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Competition or manipulation? An empirical evidence of determinants of the earnings persistence of the U.S. banks

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Abstract

We examine the impact of competition on bank earnings persistence by exploiting a natural experiment following interstate banking deregulation that increased bank competition. We find that bank earnings adjustment speed increases after the state where the bank locates implements the deregulation. This relationship is weakened, however, with the increase of banks' abilities to sustain earnings, as reflected in size, diversification, managerial efficiency and safety. We further find that compeititon directly impacts bank earnings adjustment speed, and does not indirectly go through the channel of earnings management.

Keywords: Competition; Geographic Expansion Index; Earnings persistence; Earnings adjustment speed, Earnings management

JEL Classification: G20, G21, G38

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1. Introduction

Financial crisis raises the recent intense debate on the association between accounting changes and financial crisis. For instance, the accusation of market value accounting after the 2007-2009 financial crisis, along with the economic significance of banks' liquidity and capital provision requirements, reveals the vital economic role of bank accounting (Beatty and Liao, 2014). Bank earnings persistence plays an important role in maintaining the stability of the whole financial system and so has attracted growing debate on the factors that drive such a phenomenon (Cumming et al., 2012; Beaver et al., 2012; Gao and Zhang, 2015; Peterson et al., 2015; Hui et al, 2016; Buchner et al., 2016).

According to economic competition theory, competition contributes to the mean reversion of market profitability (decreased earnings persistence) in the long term (Stigler, 1961; Mueller, 1977, 1986; Berger et al., 2000; Goddard et al., 2011). In other words, competition could erode away all excessive returns by attracting new entrants or all excessive losses by forcing the improvement of operations or exit of the market. Thus, competition could directly reduce earnings persistence. However, accounting studies implicitly suggest that earnings persistence is a result of earnings management (Sloan, 1993; Pope and Wang, 2005; Chen, 2010; Dechow et al., 2010; Skinner and Soltes, 2011; Li, 2010; Healy et al., 2015).

Few studies have attempted to reconcile the differences between theories that explain the main driving force of bank earnings persistence. It is possible that, as an effective external governance mechanism, competition could reduce earnings management via increasing the cost of mispricing (Graham et al., 2005; Dechow et al., 2010; Burks et al., 2016; Jiang et al., 2016). Hence, the resulted reduced earnings persistence is the result of decreased earnings management caused by the increased competition. It is thus the central focus of this paper to determine whether the impact of competition on bank earnings persistence is directly or indirectly from earnings management.

We use a comprehensive data set of the US banking industry for the period between 1986 and 2013 and our final sample includes 15,546 unique commercial banks with 226,153 firm-year observations. The benefits of studying the banking industry are two-fold: First, our focus on a single homogenous industry removes the challenges of defining the market where a firm competes, thereby removing the potential bias in industry identification that is overly broadly or unduly narrowly defined. Second, the focus of analyzing the banking sector

eliminates the concern on conglomerates that operate in different industries and thus face competitions in different markets.

We use a partial adjustment model to capture bank earnings adjustment speed, which allows earnings targets to be bank-specific and to vary over time (see, also, Healy et al., 2014; Flannery and Rangan, 2006; De Jonghe and Öztekin., 2015). Earnings adjustment speed refers to the speed at which banks adjust earnings to their target ROA, and equals one minus earnings persistence. Thus, faster adjustment speeds indicate lower earnings persistence. We estimate heterogeneous adjustment speeds via a two-stage procedure. In the first stage, we obtain a constant adjustment speed λ for each bank and estimate the target ROA for each bank-year. In the second stage, we use the gap between the target ROA and the observed realized ROA to obtain a time-varying adjustment speed for each bank in each year.

We exploit the cross-state, time-varying variation in the removal of interstate bank branching prohibitions to identify an exogenous increase in bank competition. The introduction of the Interstate Banking and Branching Efficiency Act (IBBEA) in 1994 by the US authorities relaxed geographical restrictions to bank expansion across state borders. This relaxation enhances competition by enabling banks to enter into new markets in other states, thereby allowing them to compete with those banks in the local market (DeYoung, 2010; Rice and Strahan, 2010, among others).

We start by investigating whether banks adjust their earnings with a faster speed in those states that implement the IBBEA and deregulate interstate banking within their borders to a great extent. We find that an increase in the Geographic Expansion Index, which indicates an increase in bank competition, leads to an increase in bank earnings adjustment speed. This finding is in line with the prediction of the economic theory that competition reduces earnings persistence (Stigler, 1961). We also find that banks with higher earnings management, which is measured as Discretionary Loan Loss Provisions, tend to have slower earnings adjustment speed. This finding is in line with the arguments in the extant accounting literature.

Our findings hold after controlling for state and time fixed effects, a wide array of time-varying bank characteristics, such as size, risk, capital-asset ratio, efficiency, and macroeconomic conditions, such as GDP growth, inflation and GDP per capita in each state. We conduct a host of robustness tests to ensure that our findings are not driven by potential biases in the sample or alternative explanations. In our additional cross-sectional analysis, we find that the impact of bank competition on earnings adjustment speed is reduced with

the increase of banks' abilities to sustain earnings, including size, diversification, managerial efficiency and safety.

Next, we investigate whether the positive impact of competition on bank earnings adjustment speed goes through an indirect earnings management channel. If this were true, we should expect to find a negative impact of competition on bank earnings management, because a higher level of competition would result in lower earnings management, which will then lead to higher earnings adjustment speed. The extant literature, however, does not provide a widely accepted direction on the relationship between firm competition and earnings management. The researchers who advocate a negative relationship argue that competition acts as an external governance mechanism, which prevents managerial slack and protects the interest of shareholders (Dechow et al., 2010), and that competition increases the cost of misreporting, thereby curbing earnings management incentives (Graham et al., 2005).

On the other hand, if the positive impact of competition on bank earnings adjustment speed does not go through the earnings management channel, we expect to find a non-negative (positive or insignificant) impact of competition on bank earnings management. This will then be consistent with another strand of the literature which argues that increased competition puts higher pressure on managers and hence, induces managers' unethical behaviors such as earnings management, giving rise to an empirically observed positive relation between competition and earnings management (Shleifer, 2004; Burgstahler and Dichev, 1997; Milgrom and Roberts, 1992; Bagnoli and Watts, 2010; Tomy, 2016; Dou et al., 2016).

To answer this question, we conduct two analyses to examine whether competition exerts a positive impact on bank earnings management by using two bank earnings management frameworks. First, we use discretionary loan loss provisions, which is widely used to measure earnings management in the banking industry (see, e.g., Beatty et al., 2002; Cohen et al., 2014; Cornett et al., 2009; Cheng and Warfield, 2005; Beatty and Liao, 2014). We indeed find a positive relation between competition and discretionary loan loss provisions. Thus, our evidence does not support the argument that the impact of competition on bank earnings adjustment speed goes indirectly through the channel of earnings management.

Second, we consider the possibility that banks may use securities available for sale to smooth earnings, as suggested by the recent findings of Barth et al. (2015), and Dong and Zhang (2015). Available for Sale (AFS) securities is the largest category of banks' securities

that comprise a sizable proportion of bank assets (Nissim and Penman, 2007; Laux and Leuz, 2010). It is less costly to conduct earnings management via realizing gains and losses on AFS securities than via managing accruals or by involving in real activities because sales of securities are not subject to ex post scrutiny by professional institutions such as auditors. This advantage may therefore enables banks to continuously manage earnings despite facing competition. If this is true, regardless of whether competition is strong or weak, banks can manage AFS to achieve the purpose of earnings management via. Our evidence supports this argument, and again suggests that competition directly impacts bank earnings persistence, rather than indirectly going through the channel of earnings management.

This paper contributes to the literature in several ways. First, to our best knowledge, we are the first to document the causal relation between competition and earnings persistence by employing Interstate Banking and Branching Efficiency Act as an exogenous shock. Prior studies tend to ignore the endogeneity with respect to the causal relation between competition and earnings persistence (Goddard et al., 2004; Gropp and Kashyap, 2010; Goddard et al., 2011). Recently, Healy et al. (2014) recognize that it is difficult to attribute causality between competition and earnings persistence, given many channels that drive competitive forces, such as government regulation. Our study fills this gap by employing a government regulation change as an exogenous shock that impacts bank competition.

Second, we examine whether the competition law affects banks with different size, level of diversification, management efficiency, and level of default risk. We find that the stronger a bank is in its ability to sustain earnings, as reflected by having a large size, better diversification, higher managerial efficiency and lower default risk, the lower is the impact of competition on bank earnings adjustment speed. Third, we provide evidence that the effect of competition on bank earnings persistence is direct, but not indirectly through the channel of earnings management.

The rest of the paper is structured as follows. Section 2 presents conceptual framework. In Section 3, we describe our identification strategy, sample construction, instruments, models and summary statistics. Section 4 presents and discusses our main results and Section 5 conducts two additional analyses. Section 6 concludes.

2. Conceptual framework

Economic scholars argue that competition directly impacts earnings persistence, where competition could erode away all economic excessive returns and losses in the long

run and thus, the market profitability level will converge toward a long-term equilibrium (Stigler, 1961; Mueller, 1977, 1986; Berger et al., 2000; Goddard et al., 2011). More specifically, the excessive profit currently possessed by a firm attracts new competitors to enter the market by offering similar or same product with lower prices, leading to decreases in the profit margin. This process will not stop until firms' profitability reaches the average profit rate of the market. For firms with the profits under the market average will receive precaution from investors to reach the market average level in a short time. Otherwise, investors will withdraw their investment, resulting in the exit of the underperforming firms from the market. Thus, competition directly reduces earnings persistence.

On the other hand, there is a widely accepted consensus that earnings persistence is a result of earnings management choice or earnings manipulation (Sloan, 1993; Pope and Wang, 2005; Chen, 2010; Dechow et al., 2010; Skinner and Soltes, 2011). The underpinning rationale is that, with information asymmetry between managers and investors, firms smooth earnings for purposes like taxes minimization, dividend payouts, target achievements, hiding poor economic performance or avoidance of covenants (Guay et al., 1996; Arya et al., 1998; Burgstahler et al., 2006). Managers are also motivated to smooth reported earnings overtime to obtain relatively constant compensation (Gaver et al., 1995; Holthausen et al., 1995; Healy, 1985; Warfield et al., 1995; Bergstresser and Philippon, 2006). For instance, managers might manipulate earnings downward when bonuses have already reached maximum levels, and might manipulate earnings upward when the actual earnings are not qualified for a bonus plan. Subjecting to regulatory capital requirements, banks with lower regulatory capital are motivated to increase it. Consequently, banks might manipulate earnings to accomplish that objective (Barth et al., 2015).

3. Data and variables

3.1. Data

To explore the impact of competition and earnings management on earnings persistence, we combine data from several sources. From Federal Reserve Report of Condition and Income (Call Reports), we obtain the data of balance sheets and income statements at the commercial bank level, rather than their bank holding company levels. We exclude from our sample foreign banks and banks with total assets less than one million US dollars. Macroeconomic information is from World Bank database. Finally, our full sample

includes 15,546 banks with a total of 226,153 firm-year observations from 51 states over the period of 1986-2013.

3.2. The identification strategy of bank competition

Prior studies use different measures, such as country survey index, the Herfindahl-Hirschman Index, and the Lerner Index, to measure competition at the country, industry, firm or product level (Healy et al., 2014; Goddard et al., 2004; Goddard et al., 2011; Berger et al., 2000). These measures, however, cannot address the endogeneity issues between competition and earnings persistence because unobservable cross-sectional heterogeneity could impact both competition and earnings persistence. On the other hand, reverse causality may also exist. For example, persistent earnings of the industry may indicate better business operations, continuous profits, increasing stock prices and lower debt costs (Lin et al., 2013) and hence, can attract new competitor entrants. Alternatively, persistent earnings of the firm may increase the capability of existing firms in preventing new entrants into the market, resulting in less competition.

We use Interstate Banking and Branching Efficiency Act (IBBEA), which relaxes geographical restrictions on bank expansion crossing state borders enacted by the US authorities in 1994, as an exogenous shock to document the causality between competition and earnings persistence. Interstate Banking and Branching Efficiency Act (IBBEA) was passed in 1994 and completed in 1997. It allows bank holding companies to acquire banks across states (effective in 1995) and to expand across states (effective in 1997) (Rice and Strahan, 2010). Regarded as the watershed event, IBBEA indicates the end of an era of geographic restrictions on bank expansion which could be traced back to the 19th century (Rice and Strahan, 2010).

The passage of IBBEA mainly involves the relaxation of four restrictions: (1) Age restriction: State could impose a minimum existence year for banks that seek to enter. Many states set their age requirement at 5 years, while several states set a lower age requirement (eg.3 years) or no minimum age limit at all. (2) De novo interstate branching restriction: states could disallow de novo interstate bank branching, under which situation, all out-of-state banks could only open one branch in the focal state. This makes entry into certain out-of-state markets particularly difficult, because the potential of fast expansion of an out-of-state bank is significantly constrained. (3) Individual branching acquisition restriction: in an interstate merger transaction, states could require an out-of-state bank (Bidder) to acquire all branches of an in-state bank (Asker). Like de novo branching, permitting acquisition of

individual branches lowers the cost of entry for interstate banks. (4) Statewide cap on deposits restriction: states could restrict the maximum fraction of deposits that an out-of-state bank could hold. Officially, a cap of 30% is suggested by IBBEA, but each state maintains the discretion to change it. States could set a deposit cap to prevent a large in-state bank from entering into an interstate merger. For example, if a state sets a deposit cap of 20%, a bank in that state with more than 20% statewide deposits fraction could not be acquired.

This Act allows states to erect barriers to branch expansion. However, some states make use of this provision by prohibiting out-of-state banks from opening or acquiring branches, by requiring the minimum age of bank branches that could be acquired, or by mandating the maximum amount of deposits that banks could hold. Therefore, IBBEA increases banks' competition in each state while the magnitude of increased competition in each estate is different. Following Rice and Strahan (2010), we create a variable called: 'Geographic Expansion Index', which decreases with the extent of interstate branching deregulation restrictions in a state. Hence, an increase in the Geographic Expansion Index indicates an increase in bank competition.

It is important to note that interstate bank deregulation is exogenous to bank earnings persistence. There is no empirical evidence to show that banks' earnings persistence affects the timing of deregulation. Thus, the interstate bank deregulation Act tends to be a disordered act that provides a valuable research laboratory for assessing the influence of competition on banks' earnings persistence. There are also extensive studies applying IBBEA as an exogenous shock to bank competition on topics of firm financing (Rice and Strahan, 2010), firm innovation (Cornaggia et al., 2015; Amore et al., 2013), bank liquidity (Shenoy and Williams, 2015) and market valuation of bank holding companies (Goetz et al., 2013), among others.

3.3. Earnings management measure: Discretionary loan loss provision model

Discretionary loan loss provision becomes the most common vehicle to manipulate bank earnings after the launch of Statements of Financial Accounting Standards No. 133 (short for SFAS 133), which requires firms to measure total assets and liabilities at fair value on the balance sheet (Liu and Ryan, 2006). We hence follow Beatty and Liao (2014), Cohen et al. (2014), Cornett et al. (2009) and Cheng and Warfield (2005) to use the discretionary loan loss provision (DLLP) model to measure bank earnings management. The absolute value of the residual from estimating equation (1) as shown below represents the degree of

each bank's earnings management. The error term represents the unexplained component of the regression and hence, is treated as the Discretionary Loan Loss Provisions (DLLP).

$$\text{Loan Loss Provision}_{it} = \beta_1 \text{Size}_{it} + \beta_2\ \Delta\text{Loan Charge-offs}_{it} + \beta_3 \Delta\text{Loans}_{it}\ + \beta_4 \Delta\text{Non-performing Loans}_{it} + \beta_5 \Delta\text{Non-performing Loans}_{it-1} + \beta_6 \Delta\text{Non-performing Loans}_{it+1} + \varepsilon_{it} \quad (1)$$

where Size_{it} is the natural logarithm of total assets, ΔLoan Charge-offs_{it} represents the difference in total loan charge-offs between periods t and t-1, ΔLoans_{it} represents the difference in total loans between periods t and t-1, ΔNon-performing Loans_{it} reflects the change in non-performing loans between periods t and t-1, ΔNon-performing Loans_{it-1} reflects the change in non-performing loans between periods t-1 and t-2, and ΔNon-performing Loans_{it+1} represents the change in non-performing loans between periods t+1 and t. All the variables except Size in Equation (1) are deflated by the book value of total assets of each bank.

3.4. Earnings adjustment speed: The partial adjustment model

A number of studies use a first-order autoregressive model to capture the dynamics of firm's earnings (Mueller, 1990; Jenny and Weber, 1990). This model can only produce a time-invariant persistence level for each entity. However, the persistence level of each entity in every year may not remain unchanged. In order to improve the estimation accuracy, several studies adopt partial adjustment model to obtain time-varying persistence level for each entity (Healey et al., 2014; Gropp and Heider, 2010; Memmel and Raupach, 2010; De Jonghe and Öztehin, 2015). We follow these studies and employ the partial adjustment model to estimate the dynamic persistence level for each bank in each year.

In the partial adjustment model, the bank's current return level (ROA) is a weighted average of its target and its previous year's ROA:

$$\text{ROA}_{it} - \text{ROA}_{it-1} = \lambda_i(\text{ROA}^*_{it} - \text{ROA}_{it-1}) + \varepsilon_{it,} \quad (2)$$

where ROA_{it} is the return on total assets of bank i in year t. ROA^*_{it} is the target ROA of bank i in year t. λ_i represents the proportional adjustment for bank i. In our context, λ_i captures the exw a bank operates away from its target ROA. Alternatively, ROA is predicted to mean revert to a target level, ROA*. Therefore, bank earnings adjustment speed refers to the speed at which banks' earnings adjust to their target ROA and equals 1 minus earnings persistence. The ROA* can be determined by a cross-sectional model:

$$ROA^*_{it} = \beta_i X_{it} + \varepsilon_{it,} \quad (3)$$

where X_{it} is a vector of the bank and macroeconomic characteristics influencing ROA. Substituting Equation (3) into Equation (2) and rearranging yields Equation (4) below:

$$ROA_{it} = \lambda_i \beta_i X_{it-1} + (1- \lambda_i) ROA_{it-1} + \varepsilon_{it,} \quad (4)$$

Equation (4) shows that in the partial adjustment model, the bank's current ROA is a weighted average (with λ_i between 0 and 1) of ROA in its previous period, the unobserved fixed effects and random shocks. If the value of λ_i is small, the adjustment speed is slow, suggesting that it takes a long time for a bank to reach its target ROA after a shock to its ROA. On the other hand, known as an inertial fact in the partial adjustment model, (1- λ_i) represents the earnings persistence level. The smaller value of adjustment speed indicates a higher level of earnings persistence. When (1 - λ_i) equals 1, the adjustment speed equals 0, indicating that the earnings level is unchanged. In contrast, when (1 - λ_i) equals 0, the adjustment speed equals 1, suggesting that there is no earnings persistence because the speed of adjustment to the target ROA is instant.

In the partial adjustment model, the target ROA (ROA*) is unobservable and is not necessarily constant over periods. Therefore, we employ the cross-sectional model proposed by Fama and French (2006) to estimate the target ROA[1].

$$\begin{aligned} ROA^*_{it} = {} & \beta_0 + \beta_1 \text{Income Diversification}_{it} + \beta_2 \text{Non-Performing Loans}_{it} \\ & + \beta_3 \text{Revenue}_{it} + \beta_4 \text{Capital Ratio}_{it} + \beta_5 \text{Size}_{it} \\ & + \beta_6 \text{Management Efficiency}_{it} + \beta_7 \text{Loans}_{it} + \varepsilon_{it} \end{aligned} \quad (5)$$

where Income Diversification is the non-interest income to total revenue ratio, the variable of Non-performing Loans is the non-performing loans to total asset ratio, Revenue is total revenue to total asset ratio and the Capital Ratio is total equity to total assets ratio, Size is the natural logarithm of total assets. Management Efficiency is calculated via total costs divided by total revenues, and Loans is the total net loans over total assets. We employee Fama-Macbeth estimation in this first stage estimation (see, also, Fama and French, 2006; Healy et al, 2014).

The above model for estimating the target ROA uses contemporaneous variables, for which Healy et al. (2014) demonstrate to be sufficient to predict the target ROA. The adjustments are meaningful if there is a difference between the target ROA and the actual ROA. The GAP is applied to define the difference between these two variables:

[1] The variables used in equation (5) are different from those used in Fama and French (2006) because our focus is on the banking industry that they do not analyze.

$$GAP_{it} = ROA^{*}_{it} - ROA_{it} \quad (6)$$

To test what determines the dynamic of bank earnings adjustment speed. We modify the empirical setup described in Equation (2) and adjust the model such that the adjustment speed, λ, can vary over time and banks:

$$\lambda_{it} = \lambda_i + \gamma Z_{it-1} \quad (7)$$

We assume that λ_{it} is dynamic and varies across banks and over time. γ is a vector of coefficients for the adjustment speed function and Z_{it-1} is a vector of the bank and macroeconomic characteristics that could affect adjustment speed. Substituting Equation (7) into Equation (2) yields the specification for a partial adjustment model with dynamic adjustment speed λ_{it}, that is heterogeneous:

$$ROA_{it} - ROA_{it-1} = (\lambda_i + \gamma Z_{it-1})\, GAP_{it-1} + \varepsilon_{it} \quad (8)$$

We follow Healy et al, (2014) and Flannery and Rangan (2006) to estimate Equation (8) in two steps. In the first step, we use Fama-Macbeth regression for Equation (4) and obtain an estimate of target ROA (i.e., ROA_{it}*) (see, also, Fama and French, 2006; Healy et al, 2014). Then, we use Equation (6) to calculate the earnings GAP for each bank in each year. In the second stage analysis, we follow De Jonghe and Öztekin (2015) and use OLS with bank and year fixed effects. Heterogeneity robust standard errors are clustered at bank level (for robustness, we also conducted several alternative clustering methods and our conclusions are not changed). Having running regression as in Equation (8), we obtain a set of coefficients γ. These coefficients allow us to directly test how bank's competition and earnings management influence earnings adjustment speed. The sign of γ reflects the relationship between Z and the adjustment speed.

3.5. Summary statistics

Table 1 displays the summary statistics of variables. Appendix I shows the definitions of the variables. We winsorize all variables except Size at the 1st and 99th percentiles to mitigate the influence of outliers. The mean value of target ROA is 1.048% and the mean value of realized ROA is 0.974%, resulting in a positive GAP of 0.09%. These figures are consistent with studies that use Call Reports database (Beatty et al., 2002; Ellul and Yerramilli, 2013). Geographic Expansion Index ranges from zero to four and the mean value of this index is 2.06, indicating that the US states overall apply IBBEA but create on average two barriers for interstate branching. The absolute mean value of Discretionary Loan Loss Provisions (i.e., earnings management) is 0.44, which accounts for 0.278% of total assets (=

0.44 multiplied by the mean value of Loan to asset). The mean value of realized gains and losses of AFS is 0.004.

The average Z-score of US banks is around 24. On average, US banks lend 63% of their assets as loans and hold 9.8% equity to assets ratio. The average total assets of US banks is 705 million dollars. The average asset growth is equal to 8.7%. The average value of one minus costs to income ratio, a proxy for banks' managerial efficiency, is equal to 20.8%. The US banks, on average, generate around 10% of total revenue from non-interest income. Both the GDP growth and Inflation range from 2% to 3%. In addition, we found discretionary loan loss provisions have a slight increase after the introduction of IBBEA. Z-score increased from 24 to 25, on average. The mean of capital ratio leveled up from 9.3% to 10.2%, showing that banks in general reserved more equity after deregulation. Commercial banks increased size considerably from a mean of 361 million to 875 million. The average lending and diversification have grown as well. Meanwhile, banks improved their cost-efficiency by 2.7%, on average.

<Insert Table 1 here>

Table 2 reports the correlations between the variables used in this study. Geographic Expansion Index and Discretionary Loan Loss Provisions are positively correlated, showing that banks that operate in those states with lower regulatory restrictions use more earnings management. Most of the correlations are modest and the multicollinearity problem is limited.

<Insert Table 2 here>

4. Empirical results

4.1. The impact of Interstate banking deregulation on earnings adjustment speed

Table 3 presents the regression results of Equation (4) for the first stage Fama-MecBeth (1973) estimation. Most of the lagged variables that explain the target ROA have significant coefficients with expected signs, except for the insignificant coefficient on Capital ratio$_{t-1}$. The coefficient estimate on the lagged ROA indicates that the constant adjustment speed of earnings persistence in the first-stage specification is 0.488 per year (= 1- 0.512).

<Insert Table 3 here>

Table 4 reports the regression results for the second-stage estimation of Equation (8). We consider a ten-year window of the introduction of IBBEA which lasts for three years from 1994 to 1997. Specifically, we use 5 years before and after the introduction of IBBEA Act for each state to examine the effect of IBBEA. Because different states adopt the regulation changes in different years, therefore our ten-year window vary across different states. For example, Ohio State instantly relieved all four restrictions on the 21th May 1997, therefore the data for Ohio spans a ten-year window from 1992 to 2002. On the other hand, Washington State firstly relieved state deposit cap restriction on the 6th June 1996 and then gradually relieved other restrictions in following years. Since we consider a ten-year window around the first introduction of IBBEA, the data for Washington hence spans from 1991 to 2001. Thus, the overall time period for all states spans from 1989 to 2002. This allows us to capture the effect of dramatic changes of deregulation across states and time.

We standardize all the explanatory variables in the regression, except for Geographic Expansion Index because this index is an ordinal variable rather than a continuous variable. The coefficient of Geographic Expansion Index is positive and significant. Since a higher Geographic Expansion Index value indicates higher competition, a positive regression coefficient of Geographic Expansion Index indicates that banks in more competitive markets tend to adjust their earnings at a higher speed. As shown in Column (1) of Table 4, a one inter-quartile increase of Geographic Expansion Index leads to an increase of earnings adjustment speed by 9.4%. This result is in accordance with economic competition theory that competition impacts earnings persistence by eroding away economic excessive returns and losses in the long run (Stigler, 1961).

In Column (2) of Table 4, the coefficient of Discretionary Loan Loss Provisions is negative and significant, suggesting that banks with higher earnings management tend to have a slow earnings adjustment speed. Earnings adjustment speed will decrease by 4.8% (0.178*0.27) if Discretionary Loan Loss Provisions rises by one standard deviation. This result also supports the widely documented opinion that the principle purpose of earnings management is to smooth earnings (Healy and Wahlen, 1999; Dechow et al., 2010; Gaver et al., 1995; Holthausen et al., 1995). In addition, we find that the coefficients of Capital Ratio are significant and positive, indicating that banks with higher capital ratio adjust earnings faster. Size shows a significantly negative impact on the adjustment speed, suggesting that larger banks tend to have more persistent earnings than their smaller counterparts. A one standard deviation increase in Size decreases the adjustment speed by 0.324% (0.054*0.06).

Managerial Efficiency is also significantly and positively related to earnings adjustment speed.

We conduct further analysis to examine whether the positive impact of bank competition on earnings adjustment speed is driven by those banks with earnings below their target (positive GAP), because these banks tend to have more incentives to adjust their earnings to their target levels than their better performed peer banks. We re-run the regressions on the subsample of banks with positive and negative GAP, respectively. The results are reported in Column (4) and (5) of Table 4. We find that the coefficients on Geographic Expansion index remain positive and significant in both specifications. It suggests that our main results are not driven by those banks with earnings below their target (positive GAP), and competition consistently erodes away the economic excessive returns (GAP<0) and expel losses (GAP>0) (Stigler, 1961).

<Insert Table 4 here>

4.2. Robustness analyses

We also conduct additional tests to ensure that our results presented in Table 4 are not driven by potential biases in the sample or due to alternative explanations. Table 5 reports the results.

First, there exists a potential concern that our results may be driven by states that time their interstate bank branching deregulations to coincide with a higher level of bank earnings persistence. Thus, the positive coefficient estimates on Geographic Expansion Index in the previous regressions may simply reflect a trend of rising adjustment speed after the IBBEA deregulation. To address this concern, we further conduct the following empirical analysis. We follow Krishnan et al. (2014), and introduce the Before (4,1) dummy variable, which equals one for the years t-4 to t-1 preceding the deregulation year t. This variable captures the difference in earnings adjustment speed of banks in each state between the four-year period t-4 to t-1 prior to the deregulation year t and the years prior to the four-year period, t-5 and earlier, before the deregulation. If the deregulations are due to states trying to time earnings persistence or if our results above represent a secular trend in earnings persistence, the coefficient estimate on Before (4,1) dummy should be positive and statistically significant. We do not find such evidence. In Column (1) of Table 5, the coefficient estimate of the Before (4,1) dummy is statistically insignificant.

Second, if our results reflect a treatment effect of interstate bank branching deregulations by states, our results should disappear if we falsely assume that our treatment occurs one year prior to the actual deregulation year (Roberts and Whitted, 2011; Krishnan et al., 2014). For these tests, we repeat our main regressions of Equation (8) under such false definitions of Geographic Expansion Index, which takes the index value one year before the actual deregulation year. Column (2) of Table 5 reports that the coefficient estimate on the falsified Geographic Expansion Index is statistically insignificant. This result confirms that interstate bank branching law were not enacted under certain circumstances that coincide with other unobservable characteristics that also lifted bank earnings persistence. Furthermore, these results also indicate that reverse causality does not drive our results.

Third, in order to examine the influence of deregulation over a long time horizon, we expand our sample for the main regression of Equation (8) to the time period of 1986 to 2013. As shown in Column (3) of Table 5, the coefficient is significantly positive, which is the same as and consistent with those reported in Table 4. Fourth, we consider the potential bias by banks operating in multiple states. Thus, we restrict our sample to those banks with only one branch and banks with size below USD 100 million, respectively. The results reported in column (4) and (5) are consistent with our main findings.

Fifth, we are concerned with the confounding effect of the Gramm-Leach-Bliley Act of 1999, which allows banks to diversify into various businesses. The literature suggests that the GLB Act of 1999 impacts on market competition (Chronopoulos, Liu, McMillan and Wilson, 2015) and hence may also affect bank earnings adjustment speed. However, it is empirically difficult to disentangle the effect of GLB Act from the impact of Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994 since the impact of both Acts may have overlapping time periods immediately after 1999. In order to find a clean effect from IBBEA 1994, we repeat our main regression analysis using the sub-sample before year 1999 and find consistent results reported in Column (6). Sixth, we use standard errors that are clustered at the bank, state and state-year level. The coefficients of Geographic Expansion Index across column (7) to column (9) continue to be statistically significant at 1% level.

Finally, as reported in Table 5B, we conduct a robustness test using event difference-in-difference strategy following Bertrand and Mullianathan (2003), and Chemmanur, He and Nandy (2010) to further test whether our main results are sensitive to different methods. This method captures the dynamic variation of the difference between the treatment and control groups around a particular event. It could also prevent us from producing underestimated small standard errors by including a too long sample period in a difference-in-difference

estimation (Bertrand et al. 2004)). We treat the introduction year of IBBEA for each state as our event year. We use the following model to test the dynamic impact from IBBEA on earnings adjustment speed:

$$ROA_{it} - ROA_{it-1} = (\sum Before^{t} + \sum After^{t} + \gamma Z_{it-1})\, GAP_{it-1} + \varepsilon_{it}, \qquad (9)$$

where $GAP_{it-1} = ROA^{*}_{it-1} - ROA_{it-1}$, $Before^{t}$ ($After^{t}$) is a dummy variable equal to 1 for t years before (after) the introduction of deregulation of a state. For example, $Before^{5}$ equals 1 for year 5 before a particular state's deregulation introduction year, and 0 otherwise. We find that the coefficients on $After^{1}$, $After^{2}$, $After^{3}$, $After^{4}$ are all positive and statistically significant. This result shows that after the introduction of deregulation, banks accelerate earnings adjustment speed. This effect is most pronounced 2 and 3 years after the introduction year. These results are consistent with our main results.

<Insert Table 5A here>

<Insert Table 5B here>

4.3. The effect of banks' heterogeneous ability to sustain earnings on earnings persistence

In the previous sections we have established causality between competition and bank earnings adjustment speed. In this subsection, we attempt to strengthen the interpretation of this relation by exploring the impact of banks' heterogenous abilities in sustaining earnings, which affects their earnings adjustment speed. The hypothesis is that the impact of competition on bank earnings adjustment speed should be less strong for banks with higher level of ability to sustain their previous years' earnings.

Specifically, we expect that banks with larger size, higher level of diversification, more efficient in management and lower level of default risk have stronger ability to sustain earnings. A large bank size usually indicates comprehensive strength, which may help banks increase their earnings persistence. Product diversification reflects banks' business expansion, which increases banks' attractiveness to customers (De Young and Rice (2004) and Stiroh and Rumble (2006)). Further, income diversification effectively reduces earnings volatility caused by a particular external event. Banks' safety and soundness could reduce banks' default risk induced by external shocks. Efficient bank management not only reduces operation costs but also makes timely and effective strategies to mitigate loss caused by external changes or is even able to find opportunities in external crises (Lin and Zhang, 2010; Shehzad et al., 2010).

In the empirical analysis, we introduce four variables, size, diversification, managerial efficiency, and Z-score, and their interaction terms with the Geographic Expansion Index. Table 6 presents the regression results. The relations between the interaction terms of size, diversification, managerial efficiency and Z-score and earnings adjustment speed, respectively, are negative and significant. These results indicate that banks with larger size, higher level of diversification, higher managerial efficiency and lower level of default risk could persist earnings longer and hence, the impact of competition of earnings adjustment speed is less stronger.

<Insert Table 6 here>

5. The impact of competition on earnings management

In the previous sections we document a positive impact of bank competition and a negative impact of bank earnings management on bank earnings adjustment speed. Our findings emphasize that the impact of bank competition on earnings adjustment speed is direct and causal. However, the accounting literature emphasizes the role of earnings management in shaping the relation between competition and earnings persistence (Li, 2010; Healy et al., 2014).

This argument implicitly suggests that competition may indirectly impact earnings persistence through the channel of earnings management because an increased competition could lead to lower level of earnings management. The reasoning is that competition increases the cost of misreporting, thereby curbing the incentives of earnings management. With more competitive rivals, firms are more likely to lose their shareholders, customers and suppliers due to the damage of reputation caused by misreporting (Graham et al., 2005). Consequently, it is possible that competition reduces earnings management and that such a reduced earnings management results in a lower level of earnings persistence, or equivalently speaking, a higher speed of earnings adjustment, as we found in. We investigate whether this indirect channel may exist and drive our main results by using two earnings management models in this section.

5.1. The impact of competition on Discretionary Loan Loss Provisions (DLLP)

In this subsection we examine the direct impact of bank competition on bank earnings management, as measured by discretionary loan loss provisions. If it is indeed that bank competition impact on earnings persistence indirectly through the earnings management

channel, we would expect a negative relationship between the Geographic Expansion Index and our bank earnings management measure, otherwise the impact of competition on earnings adjustment speed would not be positive.

Table 7 presents the results. The coefficient of Geographic Expansion Index is significantly positive, indicating the positive impact of bank competition on earnings management. In Column (1), a one inter-quartile increase in the Geographic Expansion Index leads to an increase of 0.018% in Discretionary Loan Loss Provisions. These results support the recent growing studies that find that bank competition encourages bank earnings management. For instance, Tomy et al. (2016) argue that banks would inflate loss provisions, which reduces reported earnings and hence discourages the entry of new banks. Dou, Ryan, and Zou (2016) argue that banks would suppress loan provisions, which creates the impression of high underwriting quality and hence helps deter the entry of new banks. Our evidence does not support the notion that competition reduces earnings management (see, e.g., Graham et al., 2005; Lin et al., 2016; Burks et al., 2016; Jiang et al., 2016).

We further examine whether the impact of bank competition on earnings management is driven by banks with earnings above their targets (GAP<0), because these outperforming banks have more incentives to manipulate earnings to avoid sudden drops in earnings. We thus re-run the regressions with two sub-samples of banks with earnings below (GAP>0) and above (GAP<0) their target, respectively. Column (2) and (3) of Table 7 report the results. We find that the coefficient of Geographic Expansion Index is significantly positive only in the GAP<0 regression but not in the GAP>0 regression. These results indicate that the impact of bank competition on earnings management is driven by banks that have higher ROA than their targets (GAP<0).

<Insert Table 7 here>

5.2. The impact of competition on bank earnings management through Available for Sale Securities (AFS securities)

Prior research documents that banks tend to use the item of available for sale (AFS) securities to smooth earnings (Barth et al., 2017; Dong and Zhang, 2015). AFS securities is the largest category of banks' securities and contains a sizable proportion of bank assets (Nissim and Penman, 2007; Laux and Leuz, 2010). Standards Codification (ASC) Topic 320 specifies that AFS securities should be measured as fair value in the statement of financial position, with changes in fair value recognized in other comprehensive income. Hence, the accounting treatment for gains and losses from AFS securities provides banks a chance to

engage in earnings management by selling these securities and realizing selected gains and losses. After the announcement of Accounting Standard Codification (ASC) 320, it is increasingly popular that banks use AFS securities to manage earnings due to large size of this item and lower cost of managing this item (Nissim and Penman, 2007; Laux and Leuz, 2010).

In this Section, we examine whether competition induces earnings smoothing via utilizing the AFS securities. Following Barth et al. (2017) and Dong and Zhang (2015), we use realized gains and losses of AFS securities model to capture bank earnings management. We estimate the following model:

$$\begin{aligned}\text{AFS securities}_{it} = {} & \beta_1 \text{Net Income}_{it} + \beta_2 \text{ Competition}_{it} \\ & + \beta_3 \text{ Net Income}_{it} \text{ x Competition}_{it} \\ & + \beta_4 \text{Discretionary Loan Loss Provisions}_{it} + \beta_5 \text{Z-score}_{it} \\ & + \beta_6 \text{Capital Ratio}_{it} + \beta_7 \text{ Loan to Total Asset}_{it} + \beta_8 \text{Size}_{it} \\ & + \beta_9 \text{Total Assets Growth Rate}_{it} + \beta_{10} \text{Managerial Efficiency}_{it} \\ & + \beta_{11} \text{Income Diversification}_{it} + \beta_{12} \text{GDP Growth Rate}_{it} \\ & + \beta_{13} \text{Inflation}_{it} + \beta_{14} \text{GDP Per Capita}_{it} + \varepsilon_{it} \qquad (10)\end{aligned}$$

where $\text{AFS securities}_{it}$ is realized gains and losses on AFS securities and Net Income_{it} is net income before taxes and gains and losses on AFS securities, both deflated by beginning-of-year total assets. Competition_{it} is the Geographic Expansion Index. If banks employ AFS securities to maintain persistent earnings, the coefficient on Net Income_{it}, β_1, should be negative, and if banks under more competition realize more gains from AFS securities, the coefficient on Competition_{it}, β_2, should be positive. Our interested coefficient is β_3, the interaction term between Net Income_{it} and Competition_{it}. It tests whether earnings smoothing is more pronounced for banks under higher competition. A negative β_3 implies that competition would directly intensify banks earnings smoothing behavior. [2]

The results are reported in Table 8. In column (1), net income before tax is negatively related to realized gains and losses of AFS securities. This finding suggests that banks use AFS securities to smooth earnings, which is consistent with Barth et al. (2017). The interaction term of Geographic Expansion Index and Net Income is insignificant, indicating that bank competition does not induce more earnings smoothing by utilizing AFS securities. Column (2) and (3) consistently show insignificant coefficients on the interaction term of

[2] It is worth to note that the model of Barth et al., (2017) only allows us to check whether banks use AFS securities to smooth earnings, but not the magnitude of this earnings management.

Geographic Expansion Index and Net Income when we consider the sub-samples when GAP >0 and GAP<0, respectively. These results further confirm our main findings that bank competition has a direct rather than indirect impact on bank earnings persistence through the channel of earnings management.

<Insert Table 8 here>

6. Conclusions

In this study we investigate whether competition directly affects bank earnings persistence or indirectly go through the channel of earnings management. We employ a sample of commercial banks in the U.S. from 1986 to 2013. We use the introduction of the Interstate Banking and Branching Efficiency Act (IBBEA) as a natural experiment of competition, which could effectively mitigate endogeneity issues in prior research. By applying a two-stage partial adjustment model, we find a negative impact of competition on earnings persistence, consistent with economic competition theory that competition directly impacts earnings persistence. O the other hand, we do not find a negative relation between competition and earnings management, although we find a positive relation between earnings management and persistence. Therefore, our evidence rules out the possibility that competition could indirectly decrease earnings persistence through the channel of earnings management.

Our findings are useful for scholars and practitioners, who seek to understand bank earnings persistence. The implication for policy makers is to pay attention to form a healthy competition environment for existing banks while at the same time encourage information disclosure quality. As a result, investors could obtain more valuable information regarding banks performance and the banking industry could become more stable, contributing to the stability of the financial system.

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Table 1

Panel A Summary Statistics

This table reports the summary statistics for banks during the period of five years before and five years after the year when the IBBEA act was introduced in each state. ROA* is estimated using the first stage of the partial adjustment model, $ROA_{it} = \lambda_i \beta_i X_{it-1} + (1- \lambda_i) ROA_{it-1} + \varepsilon_{it}$, $GAP_{it} = ROA^*_{it-1} - ROA_{it-1}$. $\Delta ROA = ROA_{it} - ROA_{it-1}$. We use Fama-Macbeth regression to estimate the ROA* in the first stage. Appendix presents the definitions of variables.

	(1)	(2)	(3)	(4)	(5)
Variable Name	Observations	Mean	Standard Deviation	Minimum	Maximum
Target ROA(ROA*)	77929	1.048	0.530	-2.834	2.424
ROA	77929	0.974	0.723	-4.440	2.961
GAP	77929	0.091	0.766	-2.908	4.520
ΔROA	77929	0.030	0.682	-7.401	7.401
Discretionary Loan Loss Provisions	77929	0.435	0.270	0.011	1.319
Realized gains and losses of AFS	77929	0.004	0.052	-6.433	8.044
Geographic Expansion Index	77929	2.060	1.907	0.000	4.000
Z-score	77929	24.132	17.069	0.428	83.816
Capital Ratio	77929	9.799	3.460	3.992	36.872
Loan to Total Asset	77929	63.118	20.751	13.274	148.805
Total Assets (million)	77929	705.256	15091.220	0.723	1746242.000
Size (Log total Asset)	77929	11.339	1.296	8.679	15.734
Total Assets Growth	77929	8.686	15.879	-18.691	125.575
Managerial Efficiency	77929	20.808	8.741	-4.076	45.923
Income Diversification	77929	10.131	7.519	0.492	53.253
Inflation	27	2.463	0.763	0.879	3.793
GDP Growth	27	2.746	1.585	-3.109	4.869
GDP Per Capita	27	10.307	0.304	9.822	10.819

Panel B Summary statistics around IBBEA introduction

This table presents summary of interested variables before and after the introduction of IBBEA in each state for a 10 year window.*, **, *** denote the 10%, 5% and 1% significance levels, respectively.

	Before Deregulation			After Deregulation			Difference in Mean
	Mean	Median	Standard Deviation	Mean	Median	Standard Deviation	After-Before
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Discretionary Loan Loss Provisions	0.003	0.003	0.002	0.004	0.004	0.002	0.001***
Z-score	24.403	20.883	16.868	25.167	21.120	17.292	0.764***
Capital Ratio	9.340	8.629	3.118	10.242	9.355	3.591	0.009***
Loan to Total Asset	58.978	59.180	19.226	66.213	66.083	19.950	0.072**
Total Assets (million)	361.950	57.986	3278.168	875.287	102.418	8306.641	513.337***
Total Assets Growth Rate	7.806	5.004	15.205	10.424	6.812	16.924	2.61762***
Managerial Efficiency	22.148	22.195	7.687	19.387	19.216	7.601	-2.761***
Income Diversification	9.198	7.667	6.498	10.082	8.404	7.313	0.884***

Table 2

Correlation Matrix

This table reports the correlation covariance. * denotes the 5% significance level. Appendix presents the definitions of variables.

	Geographic Expansion Index	Discretionary Loan Loss Provisions	Z-score	Capital ratio	Loan to total asset	Size	Total Assets Growth	Managerial efficiency	Income diversification	Inflation	GDP growth	GDP per capita
Geographic Expansion Index	1											
Discretionary Loan Loss Provisions	0.0728*	1										
Z-score	0.0267*	-0.2257*	1									
Capital ratio	0.1970*	-0.2168*	0.3399*	1								
Loan to total asset	0.2542*	0.4709*	-0.2191*	-0.1983*	1							
Size	0.3104*	0.1196*	-0.0026	-0.1127*	0.3062*	1						
Total Assets Growth	0.0390*	0.1413*	-0.1349*	-0.0899*	0.5593*	0.1602*	1					
Managerial efficiency	-0.2891*	-0.1342*	0.1934*	0.2947*	0.1186*	0.2862*	0.0205*	1				
Income diversification	0.1889*	0.0039	-0.1554*	0.0560*	0.0389*	0.2982*	0.0499*	-0.1032*	1			
Inflation	-0.4282*	-0.0004	-0.0239*	-0.1188*	-0.0893*	-0.1314*	-0.0162*	0.2305*	-0.1297*	1		
GDP growth	-0.1653*	-0.2515*	0.0101*	-0.0389*	-0.0445*	-0.1141*	0.0231*	-0.0117*	-0.0621*	-0.0031	1	
GDP per capita	0.3786*	-0.2058*	0.0115*	0.2171*	0.2440*	0.3250*	0.0155*	-0.3318*	0.2311*	-0.3904*	-0.3128*	1

Table 3
First Stage Partial Adjustment Model

This table reports the results of the first-stage partial adjustment model assuming a static earnings adjustment speed. $ROA_{it} = \lambda_i \beta_i X_{it-1} + (1- \lambda_i) ROA_{it-1} + \varepsilon_{it}$, where $(1- \lambda_i)$ is the level of persistence of ROA. In column (1), we follow Fama and French (2006) and Healy et al. (2014) to use Fama-Macbeth regression for estimating ROA. t-statistics are in parentheses. *, **, *** denote the 10%, 5% and 1% significance levels, respectively. In this regression, we use the original values of these ratios instead of percentages. Appendix presents the definitions of variables.

Dependent Variable	ROA_t
ROA_{t-1}	0.512***
	(22.06)
$Revenue_{t-1}$	0.005*
	(1.74)
$Capital\ ratio_{t-1}$	0.066
	(0.37)
$Loans_{t-1}$	-0.027***
	(-4.54)
$Total\ Assets_{t-1}$	-0.004**
	(-2.21)
$Diversification_{t-1}$	0.004***
	(3.42)
$Managerial\ Efficiency_{t-1}$	0.129***
	(13.97)
$Growth\ of\ Total\ Assets_{t-1}$	0.002***
	(6.11)
Constant	-0.456**
	(-2.02)
N	77929

Table 4
Determinants of Bank Profit Adjustment Speed: a ten-year window of IBBEA

We assume λ_i to be dynamic, so it varies across banks and over time. Z is a vector of all independent variables. This table presents the OLS results for parameter estimates on Z in the Partial Adjustment Model: ($ROA_{it} - ROA_{it-1} = (\lambda_i + \gamma Z_{it-1}) GAP_{it-1} + \varepsilon_{it}$,$GAP_{it-1} = ROA^*_{it-1} - ROA_{it-1}$) over the ten-year period in which no more than five years are distant from the IBBEA introduction year. Discretionary Loan Loss Provisions are the proxy for earnings management across all columns. t-statistics are in parentheses. *, **, *** denote the 10%, 5% and 1% significance levels, respectively. Appendix presents the definitions of variables.

	(1)	(2)	(3)	(4)	(5)
				Below target GAP>0	Above target GAP<0
Geographic Expansion Index	0.094***		0.090***	0.057***	0.042***
	(7.38)		(8.70)	(11.09)	(7.11)
Discretionary Loan Loss Provisions		-0.178***	-0.176***	0.041***	-0.069***
		(-4.25)	(-4.22)	(9.66)	(-10.21)
Z-score	-0.012	-0.009	-0.009	-0.004	-0.116***
	(-1.63)	(-1.21)	(-1.21)	(-0.68)	(-12.46)
Capital Ratio	0.021***	0.022***	0.022***	-0.005	0.007
	(3.14)	(3.21)	(3.21)	(-1.13)	(1.27)
Loan to Total Asset	-0.004	-0.010	-0.010	0.062***	-0.003
	(-0.60)	(-0.96)	(-0.96)	(9.13)	(-0.39)
Size	-0.053***	-0.054***	-0.054***	-0.051***	-0.074***
	(-5.03)	(-5.04)	(-5.04)	(-5.34)	(-9.65)
Total Assets Growth	0.006	0.008	0.008	-0.023***	0.021***
	(1.28)	(1.43)	(1.43)	(-5.52)	(3.84)
Managerial Efficiency	-0.026***	-0.027***	-0.027***	-0.004	-0.072***
	(-4.11)	(-4.22)	(-4.22)	(-1.09)	(-11.99)
Income Diversification	-0.005	-0.006	-0.006	0.018***	-0.039***
	(-1.03)	(-1.11)	(-1.11)	(5.45)	(-6.43)
Inflation	0.017	0.019	0.019	-0.049***	-0.068***
	(1.12)	(1.34)	(1.34)	(-8.49)	(-11.91)
GDP Growth	0.013	0.014	0.014	-0.119***	0.019***
	(1.39)	(1.50)	(1.50)	(-21.74)	(3.38)
GDP Per Capita	-0.001	-0.001	-0.001	-0.383***	-0.197***
	(-0.06)	(-0.09)	(-0.09)	(-25.28)	(-14.22)
Constant	0.091***	0.091***	0.097***	0.850***	0.738***
	(9.66)	(9.70)	(9.70)	(54.33)	(51.39)
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes
N	77929	77929	77929	128584	97513
adj. R-sq	0.792	0.793	0.793	0.659	0.613

Table 5A

Determinants of Bank Profit Adjustment Speed: Robustness Analysis

We assume λ_i to be dynamic, so it varies across banks and over time. Z is a vector of all independent variables. This table presents the placebo tests of the OLS results for parameter estimates on Z in the Partial Adjustment Model: ($ROA_{it} - ROA_{it-1} = (\lambda_i + \gamma Z_{it-1})GAP_{it-1} + \varepsilon_{it}$, $GAP_{it-1} = ROA^*_{it-1} - ROA_{it-1}$). Column (1) shows the results controlling for the four years prior to the deregulation year. Before (4, 1) is a dummy variable equals one for year -4 to -1 relative to the deregulation year. Columns (2) displays the results under which Geographic Expansion Index variable is the actual index for one year prior to the actual deregulation. Column (3) displays the regression results for both large banks and their smaller counterparts. Column (4) presents the regression results using the full sample. Column (5) to (7) present the regression results using the sub samples, while (8) to (10) show regression results using different standard errors clustering method. t-statistics are in parentheses. *, **, *** denote the 10%, 5% and 1% significance levels, respectively. Appendix presents the definitions of variables.

	Before(4,1) dummy	Falsified one-year before Geographic Expansion Index	Full sample	Banks with only one branch	Banks with total assets smaller than 100million	Before GLB Act	Bank-level clustering	State-level clustering	State-year-level clustering
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Geographic Expansion Index	0.088***	-0.007	0.071***	0.016***	0.082***	0.029***	0.091***	0.091***	0.091***
	(18.85)	(-1.36)	(18.33)	(3.55)	(6.35)	(6.16)	(12.01)	(3.80)	(4.74)
Before (4,1)	0.011								
	(0.05)								
Discretionary Loan Loss Provisions	-0.017***	-0.018***	-0.025***	-0.021***	-0.082***	-0.021**	-0.126**	-0.126*	-0.126***
	(-3.27)	(-2.58)	(-5.87)	(-3.14)	(-5.51)	(-2.19)	(-2.32)	(-1.89)	(-2.63)
Early Deregulation Index		0.019**	0.017**						
		(2.31)	(2.21)						
Z-score	-0.013***	-0.032***	-0.058***	-0.090***	-0.050***	-0.061***	-0.069***	-0.069***	-0.069***
	(-12.11)	(-5.68)	(-12.25)	(-9.12)	(-7.36)	(-6.49)	(-7.79)	(-8.46)	(-10.72)
Leverage Ratio	0.017***	0.017***	-0.201***	-0.001	0.004	0.019***	0.014**	0.014**	0.014**
	(3.64)	(3.79)	(-3.27)	(-0.17)	(0.76)	(4.42)	(2.26)	(2.41)	(2.49)
Loan to Total Asset	0.058***	0.000	0.049***	0.033**	0.001	-0.007	-0.026***	-0.026**	-0.026***
	(13.33)	(0.02)	(11.66)	(2.62)	(0.13)	(-0.83)	(-2.86)	(-2.44)	(-2.86)
Size	-0.049***	-0.076***	-0.062***	-0.092***	-0.077***	-0.106***	-0.124***	-0.124***	-0.124***
	(-5.62)	(-8.93)	(-11.57)	(-6.92)	(-6.83)	(-9.71)	(-11.90)	(-13.42)	(-19.08)
Total Assets Growth	0.004	0.004	-0.011***	-0.002	0.017***	-0.002	0.017***	0.017***	0.017***
	(0.85)	(1.14)	(-3.25)	(-0.26)	(3.37)	(-0.38)	(2.82)	(3.43)	(3.01)
Managerial Efficiency	-0.023***	-0.038***	-0.025***	-0.043***	-0.042***	-0.043***	-0.093***	-0.093***	-0.093***
	(-4.34)	(-9.60)	(-7.61)	(-3.97)	(-9.56)	(-4.93)	(-14.06)	(-13.61)	(-16.58)
Income Diversification	-0.010**	-0.007*	0.000	-0.012*	-0.013**	-0.034***	-0.013**	-0.013	-0.013***
	(-2.28)	(-1.90)	(0.03)	(-2.00)	(-2.01)	(-4.77)	(-2.10)	(-1.64)	(-2.60)
GDP Growth	0.015	0.001	-0.075***	-0.054***	-0.114***	-0.005	-0.007	-0.007	-0.007
	(1.62)	(0.29)	(-25.29)	(-5.86)	(-15.15)	(-0.76)	(-0.93)	(-0.95)	(-0.88)

Inflation	0.006	-0.019***	-0.056***	-0.029***	0.048***	0.009	0.001	0.001	0.001
	(0.47)	(-3.51)	(-16.63)	(-3.33)	(2.97)	(1.21)	(0.11)	(0.14)	(0.08)
GDP Per Capita	-0.321***	-0.121***	-0.354***	-0.192***	-0.592***	0.114***	0.047	0.047	0.047
	(-45.30)	(-37.27)	(-43.49)	(-8.84)	(-19.46)	(5.75)	(1.09)	(1.24)	(0.94)
Constant	0.896***	0.857***	0.823***	0.659***	1.124***	0.750***	0.702***	0.702***	0.702***
	(80.29)	(85.79)	(88.14)	(26.71)	(24.80)	(43.23)	(19.55)	(21.07)	(16.69)
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	226153	77929	226153	42942	102551	140572	77929	77929	77929
adj. R-sq	0.826	0.808	0.701	0.777	0.614	0.826	0.697	0.697	0.697

Table 5B

Determinants of Bank Profit Adjustment Speed: Robustness checks

We assume λ_i to be dynamic, so it varies across banks and over time. Z is a vector of all independent variables. This table presents the OLS results for parameter estimates on Z in the Partial Adjustment Model. We use the event DID results. [ROA_{it} - ROA_{it-1}=($\sum Before^t$+$\sum After^t$+ γZ_{it-1}) GAP_{it-1}+ ε_{it}, GAPit-1 = ROA^*_{it-1} - ROA_{it-1}], $Before^t$($After^t$) is a dummy variable equal to 1 for t years before(after) the introduction of deregulation of a state. For example, $Before^5$ equals 1 for year 5 before a state's first time deregulation, and 0 otherwise. We apply OLS regression. t-statistics are in parentheses. *, **, *** denote the 10%, 5% and 1% significance levels, respectively. Appendix presents the definitions of variables.

	(1)
Before 5	-0.037**
	(-2.57)
Before 4	-0.031*
	(-1.82)
Before 3	0.006
	(0.37)
Before 2	-0.020
	(-1.21)
Before 1	0.011
	(0.90)
After 1	0.034***
	(2.59)
After 2	0.258***
	(4.02)
After 3	0.1190*
	(1.78)
After 4	0.032**
	(2.56)
After 5	0.008
	(0.61)
Discretionary Loan Loss provisions	-0.113*
	(-1.89)
Constant	0.7585***
	(112.92)
Bank Controls	Yes
Time Fixed Effects	Yes
Bank Fixed Effects	Yes
N	77929
adj. R-sq	0.687

Table 6

Determinants of Bank Profit Adjustment Speed: Heterogeneity

This table investigates the potential mechanisms between earnings adjustment speed and bank competition. The Geographic Expansion measure is a state level competition measure. Following Rice and Strahan (2010), Geographic Expansion is an index that captures the level of interstate Geographic Expansion for each state. All other variables are defined in the appendix. *, **, *** represents the significance level of 10%, 5% and 1% respectively.

	(1)	(2)	(3)	(4)
Geographic Expansion Index *Size	-0.034***			
	(-6.28)			
Geographic Expansion Index *Income Diversification		-0.011***		
		(-2.93)		
Geographic Expansion Index *Managerial Efficiency			-0.037***	
			(-5.83)	
Geographic Expansion Index *Z-score				-0.007***
				(-3.45)
Geographic Expansion Index	0.056***	0.042***	0.057***	0.088***
	(4.27)	(6.68)	(5.96)	(7.43)
Discretionary Loan Loss provisions	-0.019***	-0.021***	-0.016***	-0.021***
	(-4.75)	(-5.17)	(-3.84)	(-5.13)
Z-score	-0.086***	-0.084***	-0.090***	-0.114***
	(-17.28)	(-16.69)	(-18.56)	(-11.45)
Capital Ratio	-0.003	-0.003	-0.004	-0.003
	(-0.42)	(-0.38)	(-0.56)	(-0.43)
Loan to Total Asset	0.072***	0.071***	0.056***	0.070***
	(13.62)	(13.12)	(10.11)	(13.31)
Size	-0.033***	-0.065***	-0.070***	-0.064***
	(-4.02)	(-12.13)	(-12.95)	(-12.09)
Total Assets Growth Rate	-0.018***	-0.017***	-0.010***	-0.017***
	(-4.75)	(-4.39)	(-2.63)	(-4.37)
Managerial Efficiency	-0.107***	-0.042***	-0.012***	-0.036***
	(-5.14)	(-8.38)	(-2.89)	(-7.52)
Income Diversification	0.005*	-0.018***	0.004	-0.000
	(1.80)	(-2.84)	(1.26)	(-0.06)
GDP Growth Rate	-0.077***	-0.077***	-0.077***	-0.078***
	(-23.47)	(-23.67)	(-23.87)	(-23.88)
Inflation	-0.071***	-0.073***	-0.070***	-0.074***
	(-21.85)	(-22.31)	(-22.03)	(-22.60)
GDP Per Capita	-0.261***	-0.254***	-0.249***	-0.256***
	(-41.61)	(-41.39)	(-40.17)	(-41.87)
Constant	0.980***	0.634***	0.691***	0.618***
	(18.76)	(70.01)	(103.31)	(48.61)
Time Fixed Effects	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes
N	226153	226153	226153	226153
adj. R-sq	0.707	0.707	0.708	0.7073

Table 7
The Impact of Competition on Bank Earnings Management

This table presents the OLS results between competition and earnings management with the full sample, and when the bank is above or below its ROA target (GAP<0 or GAP>0). The dependent variable, earnings management, is measured by Discretionary Loan Loss Provisions. As to independent variable, competition is measured by Geographic Expansion Index. *, **, *** denote the 10%, 5% and 1% significance levels, respectively. Appendix presents the definitions of variables.

	(1)	(2)	(3)
	Full Sample	Below target GAP>0	Above target GAP<0
Geographic Expansion Index	0.00008**	0.00000	0.00002**
	(1.97)	(0.77)	(2.32)
Z-score	-0.000***	-0.000	-0.000***
	(-10.20)	(-1.52)	(-14.93)
Leverage Ratio	-0.001	0.002**	-0.003***
	(-1.14)	(1.98)	(-3.29)
Loan to Total Asset	0.008***	0.008***	0.009***
	(131.77)	(108.44)	(94.53)
Size	0.000***	0.000***	0.000***
	(8.56)	(3.41)	(7.71)
Total Assets Growth Rate	-0.000***	-0.000***	-0.000***
	(-70.73)	(-49.13)	(-53.47)
Managerial Efficiency	-0.000***	-0.000	-0.000***
	(-13.86)	(-0.89)	(-3.81)
Income Diversification	0.000***	0.000***	0.000***
	(4.99)	(6.23)	(4.07)
GDP Growth Rate	-0.000***	-0.000***	-0.000***
	(-89.79)	(-49.22)	(-49.38)
Inflation	-0.003***	-0.003***	-0.003***
	(-185.22)	(-177.35)	(-95.00)
GDP Per Capita	0.043***	0.037***	0.044***
	(52.89)	(30.66)	(34.03)
Constant	-0.456***	-0.388***	-0.457***
	(-52.25)	(-29.25)	(-31.92)
Time Fixed Effects	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes
N	214403	128584	97513
adj. R-sq	0.776	0.778	0.771

Table 8
The Impact of Competition on Bank Realized gains/losses of AFS

This table investigates whether competition induces banks earnings management using realized gains/losses of available for sale securities, when the bank is above or below its ROA target (GAP<0 or GAP>0). The dependent variable is Realized gains/losses of AFS scaled by total assets. NI is net income before tax and realized gains/losses of AFS scaled by total assets. The Geographic Expansion Index measure is a state level competition measure. All other variables are defined in the appendix. *, **, *** represents the significance level of 10%, 5% and 1% respectively. Appendix presents the definitions of variables.

	(1)	(2)	(3)
	Full Sample	Below target GAP>0	Above target GAP<0
NI	-0.048***	-0.012***	-0.008***
	(-26.62)	(-24.04)	(-18.07)
Geographic Expansion Index	0.000	0.000001*	0.000
	(0.16)	(1.69)	(1.04)
NI*Geographic Expansion Index	-0.000	0.000	0.000
	(-0.83)	(0.53)	(1.46)
Discretionary Loan Loss Provisions	0.035***	0.001	0.009***
	(10.01)	(1.19)	(6.36)
Z-score	-0.000***	-0.000*	0.000
	(-2.91)	(-1.87)	(1.39)
Leverage Ratio	0.000	-0.000	0.000***
	(0.22)	(-0.47)	(3.20)
Loan to Total Asset	-0.002***	-0.000***	-0.000***
	(-6.34)	(-7.51)	(-8.48)
Size	0.005***	0.000***	0.000***
	(2.73)	(9.52)	(6.42)
Total Assets Growth Rate	0.000***	0.000***	0.000
	(3.43)	(4.59)	(1.43)
Managerial Efficiency	-0.003***	-0.000***	-0.000***
	(-23.05)	(-22.31)	(-14.51)
Income Diversification	-0.000***	-0.000***	-0.000***
	(-7.84)	(-5.38)	(-3.89)
GDP Growth Rate	0.003***	0.000	0.000***
	(8.72)	(1.19)	(3.91)
Inflation	-0.008***	-0.000***	-0.000***
	(-8.00)	(-6.73)	(-3.55)
GDP Per Capita	-0.003***	0.000***	0.000**
	(-6.67)	(5.48)	(1.98)
Constant	0.001	-0.001***	-0.001***
	(1.51)	(-9.50)	(-5.42)
Time Fixed Effects	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes
N	146338	78491	47324
adj. R-sq	0.112	0.079	0.081

Appendix
Definition of Variables

Variable Name	Definition
Earnings Management measure	
Discretionary Loan Loss Provisions	The Earnings Management measures the discretionary loan loss provisions manipulated by each bank. It is obtained from the discretionary loan loss provision model (Cohen et al., 2014). We treat the absolute value of the error term as the earnings management indicator. The Higher the absolute residual value, the more earnings management the bank applied.
Competition Measures	
Geographic Expansion Index	The Interstate Banking and Branching Efficiency Act (IBBEA) is an exogenous shock of competition. Followed by Rice and Strahan (2010), Geographic Expansion Index captures the level of interstate branching restrictions for each state. Before 1994, the index in each state equals to zero, while, after 1994, this index ranges from zero to four. The index equals to four for states that are most open to out-of-state entry. Then, we minus one to the index when a state has any of the four barriers: requiring a minimum age of 3 or more years on the acquiring banks; not allowing de novo interstate branching; not permitting the acquisition of single branch or portions of an institution; mandating a deposit cap on branch acquisitions less than 30%. Thus, 4 means highest competition and 0 means lowest competition
Bank-controls	
Z-score	The Z-score is an accounting-based bank-level indicator of financial stability. It is measured by the sum of return of total assets and capital ratio over the standard deviation of return of total assets. We use 3-year rolling window to estimate standard deviation of ROA. Higher Z-score indicates greater financial stability.
Capital Ratio	The ratio of total equity to total assets
Bank Size	The natural logarithm of total assets
Total Assets Growth	The yearly total assets growth rate
Managerial Efficiency	One minus the ratio of total cost to total income
Income Diversification	The ratio of non-interest income to total operating income
Loans to total assets.	The ratio of total loans to total assets
Early Deregulation Index	Early Deregulation Index represents the wave of deregulation before IBBEA. This index equals zero prior to the earlier of the year of intra- or inter-state deregulations, one if the state deregulates either full intra-state branching through acquisition and de novo branching or inter-state banking, and two if the state deregulates both types of branching expansions. The years of these deregulations are gained from Kroszner and Strahan (1999).
Macro-controls	
GDP Growth	Annual GDP growth rate
Inflation	Annual inflation rate
GDP per capita	GDP divided by the number of the people in the country