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Competition or Manipulation? An Empirical Evidence from Natural Experiments on the Earnings Persistence of U.S. Banks

By *Chi-HSiou D. Hung, Yuxiang Jiang and Hong Liu*

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Competition or manipulation? An empirical evidence from natural experiments on the earnings persistence of US banks

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Keywords: Competition; Branching Restrictions Index; Earnings persistence; Earnings adjustment speed, Earnings management

JEL Classification: G20, G21, G38

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1. Introduction

Bank earnings persistence is an important phenomenon and 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). The accounting literature argues for *the earnings management explanation* in which 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)[1]. In contrast, *the competition explanation* born by the economics literature advocates the view of market competition, which gives rise to mean reversion in profitability (Mueller, 1986; Healy and Wahlen, 1999). Thus, firms' ability to manipulate earnings is limited by their market power, where the greater market competition firms face, the weaker earnings persistence will be.

In this paper we shed new light on this debate and our main contribution is to implement new approaches for identifying the causal impact of competition on firm earnings persistence, with a particular focus on banks. Our paper is also motivated by the recent debate on the association between accounting changes and financial crisis, such as the accusation of market value accounting after the 2007-2009 financial crisis, along with the economic significance of banks' liquidity and capital provision requirements, which reveals the vital economic role of bank accounting (Beatty and Liao, 2014).

We exploit the cross-state, cross-time variations 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 markets (DeYoung, 2010; Rice and Strahan, 2010).

[1] Managers could also obtain personal benefits from earnings smoothing because their bonuses, options and stocks are usually based on firm performance (Healy, 1985; Warfield et al., 1995; Bergstresser and Philippon, 2006).

Our approaches have significant advantages over those employed by the extant research. The main drawback of prior research on the influence of competition on earnings persistence is that they are hardly able to establish a causal relationship between competition and earnings persistence. These studies quantify competition by using measures such as the Herfindahl-Hirschman Index and the Lerner Index (see, e.g., Berger et al., 2000; Goddard et al., 2004; Goddard et al., 2011; Healy et al., 2014). Importantly, simply taking competition as an exogenous variable in a regression model can be seriously misleading because the earnings ability of a bank may affect its competitive position and its survival. For example, persistent earnings may entice new entrants into the market and hence, increase competition. On the other hand, persistent earnings may enhance the capability of existing firms in preventing new entrants into the market, thereby curbing additional competition. Moreover, omitted variables in a model could influence both competition and earnings persistence. We deal with the endogeneity concern by exploiting an exogenous shift in bank earnings persistence as a result of interstate bank branching deregulation. Following Rice and Strahan (2010), we create a variable called IBBEA restriction index, which increases with the extent of interstate branching deregulation restrictions in a state. Hence, an increase in the IBBEA restriction index indicates a decrease in bank competition.

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 banks with 226,153 firm-year observations. In our main analysis, we focus on the period of five years before and five years after the year when the IBBEA act was introduced in each state. 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.

Our measure of earnings management is discretionary loan loss provisions. Because bank accruals are different from those of industrial firms, discretionary loan loss provisions or discretionary realizations of security gains or losses have been 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 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 by 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 of the banks 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 start by investigating whether banks adjust their earnings with a faster speed in states that implement the IBBEA and deregulate interstate banking within their borders to a great extent. We find that an increase in the branching restriction index, lead to a decrease in bank earnings adjustment speed. This evidence indicates a negative relation between competition and earnings persistence, which is in line with the prediction of the economic theory. We also find that an increase in earnings management reduces earnings adjustment speed, consistent with the accounting viewpoint. These findings hold after controlling for bank and time fixed effects, a wide array of time-varying bank characteristics, such as size, risk, capital-asset ratio, efficiency, and the macro-economic conditions, such as GDP growth, inflation and GDP per capita in each state. Thus, our main findings support that both effects matter for earnings persistence of banks. Next, we conduct a host of robustness tests to ensure that our findings are not driven by potential biases in the sample or due to alternative explanations, and we find that they do not.

We then use the Sarbanes-Oxley Act (SOX) as a source of exogenous variation in firm earnings management. The increasing accounting scandals from the early 2000s indicates the prevalence of managers' earnings management behaviors among public companies (Bergstresser and Philippon, 2006; Efendi et al., 2007). In order to alleviate this phenomenon, the clawback provision of the 2002 Sarbanes-Oxley Act (SOX) enables the board to recover bonus or other incentive compensation paid to CEOs and CFOs when the firm is required to restate its financial reports. Several empirical studies indicate that this clawback provision is an effective means to prevent earnings management and increase accounting quality (Chan et al., 2012; Chan et al., 2013; DeHaan et al., 2013). Our identification strategy depends on the hypothesis that the SOX Act influenced the largest banks more than their smaller counterparts because clawback firms, i.e., firms that utilized the clawback provision, are larger than their non-clawback counterparts (Chan et al., 2013), in general. We find that, in the post-SOX Act period, banks in the largest size quintile, who tend to be the 'clawback banks', adjust their earnings faster than smaller banks. This finding further supports the causal impact of bank earnings management on earnings adjustment speed[2].

In addition to our major contribution in identifying the causal impact of competition on bank earnings adjustment speed, we examine an alternative potential explanation of our main findings that competition leads to higher bank earnings adjustment speed. Market competition can act as an external governance mechanism to prevent managerial slack and protect the interest of shareholders (Dechow et al., 2010). Also, competition increases the cost of misreporting, thereby curbing earnings management incentives (Graham et al., 2005). Consequently, the reduced earnings management resulted from heightened competition may lead to an increase in earnings adjustment speed. According to this view, the impact of competition on earnings adjustment speed indirectly goes through the channel of earnings management. We therefore examine the relationship between the branching restriction index and bank earnings management. Importantly, we find that competition positively and significantly affects earnings management, consistent with the findings of Lin et al. (2013) and Karuna et al. (2012). This evidence rejects the idea that highly competitive environment reduces the tendency of earnings management, which may in turn increase bank earnings adjustment speed.

Finally, we conduct several additional analyses to test whether the level of earnings performance affects the relationship between bank earnings management and earnings adjustment speed. Liu and Ryan (2006) suggest that, as determined by banks' internal decisions, the effect of earnings management on adjustment speeds varies depending on actual bank performance. We find that underperforming banks employ earnings management to accelerate their earnings adjustment speeds, possibly for the purpose of avoiding the increase of costs of debt brought about by negative earnings surprises (Dechow et al., 1996). On the other hand, outperforming banks employ earnings management to slow down their earnings adjustment speeds because they tend to maintain

[2] We acknowledge the limitations of this identification strategy. First, SOX act include many provisions beyond clawback, such as internal control weakness and audit independence, which could also cast implication on earnings management of banks. Most existing literature finds that earnings management in general reduces after SOX. Second, SOX 304 (clawback provision) was rarely enforced by the SEC largely due to ambiguities in the legislation and the SEC's lack of resources after 2002. In fact, most firms voluntarily adopt such provisions. Corporate Library indicates that only 194 firms in the S&P 500 (39.8%) had clawback provisions in place by 2010. The number of banks that adopt this provision during our sample period is unknown.

their profitable earnings. We also find that, when banks experience the lowest profitability relative to their industry peers, they tend to report earnings downward by the possible maximum amount, which is the so-called 'big bath accounting' (Kirschenheiter and Melumad, 2002), thereby making the effect of earnings management on earnings adjustment speed insignificant.

This study contributes to the literature on earnings persistence by distinguishing between *the earnings management explanation* and *the competition explanation* of firm earnings persistence in one model. The only study that considers both explanations is Healey et al. (2014), which investigates how cross-country differences in competition and earnings management influence the mean-reverting speed of ROA. Although country-level competition is less determined by firm-level earnings persistence, the relationship between the two may still be endogenous given that both may be determined by unobserved or unidentified factors that exist in the same country. To our best knowledge, we are the first to use the Branching Restrictions Index developed from Interstate Banking and Branching Efficiency Act and the clawback provision of the 2002 Sarbanes-Oxley Act (SOX) as exogenous shocks to document the causality of competition and earnings management on bank earnings persistence.

This study also provides new evidence on the relationship between competition and earnings management, where the theories and empirical evidence is conflicting. One strand of literature argues that increased competition could put more pressure on managers and hence, induces their unethical behavior 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). Others argue that due to predation risk, a negative relation between competition and earnings management should be observed (Dechow et al., 2010; Graham et al., 2005; Botosan and Stanford, 2005; Ali et al., 2009; Li, 2010). Our evidence of a positive relation between competition and earnings management rejects the hypothesis that competition indirectly impacts earnings persistence.

Finally, this paper contributes to the literature on earnings management and earnings persistence in the banking industry. Despite a voluminous literature on bank earnings management, little is done concerning the causal relation between bank earnings management and earnings persistence. Our study fills this gap. Shen and Chih (2005) exploit the variation in earnings management in the banking industry around the world. Others document that the determinants of earnings management in the banking sector include CEO compensation (Clinch and Magliolo, 1993), auditor reputation (Kanagaretnam et al, 2010), investor protection, transparency in accounting disclosure, restrictions on bank activities, and official and private supervisions (Shen and Chih, 2005; Fonseca and González, 2008). Other studies examine the impact of earnings management in the banking industry on the high frequency of small earnings increases (Beatty et al, 2002), earnings smoothing (Liu and Ryan, 2006) and tail risk during the financial crisis (Cohen et al., 2014).

The rest of the paper is structured as follows. Section 2 illustrates our identification strategy of competition. In Section 3, we describe our 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. The identification strategy of 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, which is the simultaneity effect. On the other hand, earnings persistence may in fact cause competition, which is the reverse causality effect. For example, persistent earnings 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 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, 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. This deregulation increases competition through reducing entry barriers in most US states and creates growth opportunities for banks through geographic diversification (Goetz et al., 2013). Differences in the extent of entry barrier reduction in each state create variations in the potential increase in banking competition in each state. It is important that interstate bank deregulation is exogenous to bank earnings persistence.

Interstate banking restrictions shielded banks from competition before the1970s but since the late 1970s, innovations in technology and finance diminish the effect of these restrictions. Developments in data processing, telecommunications and credit scoring erode the popularity of local banks, leading to lower willingness of banks to make efforts to maintain restrictive regulations. There is no empirical evidence to show that banks' earnings persistence affects the timing of deregulation. Thus, this Act of interstate bank deregulation tends to be a fairly disordered act that provides a valuable research laboratory for assessing the influence of competition on banks' earnings persistence. There are also several studies applying IBBEA as an exogenous shock to firm financing (Rice and Strahan, 2010; Wu, 2016), 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).

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 trace back to the 19^{th} century (Rice and Strahan, 2010). However, in the meantime, this Act also allows states to erect barriers to branch expansion. 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, due to the provision of IBBEA. Thus, following Johnson and Rice (2008), we use branching restriction index to capture the magnitude of competition change in each state[3].

[3] Before 1994, the index in each state equals to four, while, after 1994, this index ranges from zero to four. Following Rice and Stranhan (2010), the index equals to zero for states that are most open to out-of-state entry. We add 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, and mandating a deposit cap on branch acquisitions less than 30%.

3. Sample and variables

3.1. Data

To explore the impact of competition and earnings management on earnings persistence, we combine data from several sources. We obtain bank-specific data on banks' balance sheets and income statements from Federal Reserve Report of Condition and Income (Call Reports). We link the bank-specific data to branching restriction index of each state (Johnson and Rice, 2008) and macroeconomic information 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. However, in our main analysis, we focus on the ten-year period in which no more than five years are distant from the IBBEA introduction year in each state.

3.2. Earnings management measurement: 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).

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

where Size_{it} is the natural logarithm of total assets, $\Delta\text{Loan Charge-offs}_{it}$ 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*, $\Delta\text{Non-performing Loans}_{it}$ reflects the change in non-performing loans between periods *t* and *t-1*, $\Delta\text{Non-performing Loans}_{it-1}$ reflects the change in non-performing loans between periods *t-1* and *t-2*, and $\Delta\text{Non-performing Loans}_{it+1}$ 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.

3.3. Earnings adjustment speed measurement: 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-variant persistence level for each entity (Healey et al., 2014; Gropp and Heider, 2010; Memmel and Raupach, 2010; De Jonghe and Öztehin, 2015). We, therefore, 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:

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

where ROA_{it} is the returns 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 how banks are operating 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 by 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 it is not necessarily constant over periods. Therefore, we employ the cross-sectional model proposed by Fama and French (2006) to estimate the target ROA[4].

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

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 the 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.

The estimation model of the target ROA uses contemporaneous variables 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:

$$\mathrm{GAP}_{it} = \mathrm{ROA}^*_{it} - \mathrm{ROA}_{it} \qquad (6)$$

Therefore, Equation (2) could be modified into Equation (7) below:

$$\mathrm{ROA}_{it} - \mathrm{ROA}_{it-1} = (\lambda_i + \gamma_{it-1}Z)\ \mathrm{GAP}_{it-1} + \varepsilon_{it} \qquad (7)$$

In Equation (7), we assume that λ_i is dynamic and varies across banks and over time. Z is a vector of the bank and macroeconomic characteristics. Having run the regression of this equation, we obtain a set of coefficients (γ_{it-1}) varying across banks and years. These coefficients allow us to directly test how bank's competition and earnings management influence earnings adjustment speed. The sign of γ_{it-1} reflects the relationship between Z and the adjustment speed. GAP_{it-1} is calculated as the difference between ROA^*_{it} and ROA_{it-1}. The standard errors are clustered both in the firm and year.

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

3.4. Control Variables

We employ a series of variables to control for bank-specific and macroeconomic characteristics in equation (7). We measure bank risk by the *Z-score* – the sum of ROA and equity to assets ratio divided by the standard deviation of ROA (the lower the Z-score value, the greater is the bank risk). Berger et al. (2000) suggest that high risk positively affects earnings persistence during economic expansion periods and negatively influences earnings persistence during economic recession periods. *Capital Ratio* is equity-to-total assets ratio (Berger, 1995) and is expected to link positively to earnings persistence of banks because higher capital ratio increases a bank's immunity to earnings volatility, and hence reduces the likelihood of falling into financial distress. *Loan to total asset* represents a bank's dependence on debt to grow its business (Cheng et al., 1989) and is expected to relate negatively to earnings persistence. This is because less specialization in traditional activities indicates banks' higher ability to seek and seize business opportunities, which could help banks sustain their earnings.

Size is measured by the logarithm of total assets. Large size indicates banks' comprehensive strength, which may help banks increase their earnings persistence. *Total assets growth*, as measured by the growth of bank assets (Short, 1979; Bourke, 1989), is expected to be negatively related to earnings persistence because fast-growing banks face a higher degree of uncertainty when expanding, which may lead to more volatile earnings. *Managerial efficiency* is measured by the cost to income ratio and its effect on earnings persistence is expected to be positive. This is because higher managerial efficiency indicates the higher capability of banks to maintain their profitability. *Income diversification*, as measured by non-interest income divided by total revenue (De Young and Rice, 2004; Stiroh and Rumble, 2006), reflects a business expansion opportunity for banks, contributing to an increased ability of banks to sustain their profitability.

For macroeconomic-level controls, we apply *inflation* (Angelini and Cetorilli, 2003; Claessens and Laeven, 2004; Boyd et al, 2001; Goddard et al., 2011), *GDP growth* and *GDP per capita* (Albertazzi and Gambacorta, 2009; Goddard et al., 2011). Goddard et al. (2011) find that inflation is positively related to earnings persistence of banks because under a high inflation environment, the prices of financial services, such as interest rates, become less informative (Claessens and Laeven, 2004), thereby offering banks more pricing power as well as earning manipulation opportunities, resulting in higher earnings persistence. GDP growth and GDP per capita could help banks increase the persistence of their earnings because GDP growth provides banks more business opportunities (Albertazzi and Gambacorta, 2009; Goddard et al., 2011).

3.5. Summary statistics and correlation matrix

Table 1 displays summary statistics of variables based on the IBBEA ten-year window. 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) and Ellul and Yerramilli (2013)). Branching Restriction 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. Lerner Index is equal to 0.2. In line with that reported by Cohen et al. (2014) and Kothari et al. (2005), the absolute mean value of Discretionary Loan Loss Provisions (i.e., earnings management) is 0.44, indicating that earnings management accounts for 0.278% of total assets (= 0.44 multiplied by the mean value of Loan to asset).

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 size of US banks is 11.3 billion dollars, and the average asset growth is equal to 8.7%. The average value of costs to income ratio, a proxy for banks' managerial efficiency, is equal to 79.2%. 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%.

<Insert Table 1 here>

Table 2 reports the correlations between the variables used in this study. Branching Restrictions Index and Discretionary Loan Loss Provisions are negatively correlated, showing that banks that operate in those states with high regulatory barriers use more earnings management. Most of the correlations are modest and the multicollinearity problem should be limited.

<Insert Table 2 here>

4. Empirical results

4.1. The impact of earnings management and competition on earnings adjustment speed: natural experiment of competition

Table 3 presents the regression results of Equation (5) for the first stage Fama and MecBeth (1973) estimation. Most of the lagged variables denoting the target ROA have significant coefficients with expected signs, except 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 regressions results for the second stage estimation of Equation (7). We consider the time period from 1989 to 2002, a ten-year window of the introduction of IBBEA which lasts for three years from 1994 to 1997. We standardize all variables in the regression, except for Branching Restrictions Index because this index is an ordinal variable rather than a continuous variable. The coefficient of Branching Restrictions Index is negative and significant. Since a higher Branching Restrictions Index value indicates lower competition, a negative regression coefficient of Branching Restrictions Index indicates that banks in less competitive markets tend to adjust their earnings at a lower speed. As shown in Column (1) of Table 4, one inter-quartile increase of Branching Restriction Index leads to a decline of earnings adjustment speed by 0.094%. This result is in accordance with economic competition theory that competition could erode away economic excessive returns and losses in the long run (Stigler, 1961).

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. As listed in Column (3) of Table 4, 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).

We also use the Lerner Index as an alternative measure of market power, which has been widely used in the banking literature (see, Maudos and Guevara, 2007; Angelini and Cetorelli, 2003; Fonseca and González, 2010; Jiménez et al., 2013; Delis and Tsionas, 2009; Bikker and Haaf, 2002). As a non-structural indicator, the Lerner index reflects the capacity of price power and is calculated as the difference between price and marginal cost as a percentage of the price. The regression results in Table 4 show that the Lerner index has a significantly negative impact on earnings adjustment speed[5], which is consistent with our findings above.

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.

<Insert Table 4 here>

4.2. Placebo tests

We also conduct additional tests to ensure that our results in Table 4 are not driven by potential biases in the sample or due to alternative explanations. These results are reported in Table 5. 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 negative coefficient estimates on Branching Restrictions Index in the previous regressions may simply reflect a trend of falling adjustment speed after the IBBEA deregulation. To address this concern, we conduct three empirical analyses to verify our argument that these deregulations present an exogenous shift in competition. Columns (1) to 4 of Table 5 report the results. We follow Krishnan et al. (2014), and rule out such timing and trend explanations by introducing the *Before (4,1)* dummy variable in Column (1) of Table 5. This variable captures the difference in earnings persistence of banks in each state between the four years before the deregulation and the years prior to the four years 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. In Column (1), we find that the coefficient estimate of the *Before (4,1)* dummy is statistically insignificant.

[5] A one standard deviation increase in the Lerner Index results in a decrease in the adjustment speed by 3%.

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 or one year after the actual deregulation year (Roberts and Whitted, 2011; Krishnan et al., 2014). For these tests, we keep the sample restricted to the actual IBBEA ten-year window. We repeat our main regressions of Equation (7) under such false definitions of Branching Restrictions Index. Column (2) and (3) of Table 5 report the results of this placebo analysis where the Branching Restrictions Index variable is the actual index for one year after the actual deregulation and one year prior to the actual deregulation, respectively and zero otherwise. Our results indicate that the coefficient estimate on the falsified Branching Restrictions Index is statistically insignificant. The results of this test as well as the insignificant coefficient estimate on the *Before (4, 1)* dummy in Column (1) reassure us that interstate bank branching law were not enacted to coincide with other unobservable characteristics that would also have lifted bank earnings persistence. Further, these results also indicate that reverse causality does not drive our results.

Third, we assume that bank competition in each state is the same before IBBEA, which might not be the case. State-level deregulations of intra-state branching and inter-state banking expansion are prior to the IBBEA. According to Black and Strahan (2002) and Cetorelli and Strahan (2006), these two types of state-level deregulations also have an impact on bank competition. Further, the impacts on bank competition in each state might be different because some states may not adopt these deregulations and the states that adopted may implement these regulations in different years. In order to eliminate this concern, following (Krishnan et al., 2014), we control for this prior wave of deregulations using a separate deregulation index, *Early Deregulation Index*. This index equals two 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 zero if the state deregulates both types of branching expansions. The years of these deregulations are gained from Kroszner and Strahan (1999). We add this index in all regressions in Table 5 and the coefficient of Branching Restrictions Index still remains consistent with prior results, although the coefficients of *Early Deregulation Index* in every column are insignificant.

Moreover, we expect that the effect of competition change caused by the IBBEA, if any, should be different for large banks and small banks. Large banks should benefit more from the IBBEA than small banks, such as the increase in their market share, because of their ability to expand into other states. We define a large bank dummy which equals 1 with total asset being above $1billion in our sample period and 0 otherwise in Column (4) of Table 5. The results show that both coefficients of the interaction term of Branching Restriction Index*Large Banks and that of Branching Restriction Index*(1-Large Banks) are negative and significant, suggesting that competition have a negative impact on the earnings persistence of both large and small banks. The coefficient of Branching Restriction Index*Large Banks doubles in value compared with that of Branching Restriction Index*Small Banks. These figures indicate that competition effect on earnings persistence of large banks is one time stronger than that of small banks.

Further, in order to examine the influence of deregulation over a long time horizon, we expand our sample for the main regression of Equation (7) to the time period of 1986 to 2013. As shown in Column (5) of Table 5, the coefficient is significantly negative, which is the same as that reported in Table 4 and indicates consistent findings.

<Insert Table 5 here>

4.3. The impact of the change of earnings management on earnings adjustment speed: Difference-in-difference analysis of earnings management

We now investigate the link between changes in bank earnings management and changes in earnings persistence, using the Sarbanes-Oxley Act (SOX) as a source of exogenous variation in Discretionary Loan Loss Provisions. Since U.S. Department of the Treasury (2009) mandatorily requires all financial firms to adopt the clawback provision, earnings management is expected to experience a significant reduction. Therefore, we also use mandatory adoption of the clawback provision as an instrument of earnings management to further eliminate the endogeneity issue of earnings management. Chan et al. (2012), Chan et al. (2013) and DeHaan et al. (2013) find the evidence that the adoption of clawback provision is negatively related to the frequency of financial reporting restatements and positively associated with the credibility of accounting reports perceived by investors.

According to Chan et al. (2013), clawback firms are in general larger than their non-clawback counterparts. Thus, we identify the banks whose total assets are among the top 10% of the cross-section of bank size distribution in 2002 as the largest banks and hypothesize that the largest banks are more likely to adopt the clawback provision and hence are more likely to reduce their earnings management than other banks. Our empirical strategy relies on the different sensitivity of the largest banks and other banks to the enactment of the SOX Act. We implement this approach through the following regression specifications:

$$\text{DLLP}_{it} = \beta_1\text{The largest banks}_{it} + \beta_2\text{Introduction of SOX Act}_{it} + \beta_3\text{The largest banks}_{it}\text{*Introduction of SOX Act}_{it} + \varepsilon_{it}; \quad (8)$$

$$\text{ROA}_{it} - \text{ROA}_{it-1} = (\lambda_i + \beta_1\text{Largest bank}_{it} + \beta_2\text{Introduction of SOX Act}_{it} + \beta_3\text{The largest banks}_{it}\text{*Introduction of SOX Act}_{it} + \gamma_{it-1}\text{Z})\ \text{GAP}_{it-1} + \varepsilon_{it}; \quad (9)$$

In Column (1) of Table 6, we examine the effect of the SOX Act on earnings management of the largest and other banks using a ten-year window around the clawback provision year, which refers to the ten-year period within which no more than five years deviate from the clawback provision year. Our main variable of interest is the interaction term of the variables *The largest banks* and *Introduction of SOX Act*. *The largest banks* is an indicator variable of 1 if the total assets of the banks fall in the top 10% of the size distribution, and 0 otherwise. *Introduction of SOX Act* is an indicator variable of 1 if it is after the year 2001, and 0 otherwise. A negative coefficient on this variable indicates that the largest banks reduce their earnings management more than other banks in the post-clawback provision period.

Columns (2) and (3) of Table 6 report the regressions result from the estimation of Equation (9) with the diff-in-diff estimator. The regression in Column (2) does not include time and bank fixed effects, while the regression in Column (3) includes both time and bank fixed effects, but the largest banks indicator and SOX Act indicator are both excluded from the regressions because they are invariant at the bank and time levels, respectively. The coefficients on the interaction term of *The largest banks* and *Introduction of SOX Act* are significant and positive in both columns, indicating that in the post-SOX Act period, the largest banks adjust their earnings at a faster speed than smaller banks. Overall, the results in this section provide further support on the causal impact of bank earnings management on earnings adjustment speed.

<Insert Table 6 here>

4.4. How does competition affect earnings management — A possible different channel?

In this section we examine whether the positive impact of competition on bank adjustment speed is not direct, but rather is transmitted through the earnings management channel. Specifically, increased competition may result in decreased earnings management, which in turn decreases the level of earnings persistence or increases the adjustment speed.

Two strands of research suggest that increased competition leads to lower level of earnings management. First, market competition can act as an external governance mechanism to prevent managerial slack and protect the interest of shareholders (Dechow et al., 2010). Second, competition increases the cost of misreporting, thereby curbing earnings management incentives. With more competitive rivals in the market, firms are more likely to lose their shareholders, customers and suppliers due to the damage of reputation caused by misreporting (Graham et al., 2005). Botosan and Stanford (2005) find that concentrated industries restrict the quantity of performance information to be exposed by hiding the information of profitable sectors. Additionally, Ali et al. (2009) show that firms in concentrated industries disclose earnings forecasts less often and their forecast periods are shorter. Hence, competition should reduce earnings management.

Another strand of literature argues that increased competition triggers unethical managerial behavior such as earnings management (Shleifer, 2004). Increasing competition may have negative economic effects on firms such as the losses of market share and profitability. Burgstahler and Dichev (1997) argue that real earnings decrease and losses caused by competition induce managers to manipulate earnings as they fear the potential punishment from financial markets on firms that report lower than expected earnings. Milgrom and Roberts (1992) claim that competition pressure accelerates moral hazard behaviors in US savings and loan industry, whereby managers tend to make riskier investment in order to survive. Bagnoli and Watts (2010) find that in competitive markets, upward earnings manipulation is an effective strategy for firms to leave the competition pressure to their rivals and potential entrants. Managers can increase the firm’s short-term profitability via delaying or abandoning R&D activities or other investment projects that may produce future cash flows. Li (2010) also finds that facing competition from existing rivals, firms prone to cut the quantity of disclosed accounting information. Hence, competition should increase earnings management.

As shown in Table 7, both the Branching Restrictions Index and the Lerner Index have significant and negative impacts on Discretionary Loan Loss Provisions. This result is consistent with Shleifer (2004), showing that increased competition induces earnings management. This result suggests that our finding of the positive impact of competition on bank earning adjustment speeds is not likely from the earnings management channel. Otherwise, the increase in competition should lead to lower rather than higher earnings adjustment speeds. The coefficient of Branching Restrictions Index (-0.0008) is rather small, however, indicating that the economic impact of competition on earnings management is minimum.

<Insert Table 7 here >

5. Effect of earnings management on earnings adjustment speed: Does earnings performance matter?

In this section we examine whether earnings performance affects the relationship between earnings management and the earnings adjustment speed of banks. We expect that when banks underperform (GAP > 0), they are prone to accelerate adjustment speed to close the gap. This is because banks want to avoid the increase of costs of debt brought about by negative earnings surprises (Dechow et al., 1996; Healy et al., 2014). In contrast, when banks perform better than their expectation (GAP < 0), they tend to maintain their profitable earnings and slow down the adjustment speed.

The estimation results show a sharp contrast between the two earnings performance groups and meet our expectation. As shown in Table 8, when banks are underperforming, Discretionary Loan Loss Provisions has a significantly positive impact on adjustment speed. In contrast, when banks are outperforming, Discretionary Loan Loss Provisions has a significantly negative impact on adjustment speed. On the other hand, the effect of branching restrictions index on adjustment speed is negative and significant across all the specifications, regardless of bank’s earnings performance. This result is in accordance with that reported in Healy et al. (2014).

<Insert Table 8 here >

Next, we analyze whether banks with the lowest profitability level are the least likely to manipulate their earnings. Previous studies document that during recessions, managers may report earnings downward at their maximum possible, or the so-called ‘big bath’ (Francis et al., 1996; Riedl, 2004), where managers are motivated to use earnings management to discretely present an extreme drop in earnings during financial crisis periods. We thus expect that lowest profitable banks are the least likely to manipulate their earnings.

To examine this relation, we categorize banks into quartiles according to their ROAs. Table 9 reports that, as expected, Discretionary Loan Loss Provisions is negative but statistically insignificant for the banks whose ROA resides in the first quartile (<25%). The result indicates that bank managements are less likely to manipulate earnings upward for the banks with the lowest profitability level. In contrast, for all the other quartiles, Discretionary Loan Loss Provisions exerts a highly significant impact on earnings adjustment Discretionary Loan Loss Provisions increases the earnings persistence of banks located in the third (50%-75%) and fourth (>75%) quartiles, but decrease the earnings persistence of banks located in the second (25%-50%) quartile. These findings are in line with our expectation.

<Insert Table 9 here >

6. Conclusions

This study investigates the effect of competition and earnings management on bank earnings persistence (or adjustment speed) using 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, and the introduction of the Sarbanes-Oxley Act (SOX) as a natural experiment of earnings management, to test how banking competition and earnings management affect bank earnings persistence. These exogenous shocks effectively mitigate endogeneity issues in prior research.

By applying a two-stage partial adjustment model, we find that both earnings management and competition have a significant impact on bank earnings adjustment speed. The competition effect on earnings persistence of large banks is one time stronger than that of small banks. Further, we find that competition has a significantly positive impact on earnings management, implying that competition could not indirectly influence earnings adjustment speed through an earnings management channel. The impact of earnings management on earnings adjustment speed depends on the performance of banks while that of competition on earnings adjustment speed is constantly positive.

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

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	Std.dev	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
Branching Restriction Index	77929	2.060	1.907	0.000	4.000
Lerner Index	77929	0.207	0.085	0.034	0.443
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
Size	77929	11.339	1.296	8.679	15.734
Total Assets Growth	77929	8.686	15.879	-18.691	125.575
Managerial Efficiency	77929	79.205	8.741	54.076	104.290
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

Table 2

Correlation Matrix

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

	Branching Restrictions Index	Lerner 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
Branching Restrictions Index	1												
Lerner Index	-0.2671*	1											
Discretionary Loan Loss Provisions	-0.0728*	-0.1323*	1										
Z-score	-0.0267*	0.1880*	-0.2257*	1									
Capital ratio	-0.1970*	0.2949*	-0.2168*	0.3399*	1								
Loan to total asset	-0.2542*	0.1127*	0.4709*	-0.2191*	-0.1983*	1							
Size	-0.3104*	0.2629*	0.1196*	-0.0026	-0.1127*	0.3062*	1						
Total Assets Growth	-0.0390*	0.0134*	0.1413*	-0.1349*	-0.0899*	0.5593*	0.1602*	1					
Managerial efficiency	0.2891*	-0.2225*	0.1342*	-0.1934*	-0.2947*	-0.1186*	-0.2862*	-0.0205*	1				
Income diversification	-0.1889*	0.1233*	0.0039	-0.1554*	0.0560*	0.0389*	0.2982*	0.0499*	-0.1032*	1			
Inflation	0.4282*	-0.2250*	-0.0004	-0.0239*	-0.1188*	-0.0893*	-0.1314*	-0.0162*	0.2305*	-0.1297*	1		
GDP growth	0.1653*	0.0259*	-0.2515*	0.0101*	-0.0389*	-0.0445*	-0.1141*	0.0231*	-0.0117*	-0.0621*	-0.0031	1	
GDP per capita	-0.3786*	0.3077*	-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 first stage partial adjustment model assuming a static earnings adjustment speed. $ROA_{it} = \lambda_i \beta_i X_{it-1} + (1- \lambda_i) ROA_{it-1} + \varepsilon_{it}$, $(1- \lambda_i)$ is the level of persistence of ROA. In column (1), We follow Flannery (2006), Healy (2014) to use Fama-Macbeth regression to estimate 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 Z in Partial Adjustment Model: (ROA_{it} - ROA_{it-1} = (λ_i + $\gamma_{it-1}Z$) GAP_{it-1} + ε_{it} ,GAP_{it-1} = ROA^*_{it-1} - ROA_{it-1}) by the ten-year period in which no more than five years are distant from the IBBEA introduction year. Column (1) and (4) use Branching Restrictions Index to measure competition and Column (2) and (5) use Lerner Index to measure competition. Discretionary Loan Loss Provisions are the proxy of 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)
Branching Restrictions Index	-0.094***			-0.090***	
	(-7.38)			(-8.70)	
Lerner Index		-0.170*			-0.170**
		(-1.95)			(-1.97)
Discretionary Loan Loss Provisions			-0.178***	-0.176***	-0.178***
			(-4.25)	(-4.22)	(-4.25)
Z-score	-0.012	-0.014*	-0.009	-0.009	-0.010
	(-1.63)	(-1.80)	(-1.21)	(-1.21)	(-1.36)
Capital Ratio	0.021***	0.021***	0.022***	0.022***	0.022***
	(3.14)	(3.16)	(3.21)	(3.21)	(3.23)
Loan to Total Asset	-0.004	-0.003	-0.010	-0.010	-0.009
	(-0.60)	(-0.47)	(-0.96)	(-0.96)	(-0.89)
Size	-0.053***	-0.059***	-0.054***	-0.054***	-0.060***
	(-5.03)	(-5.34)	(-5.04)	(-5.04)	(-5.37)
Total Assets Growth	0.006	0.005	0.008	0.008	0.007
	(1.28)	(1.05)	(1.43)	(1.43)	(1.26)
Managerial Efficiency	0.026***	-0.143	0.027***	0.027***	-0.143
	(4.11)	(-1.62)	(4.22)	(4.22)	(-1.63)
Income Diversification	-0.005	-0.000	-0.006	-0.006	-0.001
	(-1.03)	(-0.03)	(-1.11)	(-1.11)	(-0.09)
Inflation	0.017	0.018	0.019	0.019	0.021
	(1.12)	(1.24)	(1.34)	(1.34)	(1.47)
GDP Growth	0.013	0.014	0.014	0.014	0.015
	(1.39)	(1.47)	(1.50)	(1.50)	(1.59)
GDP Per Capita	-0.001	-0.009	-0.001	-0.001	-0.009
	(-0.06)	(-0.56)	(-0.09)	(-0.09)	(-0.59)
Constant	0.091***	0.091***	0.091***	0.097***	0.096***
	(9.66)	(16.55)	(9.70)	(9.70)	(9.84)
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes
N	77929	77929	77929	77929	77929
adj. R-sq	0.7922	0.7924	0.7923	0.7923	0.7925

Table 5

Determinants of Bank Profit Adjustment Speed: Placebo Tests

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 on *Z* in Partial Adjustment Model (ROA_{it} - ROA_{it-1} = (λ_i + γ_{it-1}Z)GAP_{it-1} + ε_{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 equal to one for year -4 to -1 relative to the deregulation year. Columns (2) and (3) display the results under which Branching Restrictions Index variable is the actual index for one year after the actual deregulation and one year prior to the actual deregulation, respectively, and zero otherwise. Column (4) displays the regression results for both large banks and their smaller counterparts. Column (5) presents the regression results using the full sample. *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)
Branching Restrictions Index	-0.094***	0.007	0.005		-0.071***
	(-22.64)	(1.36)	(1.41)		(-18.33)
Before (4,1)	0.125				
	(0.08)				
Branching Restrictions Index*Large Banks				-0.139***	
				(-12.40)	
Branching Restrictions Index*(1-Large Banks)				-0.068***	
				(-13.55)	
Discretionary Loan Loss Provisions	-0.017***	-0.018***	-0.019***	-0.025***	-0.025***
	(-3.91)	(-2.58)	(-2.63)	(-6.04)	(-5.87)
Early Deregulation Index	-0.005	-0.007	-0.005	-0.004	-0.006
	(-0.71)	(-0.87)	(-0.68)	(-0.58)	(-0.82)
Z-score	-0.078***	-0.032***	-0.032***	-0.066	-0.058***
	(-15.98)	(-5.68)	(-5.74)	(-1.51)	(-12.25)
Leverage Ratio	-0.002	0.017***	0.017***	0.002***	-0.201***
	(-0.36)	(3.79)	(3.82)	(3.26)	(-3.27)
Loan to Total Asset	0.058***	0.000	-0.000	0.066	0.049***
	(13.33)	(0.02)	(-0.05)	(1.57)	(11.66)
Size	-0.067***	-0.076***	-0.076***	-0.054***	-0.062***
	(-13.03)	(-8.93)	(-8.85)	(-11.68)	(-11.57)
Total Assets Growth	-0.011***	0.004	0.004	-0.019	-0.011***
	(-3.27)	(1.14)	(1.18)	(1.14)	(-3.25)
Managerial Efficiency	0.027***	0.038***	0.038***	0.026***	0.025***
	(7.99)	(9.60)	(9.54)	(7.84)	(7.61)
Income Diversification	-0.001	-0.007*	-0.007*	-0.000	0.000
	(-0.21)	(-1.90)	(-1.89)	(-0.01)	(0.03)
GDP Growth	-0.055***	0.001	0.001	-0.033	-0.075***
	(-17.66)	(0.29)	(0.07)	(-1.58)	(-25.29)
Inflation	-0.088***	-0.019***	-0.018***	-0.016	-0.056***
	(-25.17)	(-3.51)	(-3.38)	(-1.62)	(-16.63)
GDP Per Capita	-0.230***	-0.121***	-0.206***	-0.008	-0.354***
	(-46.70)	(-37.27)	(-38.13)	(-0.56)	(-43.49)
Constant	0.630***	0.857***	0.858***	0.095***	0.823***
	(185.49)	(85.79)	(84.42)	(9.76)	(88.14)
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes
N	226153	77929	77929	77929	226153
adj. R-sq	0.6931	0.8083	0.8082	0.7099	0.709

Table 6
Determinants of Bank Profit Adjustment Speed:
SOX ACT as a natural experiment of earnings management

Column (1) of this table presents the result of difference-in-difference regression of earnings management within the clawback provision's ten-year window, where DLLP = The largest banks + Introduction of SOX Act + The largest banks*Introduction of SOX Act + ε. *The largest banks* is a dummy variable, which equals 1 if the bank's asset is among the top 10% of the size distribution. *Introduction of SOX Act* is a dummy variable, which equals 1 if the year is later than 2001. *The largest banks*Introduction of SOX Act* is the interaction term. We assume λ_i is to be dynamic, so it varies across banks and over time. Z is a vector of all independent variables plus *The largest banks*, *Introduction of SOX Act* and *The largest banks*Introduction of SOX Act*. Column (2) and (3) of this table present the OLS results for parameter Z in Partial Adjustment Model: ($ROA_{it} - ROA_{it-1} = (\lambda_i + \gamma_{it-1}Z)\ GAP_{it-1} + \varepsilon_{it}$, $GAP_{it-1} = ROA^*_{it-1} - ROA_{it-1}$) within the clawback provision ten-year window. *t*-statistics are in parentheses. *, **, *** denote the 10%, 5% and 1% significance levels, respectively. Appendix presents the definitions of variables.

	(1)	(2)	(3)
	Discretionary Loan Loss Provisions	Determinants of Bank Earnings Adjustment Speed	Determinants of Bank Earnings Adjustment Speed
The largest banks	0.047***	-0.257***	
	(36.90)	(-35.10)	
Introduction of SOX Act	-0.050***	-0.020***	
	(-10.71)	(-2.84)	
The largest banks* Introduction of SOX Act	-0.091***	0.354***	0.068***
	(-4.98)	(48.92)	(3.62)
Branching Restrictions Index		-0.071***	-0.071***
		(-18.33)	(-18.33)
Z-score		-0.083***	-0.057***
		(-54.05)	(-12.35)
Capital Ratio		0.004***	-0.000
		(6.04)	(-0.06)
Loan to Total Asset		0.044***	0.050***
		(34.22)	(11.91)
Size		-0.079***	-0.071***
		(-54.87)	(-11.12)
Total Assets Growth		-0.006***	-0.011***
		(-5.84)	(-3.31)
Managerial Efficiency		0.040***	0.026***
		(43.31)	(7.81)
Income Diversification		-0.008***	-0.000
		(-11.40)	(-0.11)
Inflation		-0.061***	-0.075***
		(-48.38)	(-25.14)
GDP Growth		-0.087***	-0.056***
		(-69.50)	(-16.72)
GDP Per Capita		-0.155***	-0.353***
		(-69.25)	(-43.52)
Constant		0.686***	0.819***
		(275.58)	(86.15)
Time Fixed Effects	No	No	Yes
Bank Fixed Effects	No	No	Yes
N	74731	74731	74731
adj. R-sq	0.0256	0.6939	0.8163

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. The dependent variable, earnings management, is measured by Discretionary Loan Loss Provisions. As to independent variable, competition is measured by Branching Restrictions Index in Column (1) and Lerner Index in Column (2).*t*-statistics are in parentheses. *, **, *** denote the 10%, 5% and 1% significance levels, respectively. Appendix presents the definitions of variables.

	(1)	(2)
Dependent Variable	Discretionary Loan Loss Provisions	
Branching Restrictions Index	-0.00008**	
	(-1.97)	
Lerner Index		-0.010***
		(-4.34)
Z-score	-0.000***	-0.000***
	(-10.20)	(-9.97)
Capital Ratio	-0.001	-0.001
	(-1.14)	(-1.11)
Loan to Total Asset	0.008***	0.008***
	(131.77)	(133.42)
Size	0.000***	0.000***
	(8.56)	(6.51)
Total Assets Growth	-0.000***	-0.000***
	(-70.73)	(-71.70)
Managerial Efficiency	0.000***	0.000***
	(13.86)	(15.31)
Income Diversification	0.000***	0.000***
	(4.99)	(6.2)
GDP Growth	-0.000***	-0.000***
	(-89.79)	(-89.06)
Inflation	-0.003***	-0.003***
	(-185.22)	(-186.82)
GDP Per Capita	0.043***	0.043***
	(52.89)	(53.02)
Constant	-0.456***	-0.446***
	(-52.25)	(-49.48)
Time Fixed Effects	Yes	Yes
Bank Fixed Effects	Yes	Yes
N	214403	214403
adj. R-sq	0.776	0.776

Table 8

Determinants of Bank Profit Adjustment Speed Under Different Scenarios

This table presents the OLS results for Partial Adjustment Model (ROA_{it} - ROA_{it-1} = ($\lambda_i + \gamma_{it-1}Z)GAP_{it}$ + ε_{it}, GAP_{it} = ROA^{*}_{it-1} - ROA_{it-1}) by applying Branching Restriction Index regarding to different situations (GAP > 0 vs GAP < 0), positive GAP means underperformance and negative GAP means outperformance. We assume that λ_i to be dynamic, so it varies among banks and over time. Z is a vector of all independent variables. *t*-statistics are in parentheses. *, **, *** denote the 10%, 5% and 1% significance levels, respectively. Appendix presents the definitions of variables.

	(1)	(2)
	GAP > 0	GAP < 0
Discretionary Loan Loss Provisions	0.061***	-0.064***
	(9.66)	(-10.21)
Branching Restrictions Index	-0.057***	-0.042***
	(-11.09)	(-7.11)
Z-score	-0.004	-0.116***
	(-0.68)	(-12.46)
Capital Ratio	-0.441***	-0.148
	(-5.81)	(-1.48)
Loan to Total Asset	0.062***	-0.003
	(9.13)	(-0.39)
Size	-0.051***	-0.074***
	(-5.34)	(-9.65)
Total Assets Growth	-0.023***	0.021***
	(-5.52)	(3.84)
Managerial Efficiency	-0.004	0.072***
	(-1.09)	(11.99)
Income Diversification	0.018***	-0.039***
	(5.45)	(-6.43)
GDP Growth	-0.049***	-0.068***
	(-8.49)	(-11.91)
Inflation	-0.119***	0.019***
	(-21.74)	(3.38)
GDP Per Capita	-0.383***	-0.197***
	(-25.28)	(-14.22)
Constant	0.850***	0.738***
	(54.33)	(51.39)
Time Fixed Effects	Yes	Yes
Bank Fixed Effects	Yes	Yes
N	128584	97513
adj. R-sq	0.659	0.613

Table 9

Determinants of Bank Profit Adjustment Speed and Profitability

This table presents the regression results for Partial Adjustment Model (ROA_{it} - ROA_{it-1} = ($\lambda_i + \gamma_{it-1}Z$) $GAP_{it} + \varepsilon_{it}$, where $GAP_{it} = ROA^*_{it-1} - ROA_{it-1}$) by applying Branching Restriction Index. We assume that λ_i to be dynamic, so it varies among banks and over time. Z is a vector of all independent variables. We classify the sample into 4 subsamples according to profitability level to examine the impact of earnings management and competition on profit persistence. *t*-statistics are in parentheses. *, **, *** denote the 10%, 5% and 1% significance levels, respectively. Appendix presents the definitions of variables.

	(1)	(2)	(3)	(4)
	Profitability (ROA)			
	below 25%	25%-50%	50%-75%	above 75%
Discretionary Loan Loss Provisions	-0.005	-0.078***	-0.113***	-0.056***
	(-0.67)	(4.82)	(-10.62)	(-6.22)
Branching Restrictions Index	-0.090***	-0.083***	-0.056***	-0.051***
	(-11.38)	(-11.85)	(-9.32)	(-7.47)
Z-score	-0.125***	-0.038***	-0.021***	-0.022***
	(-10.99)	(-4.66)	(-2.92)	(-3.01)
Capital Ratio	-0.183*	-0.065	-0.153	-0.184
	(-1.81)	(-0.35)	(-1.04)	(-1.42)
Loan to Total Asset	0.068***	0.111***	0.119***	0.041***
	(7.91)	(11.64)	(10.32)	(4.77)
Size	-0.052***	-0.050***	-0.071***	-0.059***
	(-7.95)	(-5.20)	(-6.39)	(-5.13)
Total Assets Growth	-0.011*	-0.037***	-0.046***	-0.007
	(-1.79)	(-5.96)	(-5.03)	(-1.08)
Managerial Efficiency	0.023***	0.053***	0.045***	0.019**
	(3.09)	(5.1)	(3.98)	(2.4)
Income Diversification	-0.004	0.000	0.003	0.012**
	(-0.87)	(-0.03)	(0.34)	(2.44)
GDP Growth	-0.092***	-0.080***	-0.066***	-0.050***
	(-17.11)	(-10.62)	(-9.67)	(-6.68)
Inflation	-0.074***	-0.086***	-0.070***	-0.034***
	(-11.32)	(-11.51)	(-9.67)	(-5.16)
GDP Per Capita	-0.405***	-0.439***	-0.366***	-0.300***
	(-25.81)	(-24.83)	(-20.11)	(-15.70)
Constant	0.809***	0.836***	0.804***	0.799***
	(37.46)	(46.59)	(56.24)	(39.37)
Time Fixed Effects	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes
N	46038	56833	61482	61744
adj. R-sq	0.760	0.745	0.743	0.626

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	
Branching Restrictions Index	The Interstate Banking and Branching Efficiency Act (IBBEA) is an exogenous shock of competition. Followed by Rice and Strahan (2010), Branching Restriction Index captures the level of interstate branching restrictions for each state. Before 1994, the index in each state equals to four, while, after 1994, this index ranges from zero to four. The index equals to zero for states that are most open to out-of-state entry. Then, we add 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, 0 means highest competition and 4 means lowest competition
Lerner Index	The Lerner index is a bank-level indicator of bank competition. By adopting the stochastic frontier analysis approach, the Lerner index is calculated as the difference between price and marginal cost as a percentage of prices. Higher Lerner index indicates greater market power.
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. 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	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 two 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 zero 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 growth rate
GDP per capita	GDP divided by the number of the people in the country

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