking behaviors, the holders of bank liabilities can force banks back toward the adequate level of risks they would choose, in the absence of any friction from governments or markets, i.e., if the price of debts correctly incorporates full and qualitative information of bank credit risks proprieties, and then reflects the fair yield for risks. Indeed, when banks take excessive risks, investors in bank liabilities can ask for higher yield or request for the funds back, leading to costlier risk taking behaviors for banks, and further promote the financial system's stability.

In the aftermath of the last financial crisis of 2007 with the failures of a large number of banks and the ensuing economic recessions, many critics are advanced, but one of the most cited reasons is related to inefficient regulatory and market discipline of banks. Some may even ask whether market discipline can still be used as a channel to supervise banks (Acharya, Anginer, and Warburton (2016)), because what happens during the crisis may send mixed signals to depositors regarding to the intervention of governements, the safety of banks, and consequently the need to monitor banks.

On the one hand, the unprecedented number of supports from government in a plethora of countries[1] following the last financial crisis renews and heightens concerns about moral hazard arising from investors' expectations of the government guarantees. That is, the government is believed to extend far beyond the *de-jure* boundaries of insured depositors, and *de-facto* protect other banks liability holders.[2] A bulk of failing bank bailouts and the resulting protection of uninsured claimants from bearing the full losses reinforce this market perception, mitigating the incentives to engage ex-ante in actively monitor banks. Recently, studies reveal the government intervention weaken the overall market discipline (Cubillas, Fonseca, and González (2012), Berger and Turk-Ariss (2014)). On the other hand, the large numbers of bank failures during and after the crisis can also entail a "wake up call" for depositors (Martinez Peria and Schmukler (2001), Karas, Pyle, and Schoors (2010), Karas, Pyle, and Schoors (2013), Iyer and Puri (2012)) since these events put investors of bank liabilities at risk – a preliminary condition helps to start the discipline being exerted.

Hence, the question of whether depositors exert their monitoring on banks remains unclear. In this study, we assess the monitoring of depositors on the moral hazard problems of banks through the bank's earnings management. Banks are inherently more opaque than other firms. They are indeed black boxes (Morgan (2002)). Through the intermediation process, there are cash inflows and outflows, but outsiders experience difficulties to observe the risk taken from banks (Tran and Hassan (2018)). When banks manipulate their reported numbers, this induces greater opacity and interfere with the private governance and official regulation of banks (Jiang, Levine, and Lin (2016)), leading higher opportunities for expropriation. As market discipline from depositors can be reflected through the higher interest rates of deposits, and as bank earnings management create asymmetric information, we focus on *how yields on deposits respond to this opportunistic behavior*. This question is crucial. Related to the literature of bank's earnings management, prior studies document that earnings management affects the cost of equity (Bhattacharya, Daouk, and Welker (2003)), the cost of debt through the credit rating (Shen and

[1] The first victim of the crisis of 2007 is surprisingly not in US, but in UK - Northern Rock – which is nationalized in February 2008. The list of casualties extends further when the tension mount over the course of 2008. USA: Indy Mac, Fannie Mae, Freddy Mac; UK: Bradford & Bingley,RBS, HBOS, Lloyds; Germany: IKB, Hypo Real Estate; Belgium/Netherlands: Dexia, Fortis; Iceland: Glitnir, Landsbanki, and Kaupthing; etc. Some countries provide blanket guarantees such as Germany, Italy. See e.g. King (2009)

[2] In order to prevent bank runs, the U.S. government temporarily increased the level of deposit insurance from $100,000 to $250,000 in 2008:Q3, an increase made permanent in the Dodd-Frank act.

Huang (2013)). Concerning the market discipline's literature, studies primarily focus on how depositors punish bank risk taking (Hannan and Hanweck (1988), Ellis and Flannery (1992), Martinez Peria and Schmukler (2001)). However, the presence and the generosity of explicit deposit insurance weakens market discipline (Demirgüç-Kunt and Huizinga (2004)). Berger and Turk-Ariss (2014) document a decrease of market discipline which is primarily attributed to the decreased discipline for large and listed banks, suggesting the moral hazard problem from government interventions. Correa, Sapriza, and Zlate (2016) document that the U.S. branches of euro-area banks experience a (large time) deposit run during the European sovereign debt crisis in 2011. And this shock is related to their euro-area affiliation rather than to country- or bank-specific characteristics.

This study complements these two strands of literature by empirically examining *three issues*. First, we provide one of the first investigation on how depositors assess the bank's discretionary behaviors. Since depositors could punish banks by ex-post withdraw their funds (in extreme case, depositor runs), and by ex-ante adjust the funding costs. Market discipline would be more efficient and orderly if the bank's costs reflect truly their risk (Ellis and Flannery (1992)). In other words, we would like to investigate *whether the costs of deposits vary directly with the bank's earnings management*. Second, we study how the behavior of depositors change over the different periods of time. Finally, we examine the effects of size and deposit inusrance on depositor's discipline.

To this end, we use a large sample of US bank holding companies (BHC) from 2000:Q1 to 2015:Q4. Following Jiang, Levine, and Lin (2016), Tran and Ashraf (2018), we measure bank's earnings management by focusing on the provisions on loans losses (LLP). LLP are by far the most critical accruals in bank accounts (Ryan (2012), Beatty and Liao (2014)). They are typically large relative to net income and equity capital (Healy and Wahlen (1999)), which are served as signal of health for bank's stakeholders such as creditors or regulators (Bushman and Williams (2012)). Due to high dependence on the judgment of managers, LLP reflect information asymmetry. We use the preferred model of Beatty and Liao (2014) in our main analysis since there is no consensus on how to best model discretionary provisions even if there are large body of literature on the earnings management by shaping an underlying model to capture the LLP characteristics. This model allows us to a better separation of the normal LLP that are supposed to capture all adjustments reflecting banks' fundamental performance, from the abnormal LLP that

are, at least in part, due to managerial discretion. The residual LLP is used as proxy of earnings management. This unexplained portion of LLP – the discretionary LLP (DLLP) reflects the degree of earnings management, that is, a greater unexplained component implies higher level of earnings management.

Following Levine, Lin, and Xie (2016), we use the (natural logarithm) bank's costs of (domestic) deposits as the proxy of market discipline. That is the implicit rates defined as the interest expenses on deposits divided by the quarterly average of the deposits.

In the next stage, we perform our baseline investigation on the effects of earnings management on bank's deposit rates. Controlling for the effects of different bank characteristics and time fixed effects, our empirical analysis provides consistent evidence on a higher costs of deposits for banks that engage more in accounting management through discretionary LLP (DLLP). The evidence suggests that depositors exert their monitoring on banks, and punish banks that have higher information asymmetry derived from earnings management.

To make sure that our findings are robust, we provide a battery of sensitivity tests. First, we perform our analysis (i) with the inclusion of additional variables and bank fixed-effects to deal with potential omitted variables, (ii) using only the fourth quarter since managers are more likely to engage in earnings management during the fourth quarter rather than other fiscal quarters, (iii) using balanced data to mitigate the effects of mergers and acquisitions activities and bank defaults on our investigation of bank discretionary behavior, with the costs of over-representation of "successful" banks, (iv) excluding the crisis period, M&A banks, (v) separating private versus listed banks. The results of our robustness tests lend support to our previous finding.

Second, we use the quantile regression instead of OLS approach since the traditional inference approach (i.e.OLS) represents the average behavior of the sample with the assumption of the homogeneity of the effects of earnings management on bank's funding costs (Tran and Hassan (2018)). We find that the relationship between earnings management and deposits costs is uniform in sign (positive), but increases in magnitude with the increase of quantiles. This evidence indicates earnings management not only affects the conditional average deposits costs, but also influences the dispersion of deposits costs.

Third, we re-estimate the analysis with alternative measures of earnings management and funding costs. For alternative measures of bank earnings management, we begin by using the deviation of DLLP of bank i at time t from the average of the industry at time t as measure of bank

earnings management (Model (1)). Next, since increasing LLP can convey private information about bank's future prospect, involving a transparency-enhancing accounting discretion rather than earnings management (Tran and Ashraf (2018)), we only consider the negative DLLP in Model (2)). In Models (3)-(5), we next use three different models to measure bank's discretionary as suggested in Beatty and Liao (2014). In all specifications, we find qualitatively similar results.

For alternative measures of deposit rates, we first focus on the change of the deposit rates which reflects the responsiveness of depositors to the discretionary behaviors of banks (Model (1)). Following Acharya and Mora (2015), in Model (2), we use the costs of core deposits that are commonly viewed as the most stable source of funding. In Model (3), following Levine, Lin, and Xie (2016), we compose the total costs of funds which is the ratio of total interest expenses over the interest-bearing liabilities. In all specification, our results remain unchanged.

Next, we address the endogeneity concerns since our results may be derived from the unobservable bank characteristics that simultaneously affect the deposit rates and the earnings management behavior of banks, which in turns lead to potential bias in the OLS framework. We begin with the propensity score matching by matching each bank that engage the most in earnings management with another banks that has the closet propensity score with a caliper of 0.0005 to minimize the risk of bad matches. We also use an instrumental variables approach. In all specifications, our findings remain quantitatively similar to our main evidence.

Having established the evidence of higher funding costs for banks that engage more in manipulation earnings, we perform further investigations to document whether depositors respond differently to bank's discretionary behaviors within different cirscumstances. We begin by investigating the effects of the last financial crisis. The banking crisis would be a unique occasion to analyze the market discipline. During the turmoil times, banks face greater difficulties, and are more likely to go bankrupt. Depositors consequently become more aware of the risk of losing their deposits, then they increase market discipline during the crisis. However, due to the potential costs of a banking crisis, governments are more likely to respond with containment and resolution policies that reinforce the safety nets of banks and protect depositors. The moral hazard as a result of government intervention at the start of the crisis could decrease the market discipline. These factors may induce an offset effect to the discipline of depositors during the crisis. Furthermore, the deposit insurance funds could be wiped out during the traumatic episodes, leading to a decrease of the ability to rescue banks. Thus, the market discipline may become stricter after the crisis

(Martinez Peria and Schmukler (2001)). We start by comparing the bank's deposit rates during the crisis by taking into account the bank characteristics of the pre-crisis period. To do so, we regress our baseline model for the pre-crisis period, then use the estimated coefficients to predict deposit rates of banks during the crisis. By comparing these predicted deposit rates with actual deposit rates during the crisis, we document how the deposit rates during the crisis should be if they were in pre-crisis time. We observe banks would pay less their deposit rates during the crisis. Next, we perform our main analysis for the periods before, during and after the crisis of 2007. We document there is always evidence of market discipline over these periods. Depositors pay attention for bank's discretionary behavior during normal times (pre-crisis period). During the crisis time, we document depositors still monitor banks, but at a lesser extent than during normal times due to the moral hazard induced from the government intervention, suggesting that there exists an offset effect to the discipline of depositors during the crisis. And depositors become more severe with bank's discretionary behavior after the crisis, indicating a rise of market discipline after crisis. Indeed, one standard deviation increase of DLLP, holding all other equal, results to an increase of the deposit rates of 2.61, 2.56 and 2.73 bps for the before, during and after crisis periods, respectively.

Next, we examine the scale effects on market discipline. During the last crisis, many large banks are rescued, reviving the debate over the negative effects of the scale effects, or in extreme case, the "too-big-to-fail" policy. The expectations of bailout would reduce the incentives of creditors, depositors and other stakeholders to monitor and exert discipline over bank's operations, leading to an increased risk-taking in banks, and ultimately to a greater financial instability. We first report results by bank size ranges (Assets under $1B, between $1B and $5B, and over $5B) over full period of study to investigate whether our core finding is concentrated in a particular bank size class. We find that the larger the banks, the higher the monitoring from depositors, and the higher the deposit rates. This suggests there exists an evidence of market discipline over the bank's size ranges. However, the depositor's behavior may change over the period as documented aboved. We then re-perform our analyses during different periods: before, during and after the crisis. For the periods before and during the crisis, depositors seem to monitor discretionary behaviors of small (assets under $1B) and medium (assets between $1B-$5B) banks, but not for larger banks (assets over $5B). These results are interesting since they show the evidence of "too-big-to-fail" perception of depositors. For the periods after the crisis, we still document the

disicipline of depositors for medium banks, but not for small banks. Interestingly, we find a rise of market discipline for large banks. Potential explanations are the followings. During the crisis, many large banks are rescued due to their risk-taking, which in turn may sensibilize depositors after the crisis to exert an increased monitoring for those banks. Furthermore, deposit insurance funds might be depleted during the turmoil time, leading to a decreased ability of insurance schemes to guarantee deposits (Martinez Peria and Schmukler (2001)). Consequently, we observe an increase in market discipline after crisis, especially for large banks.

We end up our investigations by focusing on the potential effects of the deposit insurance scheme through the comparison of the behaviors of insured and uninsured depositors. We separate insured and uninsured deposits, i.e. deposits under $100,000 and $100,000 and more, respectively.[3] We suggest that uninsured depositors should be more severe than insured depositors since they face higher risk of lost their funds. We re-run our investigation across type of deposits for full sample period. We also run the analyses across sample periods to see how different type of depositors behavior before, during and after the crisis. We document that uninsured depositors require higher deposit rates to banks that engage more in earnings management than insured depositors. Interestingly, when performing our analysis across sample periods, we find before the crisis, there is no market discipline from insured deposits whereas uninsured deposits still pay attention to bank's discretionary behavior. During the crisis, both types of depositors exert their discipline. However, when we split the crisis period into two sub-periods, we document the market discipline from insured deposits but not from uninsured deposits. And after the crisis, there is also the evidence of market discipline, and insured depositors seem to be more severe than uninsured depositors. This finding is interesting, and consistent with the evidence documented by Martinez Peria and Schmukler (2001) in Argentina, Chile, Mexico. It suggests that deposit insurance does not appear to diminish the extent of market discipline. The finding that insured depositors discipline banks during the crisis may be related to a number of reasons. According to FDIC's statistics as of June 2008, less than 2% of all bank accounts were above the $100,000 limit, and the average account balance of all deposits at FDIC-insured banks was $12,665 (Pozen (2009)).

[3] One may argue that the increase of deposit insurance limit of $250,000 from $100,000 in October 2008 may also affect the monitoring incentives of wealthy depositors who were previously uninsured (Pozen (2010)). We cannot have the data on deposits under or more than $250,000 since banks start to disclose the information after 2016. However, the increase of deposit insurance limit is coincided with the second phrase of crisis (CRISIS 2: 2008:Q3-2009:Q2), then we will assess the effects of deposit insurance change at this time period.

These depositors would have more risk averse than others, and are more sensitive during the crisis times. Furthermore, depositors may not want to face any costs related to bank failures since it could take time for the repayments from insurance funds, imposing liquidity costs for depositors (Martinez Peria and Schmukler (2001)).

Our study contributes to the literature in several ways. First, our study contributes to the market discipline literature by providing one of the first investigation of depositor's behavior on bank's discretionary behavior. Previous studies mostly focus on bank's risk-taking behavior. We take a different view when assessing the discretionary behavior of banks proxied by the measure of earnings management. When bank manipulates earnings, it alters financial reports to mislead outsiders. Our main results suggest that depositors punish banks that engage more in earnings management by requiring higher deposit rates.

Second, our study contributes to the earnings management literature. Previous studies typically focus on the influence of earnings management on the cost of capital (Bhattacharya, Daouk, and Welker (2003)), on the cost of debt (Shen and Huang (2013)). Our study complements the literature by providing the impacts of earnings management on the costs of deposits – a major source of funding of banks.

Third, the study provides the evidence of the effects of earnings management over the entire range of the deposit rates distribution. The traditional inference approach (i.e. the ordinary least squares) reflects the mean behavior of the sample due to the assumption of the homogeneity in the relationship between deposit rates and earnings management. However, with a sample as heterogeneous as ours is concerned, this approach could be a poor method to examine the relationship between deposit rates and earnings management across the entire industry. Rather than relying on a single description of the central behavior of the sample, the quantile approach explores a range of conditional quantile functions, which in turn allows us to explore potential forms of conditional heterogeneity (Tran, Hassan, and Houston (2018)). We document that the positive effects of earnings management increase in conditional high deposit rates.

Fourth, our study documents one of the first evidence of the change of depositor discipline after the crisis. We find that the discipline from depositors is lower during the crisis time, and more particularly, there is no discipline from depositors for larger banks. We also find that deposit insurance does not appear to diminish the extent of market discipline during the crisis time.

We believe that our study is of interests of regulators and policy makers. The literature generally argues the existence of deposit insurance would weaken the market discipline from private agents. The evidence of market discipline of insured depositors during the crisis time suggests that the deposit insurance schemes are not always credibles.

The next section describes the data and variables. Section 3 reports the main results and alternative tests. We provide additional tests in Section 4. Section 5 concludes the study.

2. Data, and variables

2.1 Sample banks

The Federal Reserve provides quarterly Y-9C regulatory reports filled by bank holding companies (BHC) with assets of $150 million and over. Our raw data cover the period 2001:Q1 to 2015:Q4. We remove any bank-quarter observations with missing or incomplete financial data on accounting variables in the main regression model. Following Berger and Bouwman (2013), we replace all observations with the ratio of total equity over total assets less than 1% by 1% to avoid distortion in ratios that contain equity, and also exclude observations with negative or nonexistent outstanding loans or deposits. Our dataset contains 54,821 observations for 2,482 BHCs. All financial ratios are winsorized at 1% level on the top and bottom of their distribution to dampen the effects of outliers.

2.2. Bank's cost of deposits, earnings management and other control variables

Following Levine, Lin, and Xie (2016), Gilje, Loutskina, and Strahan (2016), we use the natural logarithm of the (domestic) cost of deposits. The cost of deposits is measured as the interest expense on deposits during a quarter divided by the deposits at the beginning of the quarter. Table 2 provides summary statistics for all variables. The average cost of deposits for the period of 2000:Q1-2015:Q4 is about 2%.

Following Jiang, Levine, and Lin (2016), Tran and Ashraf (2018), Tran, Hassan, and Houston (2018), we employ the Beatty and Liao (2014) preferred model of LLP estimation, and use the abnormal of *LLP* as a proxy of bank earnings management.

$$llp_{it} = \alpha + dnpl_{it+1} + dnpl_{it} + dnpl_{it-1} + alw_{it-1} + cho_{it} + size_{it} + dloan_{it} + csret_{it} + dgdp_{it} + dunemp_{it} + \epsilon_{it} \quad (1)$$

Once the model (1) is estimated, we then use the forecasted value to estimate the non-discretionary *LLP*, and the discretionary *LLP* fall out as the prediction error (Tran and Ashraf (2018)). We compute the absolute value of both positive and negative residuals, and assign it to bank opacity. Higher (absolute) value of abnormal LLP reflect higher discretionary behavior in bank management, increasing the bank opacity.

In assessing the impact of earnings management on deposit rates, we control for several time-varying bank characteristics. The costs of funding may differ according to bank size, or between banks with different leverage, we include banks size (SIZE), capital ratio (CAPITAL). We also control for differences in profitability by including banks performance (EARNINGS), assets growth (GROWTH). Finally, we include the bank bussiness model (NII). See Table 1 for definitions, and Table 2 for summary descriptive.

3. Does earnings management affect bank's funding costs?

3.1. Main findings

In this section, we conduct multivariate analysis to formally investigate the magnitude of bank' earnings management on funding costs after controlling other control variables. Specifically, the empirical specification we estimate is as follows:

$$Y_{it} = \alpha + DLLP_{it-1} + Z_{it-1} + \theta_t + \varepsilon_{it} \quad (2)$$

where Y_{it} is the measure of funding costs of bank *i* at time *t*. We use the natural logarithm of the costs of deposits (LN_COST_DEPO) as the main proxy in our investigation. Our variable of interest is the discretional loan loss provisions, DLLP, which is defined above. Z_{it} is the vector of control variables described above. We use the lag of DLLP and control variables to take into account that the information from balance sheet is available to the public with a certain delay. We include time-fixed effects, θ_t, to control for the macroeconomic conditions, common across banks. ε_{it} is the error term. Since COST_DEPO is likely to be correlated within a bank over time, standard errors used to assess significance are corrected for heteroscedasticity and bank-level clustering.

Our main results from the multivariate analysis are shown in Table 3. Model (1) includes only our variable of interests (DLLP) and time fixed-effects. Model (2) represents our baseline model with the inclusion of our control variables. In both models, the coefficients on our main variable of interest, DLLP, are positive and highly significant. For example, in our baseline model,

one standard deviation increase of DLLP (roughly twice the difference between a 75th percentile bank and a 25th percentile bank), holding all other equal, results to an increase of the costs of deposits of 2.9 bps (i.e. the coefficient of DLLP, 4.851, times the standard deviation of DLLP, 0.006). The results suggest an economically large, positive relation between the funding costs of banks and the management of LLP. This evidence indicate that the funding costs would be higher in banks that engage more in earnings management.

In Model (3), we rank DLLP variable into quartiles and create a variable called DLLP_QUARTILE, which takes value ranging from 1 (lowest) to 4 (highest). This approach allows us to generate greater variation in the distribution of bank's earnings management. Again, we still obtain a positive and significant coefficient on DLLP_QUARTILE.

Although we include control variables identified in literature in our baseline model, there may exist some omitted and correlated variables. In Models (4), we extend our baseline model by controlling for the effect of the quality of bank' loan portfolio as measured by the ratio of non-performing loans over the total loans (NPL), negative net income indicator variable (DUMMY LOSS). Again, we observe that higher DLLP banks experience higher costs of deposits.

Next, in Model (5), we include the bank fixed-effects to take into account the unobservable bank invariant characteristics such as corporate culture, bank management, etc. and we still reach similar findings.

In Model (6), we perform our baseline model with a single cross-sectional regression (average analysis) to deal with the potential error-dependence problem (Tran and Hassan (2018)). By performing this time-series mean regression (one observation per bank), we eliminate the problem of serially correlated errors. This estimation still keeps the heterogeneity across banks but does not exploit the time-series variation in the observations (Tran, Hassan, and Houston (2018)). Our findings are comparable to our earlier results.

In Model (7), we re-perform our baseline model with only the data of the fourth quarter. This specification is motivated by findings of prior literature suggesting that managers are more likely to engage in earnings management during the fourth quarter rather than other fiscal quarters (Liu, Ryan, and Wahlen (1997)). Again, we document that the costs of funding are higher in banks that encounter more earnings management.

Our sample covers the financial crisis of 2007-2009 which critically affect the US banking industry. One may concern whether our findings are driven by the crisis period which often bring

about large change in the environment where banks function, resulting a large structural breaks in bank's discretionary behaviors and their funding costs. To address this issue, in Model (8) we re-perform our main analysis by excluding the crisis period. Our results continue to hold in this subsample. The coefficient on DLLP decreases slightly from our baseline model (Model (2)), suggesting that the relation between DLLP and LN_COST_DEPO would be more positive during the crisis. However, as indicated in prior studies, the last crisis is special. It is indeed the crisis of banks as liquidity providers (Acharya and Mora (2015)), then it is worth investigating separately. We address more parsimoniously in the next section.

In Model (9), we exclude banks that engage M&A since banks may decide to acquire target banks that have large base of funding sources. Our results remain unchanged. In Models (10), (11), we re-perform our analysis with two subsample of private and listed banks. Listed banks are usually larger, more diversified. Furthermore, even though depositors of both public and private banks are insured and explicit regulatory reporting and capital requirements are the same for public and private banks (Beatty, Ke, and Petroni, 2002), being listed helps regulators identify concerns at a bank since information of public banks is up-to-date. A greater amount of timely information leads to a faster reaction by regulators (Tran, Hassan, and Houston (2018)). In both models, we still find that manipulating earnings leads to higher costs of deposits, and the effects seem to be more severe in listed banks.

Regardless of the control variables, the results also document the evidence of depositor responsiveness to the bank characteristics. Large, well-capitalized and diversified banks enjoy lower costs of deposits. High profitable banks also experience lower costs of funding, however, the coefficient is not statistically significant. [4] We document that the costs of funding are higher for high growth banks, but the coefficient is not significant. Additionally, banks with greater amount of preexisting commitments outstanding offer lower rates of deposits whereas banks reliant on wholesale funding pay higher deposit rates on average.

[4] In an unreported test, we use alternative measures of bank size. First, since size is, to a large extent, an outcome of bank decision making, then is highly correlated with other independent and dependent variables, we decompose bank size with respect to all other independent variables into two components: an organic growth component that is measured by the fitted value, and a historical size component that equals to residual. Orthogonalizing size allows us to derive the pure effects of size De Jonghe (2010). Second, we also check for the nonlinear relationship between earnings management and size by including size-decile fixed effects to control for unobserved heterogeneity across banks in different size categories as suggested in Ellul and Yerramilli (2013). We obtain similar results.

In brief, our findings indicate that banks that engage more in earnings management heighten the asymmetry information between insiders and outsiders, become consequently more opaque and have to offer higher deposit rates.[5] It means that, depositors require higher interest rates when banks engage more in earnings management. The results indicate that there is evidence of market discipline.

3.2. Quantile regressions

In Table 4, we perform quantile regression – a generalization of median regression analysis to other quantiles - to assess whether the association between deposit rates and earnings management differ across the distribution of deposit rates. The traditional inference approach (i.e. the ordinary least squares, OLS) used above represents the average behavior of the sample with the assumption of the homogeneity of the effects of earnings management on bank's funding costs (Tran and Hassan (2018)). However, when there exists an important heterogeneity in the sample, the use of the traditional approach might not be ideal. Rather than relying on a single description of the central behavior of the sample, the quantile approach explores a range of conditional quantile functions - models in which quantiles of the conditional distribution of the deposit rates are expressed as functions of observed covariates, which in turn allows us to explore potential forms of conditional heterogeneity (Tran, Hassan, and Houston (2018)). Furthermore, the quantile regression approach avoids the restrictive assumption that the error terms are identically distributed at different distributions of the bank's funding costs (Klomp and Haan (2012)).

The coefficients on DLLP in Models (1) - (3) show the impact of earnings management on bank's deposit rates is indeed uniform in sign (positive) but increases significantly in magnitude with the increase of quantiles. In the lower part of the table, we also provide the results of interquantile range regressions, i.e. the regressions of the difference in quantiles. The standard errors are obtained by bootstrapping. 100 samples are drawn and two selected quantile regressions were estimated on each sample (i.e. 75^{th} vs 25^{th}, 50^{th} vs 25^{th}, 75^{th} vs 50^{th}). For convenience, we provide only the coefficients on our main variable of interests, DLLP. Overall, our empirical findings indicate the discretionary behaviors are not only affects the conditional average funding costs, but also affects their distribution.

[5] We also examine additional specifications to control for other sources of unobserved heterogeneity such as including the state fixed-effects to control for cross-market variation in deposit rates, bank*state-fixed effects to control for the strategies specific to the markets. We still find similar findings.

3.3. Alternative measures of earnings management

In Table 5, Panel A, we re-conduct our baseline model with alternative measures of bank earnings management. In Models (1), to mitigate the effects of outliers, we use the natural logarithm of *DLLP*. We next use the deviation of DLLP of bank i at time t from the average of the industry at time t as measure of bank earnings management in Model (2). In all specifications, our main findings are unchanged.

Since the positive DLLP could be a signal of private information that managers would like to send to the markets, and by consequence, enhance the quality of information of the firms[6] (Tran and Ashraf (2018)), we then re-estimate Equation (2) using only negative DLLP in Model (3), and find similar result.

Finally, we use three alternative models in Beatty and Liao (2014) to compute the DLLP. We next re-estimate our main model. The results are shown in Models (4)-(6), confirm previous finding on the higher deposit rates of banks that manipulate more their earnings.

3.4. Alternative measures of funding costs

In Table 5, Panel B, we re-conduct our baseline model with alternative measures of bank's funding costs. We first focus to the change of deposit rates in Model (1). Using the change of deposit rates would reflect the responsiveness of depositors to the discretionary behaviors of banks. The results in Model (1) confirm the earlier findings.

In Model (2), following Levine, Lin, and Xie (2016), Demirgüç-Kunt and Huizinga (2004), we compose the total cost of funds equals which is the ratio of total interest expenses over the interest-bearing liabilities. This measure of overall cost of bank debts reflects the implicit interest rate on bank liabilities, and is different across bank and time due to the heterogeneity of interest rates and debt maturity. In Model (3), we divide the total interest expenses over the total assets instead of interest-bearing liabilities. In all specifications, our findings remain unchanged, suggesting that banks that manipulate their earnings would encounter higher costs of funding.

[6] See e.g. Beaver et al. (1989), Wahlen (1994), Beaver and Engel (1996), Liu and Ryan (1995), Liu, Ryan, and Wahlen (1997) who find positive reactions of stock markets with discretionary accruals when future cash flow prospects improve. In contrast, Ahmed, Takeda, and Thomas (1999) do not find support for the signaling incentives in banks whereas Kanagaretnam, Lobo, and Yang (2004) find less consistent evidence.

3.5. Endogeneity concerns

Our results may be derived from the unobservable bank characteristics that simultaneously affect the deposit rates and the earnings management behavior of banks, which in turns lead to potential bias in the OLS framework. Thus, we complement our OLS estimation with different approaches: the instrumental variables approach and the propensity score matching (PSM). These procedures should control for any selection bias that could be present in the above estimation. The results are tabulated in Table 6.

We first employ the propensity score matching (PSM) system developed by Rosenbaum and Rubin (1983) and extended by Heckman et al. (1997). To conduct propensity score matching (PSM), we separate the full sample into quartiles by discretionary behaviors. We measure the propensity of a bank engaging the most in earnings management by using a logit model with the full set of control variables. We also add in this logit model an instrument variable, the average of earnings management of the industry. Then, we match each bank that engage the most in earnings management with another banks that has the closet propensity score with a caliper of 0.0005 to minimize the risk of bad matches. We use one-to-one matching without replacement, which requires each focused bank to be used exactly one time. We also use one-to-one matching with replacement. We also match each bank that manipulate the most their earnings with the two and three other banks with the closest propensity scores.[7] We present the results of our PSM analysis in Models (1)-(4). The results are robust to different specifications of PSM.

The matching estimator presented above mitigates the selection bias. However, there may be unobservable factors that explain decisions to manipulate earnings. We use the instrumental variables (IV) estimation. As above, the instrument is the average earnings management of other banks. We report the first-stage and second-stage IV regression results in Models (4) and (5) of Table 6. The result of second-stage also supports our earlier finding. We observe that the coefficient in the IV estimation is much larger than the OLS estimate, which is consistent with our concern about the reverse causality and hence with the need to use an IV approach to identify the impact of going public on bank risk (Tran, Hassan, and Houston (2018)). The OLS estimation might yield coefficient estimates of the impact of DLLP on deposit rates that are biased toward

[7] Using this oversampling matching leads to a trade-off between bias and variance. Since more information is used to construct the counterfactual for each participant, leading to a decreased variance, it increases bias resulting from poorer matches.

zero, whereas the IV estimation yields the more accurate (and larger) impact of DLLP on deposit rates.

4. Further investigations

4.1. How does the banking crisis affect the market discipline from depositors?

The banking crisis would be a unique occasion to analyze the market discipline. During the turmoil times, banks face greater difficulties, and are more likely to go bankrupt. Depositors consequently become more aware of the risk of losing their deposits, then they increase market discipline during the crisis. However, due to the potential costs of a banking crisis, governments are more likely to respond with containment and resolution policies that reinforce the safety nets of banks and protect depositors. The moral hazard as a result of government intervention at the start of the crisis could decrease the market discipline. These factors may induce an offset effect to the discipline of depositors during the crisis. Furthermore, the deposit insurance funds could be wiped out during the traumatic episodes, leading to a decrease of the ability to rescue banks. Thus, the market discipline may become stricter after the crisis (Martinez Peria and Schmukler (2001)). In this section, we investigate whether the association between earnings management and bank's deposit rates changes during crisis periods. Our study starts from 2001:Q1, then include the last crisis from 2007:Q3-2009:Q2 following Acharya and Mora (2015).

Following Tran, Hassan, and Houston (2018), Tran and Hassan (2018), we first use the variation in bank's funding costs and bank characteristics in a panel setting to assess whether the funding costs of banks during the crisis differs from the pre-crisis period, taking into account the changes of bank characteristics. To do so, we regress Equation (2) for the pre-crisis period. Next, we use the estimated coefficients to predict the deposit rates of banks during the crisis. By comparing these predicted deposit rates with actual deposit rates during the crisis, we document how the deposit rates during the crisis should be if they were in pre-crisis time. The results are shown in Table 7, Panel A. We observe the deposit rates would decrease during the crisis, since the difference is negative and statistically significant at the 1% level. In columns (2)-(5), we perform the same analysis, but with samples from PSM. The results are quantitatively similar to those in column (1).

Following Martinez Peria and Schmukler (2001), we go further by evaluating separately the response of deposit rates on bank's discretionary behaviors before, during and after the crisis,

i.e. 2001:Q1-2007:Q2, 2007:Q3-2009:Q2, and 2009:Q3-2015:Q4, respectively. The results are shown in Table 7, Panel B. We find that across the sample periods, there is evidence of market discipline from depositors. The coefficient on EM is positive and statistically significant before the crisis (Model (1)), suggesting that depositors pay attention for bank's discretionary behavior during normal times. During the crisis time, the coefficient on EM is still positive and statistically significant, but is lower than the coefficient on EM before the crisis (i.e. 4.260 vs 4.343). This evidence is consistent with our prediction that there exist an offset effect to the discipline of depositors during the crisis. That is, depositors still monitor banks during this crisis time, but at a lesser extent than during normal times due to the moral hazard induced from the government intervention. And they become more severe with bank's discretionary behavior after the crisis since we find the coefficient on EM for after crisis period is greater than those before and during the crisis. Indeed, one standard deviation increase of DLLP, holding all other equal, results to an increase of the deposit rates of 2.61, 2.56 and 2.73 bps for the before, during and after crisis periods, respectively.[8]

However, there may exist difference in deposit flows in the early and late stages of the crisis. Indeed, there is a deposit funding pressure in the first phrase of the crisis starting August 9, 2007 due to the freezing of the ABCP markets. This reflects the investor perception of greater risk of bank deposits relative to other instruments offering similar liquidity and payment services (Acharya and Mora (2015)). The situation changes when the government explicitly backs the depository system through an increase of deposit insurance to $250,000, among the other measures. We predict that depositors would be more nervous with bank's earnings management in the first phrase of the crisis than in the second phrase. We then divide our crisis period into two sub-periods: CRISIS 1 refers to the period of 2007Q3-2008Q2, and CRISIS 2 refers to the period of 2008Q3-2009Q2, and re-run our analysis separately with each stage of the crisis. The results in Model (3)-(4) show that there is more market discipline in the early stage of the crisis than in the second stage, consistent with our prediction.

Summarizing, the results shown in Table 7 suggest that there is evidence of market discipline across sample periods. Depositors require higher deposit rates as banks engage more in earnings management. The market discipline is lower during the crisis time, partially due to the government intervention, but depositors become more responsive to bank's discretionary behavior

[8] The coefficient of DLLP, 4.343, 4.260, 4.549, respectively, times the standard deviation of DLLP, 0.006.

in the aftermath of the crisis. Following the crisis, depositors realize that their funds may be at risk, leading to an increase of discipline through requiring higher deposit rates relative to the pre-, and during crisis.

4.2. How does the size effect affect the market discipline from depositors?

Previous studies document size effects on the market discipline of depositors. During the last crisis, many large banks are rescued, reviving the debate over the negative effects of the scale effects, or in extreme case, the "too-big-to-fail" policy. The expectations of bailout would reduce the incentives of creditors, depositors and other stakeholders to monitor and exert discipline over bank's operations, leading to an increased risk-taking in banks, and ultimately to a greater financial instability. Pop and Pop (2009) using an event study of the bailout Resona Holdings – the 5th largest Japanes financial group in 2003, document a reduction in the CDS spreads for the largest banks. Völz and Wedow (2011) find the distorsion of CDS spreads by a size effect when a 1 percentage point increase in size would decrease the CDS spreads of a bank by about 2 basis points. Using a sample of Brazilian banks, Oliveira, Schiozer, and Barros (2015) observe a "run" of depositors from the smaller banks to the largest banks during the crisis in late 2008. These studies conclude there should be a weaker market discipline in larger banks. However, Bertay, Demirgüç-Kunt, and Huizinga (2013) find that systemically large banks are subject to greater market discipline as evidenced by a higher sensitivity of their funding costs to risk proxies, supporting the view that these banks may be too-large-to-save.

To examine the size effects, following Berger et al. (2016), we first report results by bank size ranges (Assets under $1B, between $1B and $5B, and over $5B) over full period of study to investigate whether our core finding is concentrated in a particular bank size class. Table 8 shows the results. In Models (1) – (3), we find that higher DLLP is associated with higher deposit rates across all size classes. It is worth noting that the coefficients on DLLP are increasing with the size of banks, suggesting that the larger the banks, the higher the monitoring from depositors, and the higher the deposit rates. This evidence is consistent with Bertay, Demirgüç-Kunt, and Huizinga (2013).

However, the depositor's behavior may change over the period as explained in the above section. We then re-perform our analyses during different periods: before (Models (4)-(6)), during

(Models (7)-(9))[9] and after (Models (10)-(12)) the crisis. For the periods before and during the crisis, depositors seem to monitor discretionary behaviors of small (assets under $1B) and medium (assets between $1B-$5B) banks, but not for larger banks (assets over $5B). These results are interesting since they show the evidence of "too-big-to-fail" perception of depositors. For the periods after the crisis, we still document the disicipline of depositors for medium banks, but not for small banks. Interestingly, we find a rise of market discipline for large banks. Potential explanations are the followings. During the crisis, many large banks are rescued due to their risk-taking, which in turn may sensibilize depositors after the crisis to exert an increased monitoring for those banks. Furthermore, deposit insurance funds might be depleted during the turmoil time, leading to a decreased ability of insurance schemes to guarantee deposits (Martinez Peria and Schmukler (2001)). Consequently, we observe an increase in market discipline after crisis, especially for large banks.

4.3. How does the deposit insurance affect the market discipline from depositors?

Having documented the evidence of heterogeneity of depositor responsiveness across the sample periods, we focus in this section the potential effects of the deposit insurance scheme by comparing the behaviors of insured and uninsured depositors. We separate insured and uninsured deposits, i.e. deposits under $100,000 and $100,000 and more, respectively. We suggest that uninsured depositors should be more severe than insured depositors since they face higher risk of lost their funds. We re-run our investigation across type of deposits for full sample period. We also run the analyses across sample periods to see how different type of depositors behavior before, during and after the crisis. One may argue that the increase of deposit insurance limit of $250,000 from $100,000 in October 2008[10] may also affect the monitoring incentives of wealthy depositors who were previously uninsured (Pozen (2010)). We cannot have the data on deposits under or more than $250,000 since banks start to disclose the information after 2016. However, the increase of deposit insurance limit is coincided with the second phrase of crisis (CRISIS 2), then we will assess the effects of deposit insurance change at this time period.

The results are shown in Table 9. The results in Model (1) and (7) suggest that uninsured

[9] We obtain similar findings when separating the crisis period into CRISIS 1 and CRISIS 2.

[10] This increase of deposit insurance cover is initially temporarily until December 31, 2009 according to the Emergency Economic Stabilization Act of 2008. However, on July 21, 2010, the Dodd-Frank Wall Street Reform and Consumer Protection Act are passed, making this limit permanent.

depositors require higher deposit rates to banks that engage more in earnings management than insured depositors, consistent with our prediction. Indeed, one standard deviation of increase of DLLP is associated with an increase of insured (uninsured) deposits of 2.63 (3.24) bps. Interestingly, when we perform our analysis across sample periods, we find that before the crisis, there is no market discipline from insured deposits (Model (2)) whereas uninsured deposits still pay attention to bank's discretionary behavior. During the crisis, both types of depositors exercise their discipline. However, when we split the crisis period into two sub-periods, we document the market discipline from insured deposits (Models (4)-(5)), but not from uninsured deposits (Models (10)-(11)). And after the crisis, there is also the evidence of market discipline, and insured depositors seem to be more severe than uninsured depositors. This finding is interesting, and consistent with the evidence documented by Martinez Peria and Schmukler (2001) in Argentina, Chile, Mexico. It suggests that deposit insurance does not appear to diminish the extent of market discipline.

The finding that insured depositors discipline banks during the crisis may be related to a number of reasons. According to FDIC's statistics as of June 2008, less than 2% of all bank accounts were above the $100,000 limit, and the average account balance of all deposits at FDIC-insured banks was $12,665 (Pozen (2009)). These depositors would have more risk averse than others, and are more sensitive during the crisis times. Furthermore, depositors may not want to face any costs related to bank failures since it could take time for the repayments from insurance funds, imposing liquidity costs for depositors (Martinez Peria and Schmukler (2001)).

5. Conclusions

In this study, we provide one of the first large-sample investigation of the effects of earnings management on the cost of deposits. We exploit a dataset which allows us to examine within a context of high information asymmetry. Our finding shows that earnings management intensifies the costs of deposits, however, this effects vary across circumstances. Depositors seems to monitor banks in a lesser extent during the crisis, but they become more severe in the aftermath of the crisis. When focusing on the scale effects, we document that depositors monitor only small and medium banks's discretionary beheviors, but not for larger banks before and during the crisis. The situation changes after the crisis, since depositors concentrate more on large banks. Finally, the study documents that insured depositors monitor the discretionary behaviors of banks more than

uninsured depositors, especially during the crisis, suggesting that the deposit insurance schemes are not always fully credible. Our results survive after a battery of sensitivity tests. Our results are of interest of regulators and policymakers.

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Table 1. Variables Definitions

This table presents definitions of all main variables used in the analysis.

Variables	Definitions
Dependent variables	
LN_COSTDEPO	Natural logarith of the cost of (domestic) deposits equals natural logarith of interest expenses on domestic deposits divided by interest-bearing domestic deposits at the beginning of a period.
Δ COST_DEPO	Change of costs of deposits
COSTCOREDEPO	Natural logarith of the cost of core deposits equals natural logarith of interest expenses on core deposits divided by interest-bearing core deposits at the beginning of a period, following Acharya and Mora (2015)
COSTFUND	Natural logarithm of total cost of funds. Total cost of funds is the ratio of total interest expenses to interest-bearing liability at the beginning of a period.
Variable of interests	
EM	Absolute value of residuals from: $llp_{it} = dnpl_{it+1} + dnpl_{it} + dnpl_{it-1} + alw_{it-1} + cho_{it} + size_{it} + dloan_{it} + csret_{it} + dgdp_{it} + dunemp_{it} + \epsilon_{it}$
Deviation EM	$EM_{i,t}$ – Average $EM_{i,t}$ of the industry
Negative EM	Absolute value of negative residuals from: $llp_{it} = dnpl_{it+1} + dnpl_{it} + dnpl_{it-1} + alw_{it-1} + cho_{it} + size_{it} + dloan_{it} + csret_{it} + dgdp_{it} + dunemp_{it} + \epsilon_{it}$
EM_1	Absolute value of residual from: $llp_{it} = dnpl_{it+1} + dnpl_{it} + dnpl_{it-1} + size_{it} + dloan_{it} + csret_{it} + dgdp_{it} + dunemp_{it} + \epsilon_{it}$
EM_2	Absolute value of residual from: $llp_{it} = dnpl_{it+1} + dnpl_{it} + dnpl_{it-1} + size_{it} + dloan_{it} + alw_{it-1} + csret_{it} + dgdp_{it} + dunemp_{it} + \epsilon_{it}$
EM_3	Absolute value of residual from: $llp_{it} = dnpl_{it+1} + dnpl_{it} + dnpl_{it-1} + size_{it} + dloan_{it} + cho_{it} + csret_{it} + dgdp_{it} + dunemp_{it} + \epsilon_{it}$
Components of variable of interests	
NPL	Nonperforming assets over the quarter, scaled by total loans at the beginning of the quarter
DNPL	Change in NPA over the quarter, divided by total loans at the beginning of the quarter
LOAN	Total loans over the quarter
DLOAN	Change in total loans over the quarter, divided by total loans at the beginning of the quarter
ALW	Loan loss allowance as a percentage of lagged total loans
CHO	Adjusted charge-off as a percentage of lagged total loans
RSGL	Realized security gains and losses as a percentage of total assets (includes realized gains and losses from available-for sale securities and held-to-maturity securities)
URSGL	Unrealized security gains and losses (includes only unrealized gains and losses from available-for-sale securities) as a percentage of total assets;
SIZE	The natural logarithm of gross total assets
CSRET	The return on the Case-Shiller Real Estate Index over the quarter
DUNEMP	Change in unemployment rates over the quarter
DGDP	Change in GSP (gross state product) over the quarter
Control variables	
CAPITAL	Book value of equity over gross total assets
DUMMY LOSS	A dummy variable that equals one if net income is negative, and zero otherwise
EARNINGS	Income before taxes, provisions recognized in income over gross total assets
NII	Non-interest incomes over the net operating incomes
WHOLESALE	Wholesale funds (also known as managed liabilities in the Federal Reserve Bulletin) are the sum of large time deposits, deposits booked in foreign offices, subordinated debt

	and debentures, gross federal funds purchased, repos, and other borrowed money, following Acharya and Mora (2015)
UNUS COMMITMENTS	Unused commitments divided by the sum of unused commitments and loans, following Acharya and Mora (2015)
CRISIS	A dummy equal to 1 for a financial crisis period, and 0 otherwise.
QFE	Time fixed effects, represented by dummies for each quarter of the sample period.

Table 2. Summary Statistics

This table reports summary statistics for the main sample of U.S. commercial banks used in the analysis. The sample period is from 2001:Q1 to 2015:Q4. All financial variables are winsorized at 1% and 99% levels.

Panel A:

	N	Mean	St. deviation	Min	Max
LN_COSTDEPO	76,193	(4.091)	0.729	(6.193)	(2.994)
COSTDEPO	76,193	0.021	0.012	0.002	0.050
EM	55,543	0.003	0.006	0.000	0.074
SIZE	75,175	13.695	1.345	12.089	19.109
CAPITAL	77,153	0.092	0.031	0.019	0.220
WHOLESALE	64,895	0.218	0.097	0.029	0.514
UNUS COMMITMENTS	64,895	0.130	0.075	0.008	0.387
EARNINGS	76,757	0.015	0.009	(0.020)	0.051
GROWTH	74,106	0.019	0.045	(0.085)	0.229
NII	75,718	0.227	0.137	0.000	0.814

Panel B:

	LN_COSTDEPO	EM	SIZE	CAPITAL	WHOLESALE	UNUS COMMITMENT	EARNINGS	GROWTH
EM	-0.0217***	1						
SIZE	-0.2183***	0.0456***	1					
CAPITAL	-0.1773***	-0.0056	0.0505***	1				
WHOLESALE	0.2504***	0.0454***	0.1734***	-0.2359***	1			
UNUS COMMITMENT	-0.0156***	-0.1085***	0.3569***	-0.0972***	0.1062***	1		
EARNINGS	0.0931***	-0.1472***	0.0657***	0.2600***	-0.0915***	0.0984***	1	
GROWTH	0.0595***	-0.0925***	0.0130***	-0.0581***	0.0806***	0.1170***	0.1058***	1
NII	-0.1516***	0.0652***	0.3809***	0.0670***	-0.0014	0.0881***	0.1400***	-0.0054

Table 3. Baseline Multivariate Analysis

This table reports regression estimates of the relation between LN_COSTDEPO and EM. The sample period is from 2001:Q1 to 2015:Q4. The main independent variable is EM. Models (1) presents analysis including only our variable of interest. Model (2) represents our baseline model. Model (3) use EM QUARTILE instead of EM. Model (4) augments additional variables. Model (5) adds bank fixed-effects. Model (6) use balanced panel data. Model (7) uses only the 4th quarter data. We exclude the crisis period, M&A banks in Models (8) and (9). Only private and public banks are using in Models (10) and (11). All regressions include time (quarter) fixed effects. All financial variables are winsorized at the 1% and 99% levels. ***, **, * indicate significance at the 1%, 5%, and 10% level respectively. Standard errors are clustered at the bank level. Numbers in parentheses are t-statistics.

	Dependent variable=Cost of deposits										
	Only variable of interest	Baseline	EM quartile	Additional variables	Bank FE	Balanced data	Only 4th quarter	Excluding crisis	Excluding M&A	Only private banks	Obly public banks
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
EM	6.331***	4.851***		2.330*	0.892***	6.249*	4.571***	4.825***	4.816***	4.646***	5.048***
	(0.599)	(0.949)		(1.252)	(0.254)	(3.196)	(1.106)	(1.038)	(0.950)	(1.237)	(1.164)
EM QUARTILE			0.010***								
			(0.002)								
SIZE		-0.052***	-0.052***	-0.054***	0.135***	-0.070***	-0.054***	-0.056***	-0.052***	-0.034***	-0.055***
		(0.007)	(0.007)	(0.007)	(0.017)	(0.013)	(0.007)	(0.007)	(0.007)	(0.012)	(0.010)
EQUITY		-0.923***	-0.912***	-0.871***	-1.200***	0.131	-0.993***	-0.958***	-0.906***	-1.011***	-0.393
		(0.203)	(0.212)	(0.203)	(0.237)	(0.630)	(0.202)	(0.208)	(0.205)	(0.227)	(0.492)
WHOLESALE		1.132***	1.138***	1.117***	0.454***	1.242***	1.141***	1.174***	1.132***	1.170***	1.077***
		(0.064)	(0.064)	(0.063)	(0.060)	(0.162)	(0.062)	(0.065)	(0.064)	(0.070)	(0.134)
UNUS COMMITMENTS		-0.689***	-0.707***	-0.648***	0.015	-0.492*	-0.634***	-0.709***	-0.691***	-0.630***	-0.833***
		(0.104)	(0.104)	(0.104)	(0.090)	(0.295)	(0.101)	(0.107)	(0.104)	(0.104)	(0.214)
EARNINGS		-0.154	-0.205	1.022	-1.387***	-2.487	0.321	0.617	-0.152	0.994	-2.906**
		(0.688)	(0.713)	(0.725)	(0.347)	(1.766)	(0.739)	(0.749)	(0.693)	(0.766)	(1.365)
GROWTH		0.045	0.024	0.134***	-0.131***	-0.049	0.004	0.017	0.049	0.039	0.019
		(0.046)	(0.046)	(0.044)	(0.024)	(0.122)	(0.073)	(0.050)	(0.046)	(0.055)	(0.075)
NII		-0.231***	-0.221***	-0.229***	0.056	-0.309**	-0.224***	-0.220***	-0.231***	-0.334***	-0.022
		(0.054)	(0.055)	(0.053)	(0.037)	(0.152)	(0.055)	(0.055)	(0.052)	(0.062)	(0.096)
NPL				1.575***							
				(0.296)							
DUMMY LOSS				0.054***							
				(0.012)							
Constant	-4.816***	-4.135***	-4.151***	-4.151***	-6.557***	-3.971***	-4.123***	-4.101***	-4.138***	-4.361***	-4.122***
	(0.007)	(0.086)	(0.088)	(0.086)	(0.224)	(0.168)	(0.085)	(0.087)	(0.086)	(0.165)	(0.126)
QFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	55,456	54,689	54,689	54,689	54,689	10,154	15,054	48,092	54,063	38,706	15,983
Adj R2	0.733	0.791	0.790	0.793	0.903	0.827	0.806	0.785	0.792	0.788	0.802
N_clust	2483	2483	2483	2483	2483	211	2467	2480	2480	1997	592

Table 4. Quantile regression

This table reports regression estimates of the relation between LN_COSTDEPO and EM using quantile regression. The sample period is from 2001:Q1 to 2015:Q4. The main independent variable is EM. All financial variables are winsorized at the 1% and 99% levels. ***, **, * indicate significance at the 1%, 5%, and 10% level respectivelyNumbers in parentheses are t-statistics.

	Quantile Q=0.25 (1)	Quantile Q=0.50 (2)	Quantile Q=0.75 (3)
EM	3.339***	4.141***	5.041***
	(0.342)	(0.237)	(0.280)
SIZE	-0.053***	-0.043***	-0.036***
	(0.002)	(0.001)	(0.001)
EQUITY	-0.913***	-0.906***	-0.902***
	(0.060)	(0.045)	(0.043)
WHOLESALE	1.188***	0.975***	0.810***
	(0.014)	(0.011)	(0.011)
UNUS COMMITMENTS	-0.654***	-0.468***	-0.385***
	(0.023)	(0.018)	(0.016)
EARNINGS	-1.585***	-0.915***	-0.539***
	(0.199)	(0.147)	(0.144)
GROWTH	0.110***	0.136***	0.120***
	(0.033)	(0.025)	(0.024)
NII	-0.285***	-0.261***	-0.187***
	(0.013)	(0.010)	(0.010)
Constant	-4.202***	-4.207***	-4.190***
	(0.025)	(0.016)	(0.016)
QFE	Yes	Yes	Yes
Observations	54,689	54,689	54,689
Pseudo R2	0.594	0.563	0.535
	Interquantile (Q75-Q25)	Interquantile (Q50-Q25)	Interquantile (Q75-Q50)
EM	1.702***	0.802***	0.900***
	(0.423)	(0.306)	(0.265)

Table 5. Alternative Measures of Earnings management and Diversification

Panel A reports regression estimates of the relation between LN_COSTDEPO and alternative measures of earnings management. Panel B reports estimates using alternative measures of funding costs. The sample period is from 2001:Q1 to 2015:Q4. All financial variables are winsorized at the 1% and 99% levels. ***, **, * indicate significance at the 1%, 5%, and 10% level respectively. Standard errors are clustered at the bank level. Numbers in parentheses are t-statistics.

Panel A: Alternative measures of earnings management

	Deviation EM	Negative EM	EM_1	EM_2	EM_3
	(1)	(2)	(3)	(4)	(5)
EM	4.851***	3.960***	3.209***	2.748***	4.857***
	(0.949)	(0.903)	(0.620)	(0.612)	(0.949)
SIZE	-0.052***	-0.052***	-0.054***	-0.053***	-0.052***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
EQUITY	-0.923***	-1.081***	-0.910***	-0.919***	-0.923***
	(0.203)	(0.223)	(0.205)	(0.208)	(0.203)
WHOLESALE	1.132***	1.130***	1.137***	1.135***	1.132***
	(0.064)	(0.071)	(0.064)	(0.064)	(0.064)
UNUS COMMITMENTS	-0.689***	-0.694***	-0.692***	-0.699***	-0.689***
	(0.104)	(0.120)	(0.104)	(0.104)	(0.104)
EARNINGS	-0.154	-0.214	-0.216	-0.158	-0.156
	(0.688)	(0.859)	(0.691)	(0.709)	(0.688)
GROWTH	0.045	-0.009	0.058	0.051	0.045
	(0.046)	(0.054)	(0.046)	(0.046)	(0.046)
NII	-0.231***	-0.259***	-0.231***	-0.226***	-0.231***
	(0.054)	(0.066)	(0.054)	(0.054)	(0.054)
Constant	-4.125***	-4.093***	-4.118***	-4.127***	-4.135***
	(0.086)	(0.094)	(0.086)	(0.087)	(0.086)
QFE	Yes	Yes	Yes	Yes	Yes
Observations	54,689	31,840	54,689	54,689	54,689
Adj R2	0.791	0.807	0.791	0.790	0.791
N_clust	2483	2386	2483	2483	2483

Panel B: Alternative measures of funding costs

	Δ Cost of deposits	Costs of core deposits	Costs of funds
	(1)	(2)	(3)
EM	0.454***	3.993***	3.664***
	(0.109)	(0.833)	(0.755)
SIZE	-0.000	-0.034***	-0.032***
	(0.000)	(0.011)	(0.008)
EQUITY	-0.029*	-1.352***	-1.186***
	(0.017)	(0.326)	(0.220)
WHOLESALE	0.011**	0.797***	1.257***
	(0.005)	(0.129)	(0.072)
UNUS COMMITMENTS	-0.026***	-1.191***	-0.489***
	(0.007)	(0.169)	(0.105)
EARNINGS	-0.201**	-0.101	-0.629
	(0.081)	(1.019)	(0.670)
GROWTH	0.449***	0.002	-0.058
	(0.020)	(0.073)	(0.048)
NII	0.006	-0.624***	-0.232***
	(0.006)	(0.109)	(0.060)
Constant	-0.184***	-4.397***	-4.369***
	(0.007)	(0.126)	(0.095)
QFE	Yes	Yes	Yes
Observations	54,680	54,776	54,776
Adj R2	0.425	0.678	0.774
N_clust	2483	2483	2483

Table 6. Endogeneity concerns

The table reports regression estimates of the relation between LN_COSTDEPO and EM. The sample period is from 2001:Q1 to 2015:Q4. Models (1)-(4) reports results from matching PSM. Models (5)-(6) present estimations of IV estimations. All financial variables are winsorized at the 1% and 99% levels. ***, **, * indicate significance at the 1%, 5%, and 10% level respectively. Standard errors are clustered at the bank level. Numbers in parentheses are t-statistics.

	PSM				Instrument variables	
	N=1 w/o replacement	N=1 with replacement	N=2	N=3	1rst stage	2nd stage
	(1)	(2)	(3)	(4)	(5)	(6)
EM	3.765***	6.720***	4.250***	4.307***		13.321***
	(0.931)	(1.133)	(0.897)	(0.867)		(4.465)
SIZE	-0.051***	-0.051***	-0.049***	-0.051***	-0.000	-0.053***
	(0.007)	(0.010)	(0.007)	(0.007)	(0.000)	(0.007)
EQUITY	-1.016***	-1.195***	-0.937***	-0.906***	0.007	-0.978***
	(0.215)	(0.253)	(0.211)	(0.210)	(0.006)	(0.211)
WHOLESALE	1.074***	1.077***	1.092***	1.096***	0.003***	1.128***
	(0.068)	(0.079)	(0.065)	(0.066)	(0.000)	(0.066)
UNUS COMMITMENTS	-0.686***	-0.612***	-0.684***	-0.698***	-0.005***	-0.638***
	(0.103)	(0.140)	(0.100)	(0.100)	(0.001)	(0.109)
EARNINGS	-0.088	0.275	0.042	-0.160	-0.014	0.178
	(0.790)	(1.236)	(0.770)	(0.749)	(0.018)	(0.740)
GROWTH	0.037	0.023	0.081	0.098*	-0.005***	0.063
	(0.055)	(0.110)	(0.057)	(0.053)	(0.001)	(0.046)
NII	-0.251***	-0.278***	-0.247***	-0.238***	0.002*	-0.245***
	(0.054)	(0.066)	(0.052)	(0.053)	(0.001)	(0.056)
AVERAGE EM					0.662***	
					(0.125)	
Constant	-4.117***	-4.098***	-4.154***	-4.128***	0.002**	-4.314***
	(0.093)	(0.118)	(0.089)	(0.089)	(0.001)	(0.092)
QFE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	20,652	4,408	21,179	26,662	53,448	54,243
R-squared	0.786	0.795	0.789	0.784	0.135	0.793
N_clust	2271	1704	2287	2322	2457	2471

Table 7. The effects of the crisis

Panel A reports difference of actual deposit rates during crisis versus predicted deposit rates. Panel B reports regression estimates of the relation between LN_COSTDEPO and EM before, during and after the crisis. All financial variables are winsorized at the 1% and 99% levels. ***, **, * indicate significance at the 1%, 5%, and 10% level respectively. Standard errors are clustered at the bank level. Numbers in parentheses are t-statistics.

Panel A: Difference of actual deposit rates during crisis versus predicted deposit rates

	Full sample	N=1	N=1 w/o replacement	N=2	N=3
	(1)	(2)	(3)	(4)	(5)
Mean of difference	-0.190***	-0.210***	-0.195***	-0.192***	-0.186***

Panel B:

	Before crisis 2001:Q1-2007:Q2	During crisis 2007:Q3-2009:Q2	Crisis 1 2007:Q3-2008:Q2	Crisis 2 2008:Q3-2009:Q2	After crisis 2009:Q3-2015:Q4
	(1)	(2)	(3)	(4)	(5)
EM	4.343***	4.260***	4.172***	3.905***	4.549***
	(0.723)	(0.941)	(0.887)	(1.126)	(1.624)
SIZE	-0.040***	-0.024***	-0.017***	-0.033***	-0.083***
	(0.006)	(0.008)	(0.006)	(0.011)	(0.015)
EQUITY	-0.700***	-0.931***	-0.638***	-1.138***	-1.002**
	(0.204)	(0.272)	(0.235)	(0.363)	(0.429)
WHOLESALE	0.957***	0.768***	0.685***	0.860***	1.569***
	(0.055)	(0.079)	(0.063)	(0.119)	(0.179)
UNUS COMMITMENTS	-0.526***	-0.593***	-0.271***	-1.023***	-1.269***
	(0.091)	(0.109)	(0.091)	(0.158)	(0.247)
EARNINGS	-0.396	-4.196***	-2.322***	-5.618***	2.385*
	(0.691)	(0.698)	(0.723)	(0.850)	(1.395)
GROWTH	0.223***	0.244**	0.392***	0.117	-0.420***
	(0.051)	(0.100)	(0.090)	(0.163)	(0.121)
NII	-0.172***	-0.300***	-0.265***	-0.320***	-0.297***
	(0.049)	(0.064)	(0.054)	(0.096)	(0.101)
Constant	-4.307***	-4.191***	-4.395***	-4.418***	-4.375***
	(0.070)	(0.102)	(0.077)	(0.148)	(0.215)
QFE	Yes	Yes	Yes	Yes	Yes
Observations	34,488	6,597	3,328	3,269	13,604
R-squared	0.596	0.596	0.458	0.396	0.628
N_clust	2347	925	874	872	1067

Table 8. The effects of bank size

The table reports regression estimates of the relation between LN_COSTDEPO and EM across bank's size rages (under $1B, between $1B - $5B, over $5B) before, during and after the crisis. All financial variables are winsorized at the 1% and 99% levels. ***, **, * indicate significance at the 1%, 5%, and 10% level respectively. Standard errors are clustered at the bank level. Numbers in parentheses are t-statistics.

	Full period			Before the crisis			During the crisis			After the crisis		
	Assets < $1B	$1B<Assets<$5B	Assets>$5B	Assets < $1B	$1B<Assets<$5B	Assets>$5B	Assets < $1B	$1B<Assets<$5B	Assets>$5B	Assets < $1B	$1B<Assets<$5B	Assets>$5B
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
EM	2.780***	6.843***	8.985***	3.878***	4.604***	0.367	2.967***	5.910***	4.120	0.572	7.408**	15.601***
	(0.611)	(1.802)	(2.995)	(0.717)	(1.239)	(3.179)	(0.784)	(1.374)	(2.879)	(1.021)	(3.366)	(3.247)
SIZE	-0.016	-0.065***	0.011	-0.020*	-0.037*	0.034	-0.005	-0.039	-0.002	0.009	-0.103**	-0.012
	(0.013)	(0.024)	(0.028)	(0.012)	(0.020)	(0.032)	(0.025)	(0.025)	(0.025)	(0.049)	(0.044)	(0.033)
EQUITY	-1.117***	-0.432	1.284	-0.926***	-0.467	1.091	-1.363***	-0.514	-0.324	-1.524***	-0.721	1.966
	(0.211)	(0.405)	(1.110)	(0.204)	(0.494)	(1.266)	(0.326)	(0.403)	(0.988)	(0.542)	(0.607)	(1.630)
WHOLESALE	1.127***	1.277***	0.659**	0.978***	0.919***	1.071***	1.019***	0.779***	0.092	1.718***	2.198***	-0.037
	(0.063)	(0.111)	(0.324)	(0.058)	(0.100)	(0.328)	(0.096)	(0.118)	(0.307)	(0.195)	(0.240)	(0.453)
UNUS COMMITMENTS	-0.662***	-0.599***	-1.028**	-0.551***	-0.348**	-0.884*	-0.649***	-0.404***	-0.648	-1.010***	-0.942***	-1.654***
	(0.095)	(0.170)	(0.475)	(0.088)	(0.140)	(0.530)	(0.132)	(0.154)	(0.421)	(0.294)	(0.346)	(0.517)
EARNINGS	0.334	-1.145	-1.855	-0.291	1.104	-4.031	-3.219***	-3.816***	-7.661***	3.388**	-0.666	3.790
	(0.724)	(1.057)	(3.250)	(0.742)	(1.237)	(3.344)	(0.768)	(1.063)	(2.302)	(1.456)	(1.851)	(5.082)
GROWTH	0.071	-0.002	-0.261	0.190***	0.231***	0.139	0.201**	0.222	0.033	-0.468***	-0.092	-1.233***
	(0.049)	(0.083)	(0.186)	(0.055)	(0.088)	(0.240)	(0.094)	(0.174)	(0.330)	(0.149)	(0.162)	(0.398)
NII	-0.271***	-0.264**	-0.158	-0.306***	-0.035	0.068	-0.227***	-0.355***	-0.307	-0.196**	-0.340**	-0.468*
	(0.049)	(0.103)	(0.167)	(0.054)	(0.100)	(0.153)	(0.075)	(0.097)	(0.197)	(0.089)	(0.138)	(0.267)
Constant	-4.575***	-4.016***	-5.189***	-4.517***	-4.458***	-5.731***	-4.526***	-4.020***	-4.293***	-5.659***	-4.264***	-5.442***
	(0.163)	(0.343)	(0.451)	(0.146)	(0.300)	(0.506)	(0.339)	(0.353)	(0.404)	(0.655)	(0.623)	(0.563)
QFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	36,502	13,702	4,485	26,143	6,103	2,242	3,317	2,525	755	7,042	5,074	1,488
R-squared	0.764	0.834	0.792	0.581	0.703	0.582	0.624	0.590	0.588	0.614	0.657	0.607
N_clust	2100	612	165	2010	430	127	522	399	111	652	434	118

Table 9. The effects of deposit insurance

The table reports regression estimates of the relation between LN_COSTDEPO and EM for 2 subsamples: Under $100,000 and $100,000 and more before, during and after the crisis. All financial variables are winsorized at the 1% and 99% levels. ***, **, * indicate significance at the 1%, 5%, and 10% level respectively. Standard errors are clustered at the bank level. Numbers in parentheses are t-statistics.

	Under $100,000						$100,000 and more					
	Full sample 2001:Q1-2015:Q4	Before crisis 2001:Q1-2007:Q2	During crisis 2007:Q3-2009:Q2	Crisis 1 2007:Q3-2008:Q2	Crisis 2 2008:Q3-2009:Q2	After crisis 2009:Q3-2015:Q4	Full sample 2001:Q1-2015:Q4	Before crisis 2001:Q1-2007:Q2	During crisis 2007:Q3-2009:Q2	Crisis 1 2007:Q3-2008:Q2	Crisis 2 2008:Q3-2009:Q2	After crisis 2009:Q3-2015:Q4
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
EM	4.384***	0.173	4.521**	3.686*	4.714**	6.549**	5.405***	6.295***	3.014*	3.242	2.342	3.922**
	(1.436)	(1.463)	(1.835)	(2.108)	(2.108)	(2.569)	(1.550)	(1.620)	(1.559)	(2.099)	(1.503)	(1.960)
SIZE	-0.077***	-0.068***	-0.041*	-0.039	-0.039*	-0.099***	-0.113***	-0.106***	-0.059***	-0.055***	-0.064***	-0.151***
	(0.017)	(0.017)	(0.022)	(0.027)	(0.022)	(0.026)	(0.011)	(0.011)	(0.016)	(0.016)	(0.019)	(0.020)
EQUITY	-0.803*	-0.088	-1.118	-0.829	-1.417*	-1.785**	0.119	-0.088	0.660	0.584	0.735	0.947*
	(0.444)	(0.463)	(0.766)	(0.934)	(0.809)	(0.861)	(0.323)	(0.353)	(0.576)	(0.591)	(0.653)	(0.536)
WHOLESALE	0.471**	0.234	0.196	0.058	0.333	1.149***	4.208***	4.204***	3.385***	3.506***	3.261***	4.283***
	(0.188)	(0.193)	(0.276)	(0.331)	(0.270)	(0.360)	(0.105)	(0.104)	(0.157)	(0.157)	(0.193)	(0.236)
UNUS COMMITMENTS	-2.037***	-1.843***	-2.027***	-1.845***	-2.305***	-2.461***	-0.428***	-0.202	-0.765***	-0.512**	-1.154***	-1.220***
	(0.254)	(0.248)	(0.367)	(0.380)	(0.408)	(0.491)	(0.154)	(0.150)	(0.235)	(0.245)	(0.263)	(0.304)
EARNINGS	-3.580**	-5.212***	-10.792***	-11.059***	-10.712***	3.411	2.405***	4.223***	-1.187	2.927**	-4.146***	1.052
	(1.405)	(1.691)	(1.728)	(2.468)	(1.676)	(2.379)	(0.916)	(1.137)	(1.164)	(1.472)	(1.267)	(1.471)
GROWTH	-0.929***	-0.636***	0.063	0.249	-0.137	-2.188***	0.444***	0.773***	0.172	0.240	0.119	-0.341**
	(0.144)	(0.165)	(0.270)	(0.297)	(0.375)	(0.260)	(0.077)	(0.089)	(0.179)	(0.242)	(0.241)	(0.172)
NII	-0.329**	-0.369**	-0.497**	-0.746**	-0.241	-0.187	-0.239***	-0.196*	-0.409***	-0.448***	-0.359**	-0.256*
	(0.167)	(0.183)	(0.229)	(0.326)	(0.189)	(0.222)	(0.086)	(0.106)	(0.120)	(0.128)	(0.146)	(0.131)
Constant	-4.126***	-4.245***	-4.477***	-4.467***	-4.830***	-4.727***	-5.624***	-5.773***	-5.806***	-5.983***	-6.017***	-5.467***
	(0.208)	(0.215)	(0.267)	(0.309)	(0.283)	(0.363)	(0.138)	(0.134)	(0.185)	(0.178)	(0.225)	(0.298)
QFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	54,463	34,361	6,578	3,321	3,257	13,524	54,502	34,400	6,572	3,320	3,252	13,530
R-squared	0.494	0.232	0.182	0.147	0.173	0.399	0.657	0.556	0.452	0.414	0.392	0.603
N_clust	2480	2340	923	872	870	1064	2483	2345	923	873	869	1064