Bank Competition, Earnings Management and Profit Persistence

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Authors Declaration

I declare that, except where explicit reference is made to the contribution of others, that this dissertation is the result of my own work and has not been submitted for any other degree at the University of Glasgow or any other institution.

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Abstract

This thesis examines the impact of competition and earnings management on bank earnings persistence by exploiting natural experiments (IBBEA and SOX).

Chapter three examines how competition affects bank earnings persistence by exploiting a natural experiment following interstate banking deregulation that increased bank competition. We find that bank earnings adjustment speed (which equals one minus earnings persistence in partial adjustment model) increases after their states implement this deregulation. We find the impact from the competition on earnings persistence is solid and consistent using Lerner index as bank-level competition measure and a battery of placebo tests. Despite the negative impact of competition on profit persistence, we didn't find any peculiar situation that alleviates or strengthen this tie(regarding profitability, Gaps).

Chapter four examines the impact of earnings management on earnings persistence in US banking industry. Results show earnings management have a positive influence. In addition, statistics

illustrate managers are more willing to keep a high persistence of profit when they are outperformed than the expected to return. However, when it comes to the different timing of outside market, the effect of earnings management on profit persistence might vary significantly. This connection is robust by using SOX as an exogenous shock on financial reporting quality of the largest banks.

Chapter five analyze the economic significance between earnings management and competition on earnings persistence. We use a battery of tests to determine the most important factor to earnings persistence. We also introduce investment sentiment as an exogenous variation of market vitality to see how bank profit persistence changes. We find both competition and earnings management have a significant impact on profit persistence. We also discover that competition would increase earnings management. Then, if higher competition reduces earning persistence and increase earnings management. While we also observe that higher earnings management would increase earnings persistence. Therefore, we conclude that the effect of the competition on earnings persistence is not from earnings management. Furthermore, we find that competition impacts on earnings persistence is strong enough to overcome the marginal effect that boosted from earnings management due to high competition. We additionally found that earnings management is sensitive to investment sentiment.

Content

Chapter 1

Introduction

1.1 Motivation of Profit Persistence study in Banking

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). Namely, 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 thesis to determine whether the impact of competition on bank earnings persistence is direct or indirectly from earnings management.

1.2 Main Contributions

This thesis contributes to the literature in several ways. First, we construct a clean and appealing natural experiment design by using the Branching Restriction Index to identify the impact of competition on bank earnings persistence. We exploit the cross-state, time-varying 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 market (DeYoung, 2010; Rice and Strahan, 2010). In addition, in Section 4.2, we further use a separate deregulation index, Early Deregulation Index, which also represents a natural experiment design.

For earnings management, we use the Sarbanes-Oxley Act (SOX) as a source of exogenous variation in firm earnings management to document the causal effect between earnings management and earnings persistence. 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).

We 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 the 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 the 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. Our results suggest that earnings management exerts a strong positive impact on earnings persistence.

Second, we also 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 sustaining earnings, as reflected by 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 further investigate the mechanism of the effect of competition on bank earnings persistence, that is, we investigate whether competition *directly* impacts bank earnings adjustment speed or that competition reduces earnings management, which in turn, impacts earnings adjustment speed. Our evidence rules out this indirect channel and indicates that competition *directly* impacts bank earnings adjustment speed.

1.3 Data source and empirical methodology

We use a comprehensive dataset 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 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 broad or unduly narrowly defined. Second, the focus of analyzing the banking sector eliminates the concern of 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 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.

1.4 Findings in a nutshell

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, 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 use the Adjusted Lerner Index as an alternative measure of competition and find a positive relation between bank competition and earnings adjustment speed. Because deregulation is at the market level, we further adopt an instrumental variable approach by using deregulation index as an instrument for market competition HHI measurement and then regress the earning adjustment speed on the predicted HHI. We find that the fitted state HHI has a negative and significant impact on earnings adjustment speed. Because a higher fitted HHI indicates a lower level of competition, this result is consistent with our main finding in the paper.

These 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 the macroeconomic conditions, such as GDP growth, inflation and GDP per capita in each state. We also 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 bank's ability to sustain earnings, including size, diversification, managerial efficiency and safety.

We then discovered a strong correlation between earnings management and earnings persistence. This relationship holds by applying SOX as an exogenous shock on bank earnings management. We find that banks use different ways to of earning manipulation in a different circumstance. For example, when banks earnings are below the earnings target, they are more likely to use earnings management to increase earnings adjustment speed. We also find that bank earnings management behavior will be various regarding market sentiment.

Next, we investigate whether the positive impact of competition on bank earnings adjustment speed goes through the earnings management channel. If this is the case, we would expect a negative impact of competition on bank earnings management. This expectation is suggested by the literature, which argues that competition can act as an external governance mechanism to prevent managerial slack and protect 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 would expect a positive or insignificant impact of competition on bank earnings management. Some literature argues that increased competition could put higher 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; Tomy, 2016; Dou et al., 2016).

We conduct two analyses to examine whether competition has a positive impact on bank earnings management by using two bank earnings management measures. Our first measure of earnings management is discretionary loan loss provisions, which has 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). In our analyses, we find a positive relation between competition and earnings management measured as discretionary loan loss provisions, which does not support the argument that the impact of competition on bank earnings persistence goes *indirectly* through the channel of earnings management.

Our second measure of earnings management is discretionary realized gain and loss from securities available for sale (AFS). Prior studies also document that banks could use the securities available for sale to smooth earnings (Barth et al., 2015; 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). Earnings management through realizing gains and losses on AFS securities is less costly than through managing accruals or involving in real activities because sales of securities are not subject to ex-post scrutiny, such as from auditors. These advantages may enable banks to continuously manage earnings despite the existence of competition. If this is the case, competition does not affect earnings management via AFS. However, we do not find a significant

relation between competition and earnings management measured as available for sale securities. This evidence indicates that the impact of competition on bank earnings persistence does not go *indirectly* through the channel of earnings management.

Chapter 2 provides background and motivation of this study. Chapter 3 investigates how competition affects bank earnings persistence. Chapter 4 investigates how earnings management affects bank earnings persistence. Chapter 5 provides additional empirical analysis between competition and earnings management, as well as introducing how investment sentiment would affect earnings persistence. Chapter 6 concludes.

Chapter 2

Background

2.1 Competition in Banking

Banking as the heart of the financial system of a country sits a vital position for the economy. The intensity of competition in the banking industry has implications for the level of economic vitality, including access to finance, the allocation of capital funds, monitoring investments and exerting corporate governance. Banks like business firms in other industries must attract outside funding in competitive capital markets, face competition in product and labor markets. Competition plays a significant role in fostering bank efficiency. The role of banks as efficient allocators of scarce capital to the economy and as important providers of liquidity make them extremely important macro-economically. Because banks themselves are opaque in nature(Bushman, 2014), an efficient banking market becomes even more vital to economic growth. How competition influences on bank profitability? Gilbert(1984) states that a monopoly market with a small number of banks may lead to high-profit margin as they might collude together either implicitly or explicitly. In addition, they might independently use their market power to charge price, which means higher abnormal returns. However, this positive relationship between banks profitability and market concentration does not necessarily reflect collusion. It might simply because of efficiency as size are positively correlated with efficiency(Goddard et al. 2007).

Market competition theory points out that competition could erode away all economic excessive returns and losses, in the long run, so 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 specific, the excessive profit currently possessed by a firm could attract new competitors entering the market. Then, the new competing firms enter into the market by offering the similar or the same product at a lower price, leading to the decrease of profit margins. This process will not stop until the 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 underperformed firms from the market. Thus, competition could directly reduce earnings persistence.

There is a strong presumption in economics that the profitability is mean reverting, the basic logic behind this theory is the competition-profit persistence view: successful companies with advantages enable them to earn abnormal profits above the average are expected to try to maintain this advantages. However, the current successful will attract more imitations, which will erode the abnormal profits. Schohl(1989)argued that competing firms will enter the market by offering comparable products at lower prices, thus reducing the profit margins. This is a continuous process until the market has met the average value of the economy. By contrast, if the profitability of a firm is lower than the market average, there will be disinvestment, inducing a possible quit. Hence the long-run profitability will converge.

Although banks seek to maintain its profitability and strive to counter the mean reverting process, they are typically under the economic laws of competition (Aghion 2002). The outperformed firms are subjected to a lot of new competitors as well as the pressure from incumbents. New firms are that bring innovative technology can easily snatch away the abnormal earnings from the existing outperformers. The incumbents will benefit from the spillover effects through competition, which allows them to adjust faster and learn quicker, therefore again reduce the abnormal earnings from the existing outperformers. By contrast, if the incumbents cannot survive the process by improving the profitability, they will either quit or forced to bankrupt soon, which will further accelerate the mean-reverting speed.

The competitive environment hypothesis is one of the basic ideas in mainstream economic theory. When the market is not in equilibrium, the firm can earn excess profits due to its comparative advantages. The adjustment of resources and output into areas earning excess profits and away from areas earning below average profits will, in time, tend to bring returns back towards the firm's cost of capital (Jacobson and Hansen, 2001). This adjustment is 'the competitive process' and the speed at which these abnormal returns dissipate is of fundamental importance to the firm because it impacts the value of any strategic initiative.

Based on Mueller(1977), the requirement is the market is sufficiently free for exit and entry. With this premise, the abnormal profit will be eliminated rapidly and all firms' profit rates tend to converge towards an identical long-run average value. He tests how fast the market eliminates the abnormal profits. If the company strived to intervene the market competitiveness, in which way, for

example, erect entry barriers through increased product differentiation, obtain legal protection such as patents, tariffs etc, thus preserving the existing monopoly, then the profit persistence will be last much longer. Additionally, He finds that the profit rate and market share are positively related, it underpins the hypothesis that a company with high profitability makes effort to keep their monopoly position hence maintain the profit persistence. Similarly, Persistence in profits may reflect the existence of impediments to product market competition, which generates market power in output markets, and informational opacity, which generates market power in input markets, Without market power, relatively high performance by a firm would be eliminated reasonably quickly as other firms enter its local market, imitate its transparent techniques or strategies, bid for its most profitable customers, or bid up the price of its managerial talent. Similarly, poorly performed firms would be forced by competitive pressures to exit the industry or imitate the strategies or bid for the customers and managers of the firms performing at the high end of the distribution. Such logic suggests that a firm's market power can have significant influences on its persistence in excess returns. (Berger.A.N et al,2000).

Since incumbents in highly concentrated industries might have the ability (market power) to prevent entry and therefore might be able to enjoy a higher degree of profit persistence (Yamawaki, 1989; Gschwandtner and Cuaresma, 2008), bank concentration measure might have a positive impact on bank profit persistence. However, empirical evidence on this relationship is not clear (see Gschwandtner,2005; Yurtoglu, 2004; Kambhampati, 1995; Waring, 1996; Geroski and Jacquemin, 1988; Scherer and Ross, 1990).

One example of creating barriers is Isolating mechanisms(Rumelt ,1987), such as information impactedness (tacitness) that creates ambiguity on the part of competitors that prevents competitor response, organizational structures and incentives that make competitors slow to respond, buyer switching costs that create loyalty to the brand, the degree of innovativeness on the part of the firm and its competitors, and the manner in which the firm chooses to exploit its advantage, interact to determine the persistence of return. Profitable firms that face lower barriers to entry likely to see their profits eroded by competitors, therefore leading to a higher speed of mean reverting. Under-performed firms are more likely to quit the market voluntarily in order to seek higher rents. Because the lower rents in this market lead to an attractive situation. This kind of competition is referred to as product market competition. This kind of competition varies significantly across industries. For the banking industry, the legal barriers are the major determinant of market competition. Most banks are subjected to government regulations on capital requirements, loan portfolio, securitization and off-balance sheet behavior and other factors. The market is also quite opaque since all information within this industry is highly confidential which leads to a lower process of mean reversion.

A highly competitive market with low or without entry and exit barriers will accelerate the speed of imitations, therefore eliminate the economic value. So if there is intense competition, the persistence should be weak, companies those keep generating abnormal incomes in a specific period will have lower abnormal profits in the subsequent periods. If the competition is less intense, the profitability differences between firms may be expected to be more persistent(Glen.J et al,2001). There are two cases here: 1) profitable firms with firm-specific advantages are likely to be

successful in the future, and 2) the current success of a firm may have adverse effects on future profitability of the firm because of the imitation from competitors. The industry growth rate can be one indicator to explain the competition-persistence view, it might be more difficult for incumbents to maintain the market share and oligopolistic position in a slowed growing industry, on the contrary, in a rapid growth industry, the companies can maintain their price since the demand is increasing thus keep the profit differentials. It might also lead to high profitability persistence because the competition of price is low.

Based on this theory, there are two ways to maintain profit persistence, they are either putting efforts toward innovation thus obtain technological advantages or impose pressure on the market to reduce the competitiveness. A research from Roberts(1999) focusing on the pharmaceutical industry in the US indicating that the profit persistence positively correlated with the Innovation, which proved the technological advantages help maintain the profit persistence. He assumes innovation propensity will positively help companies keep abnormal profits, and competition will adversely influence the profit persistence. However, he did not find any empirical results between profit persistence and competition. In addition, the pharmaceutical industry in particular because it is heavily depending on the R&D and patent protections. However, from this study, we can assure that the internal breakthrough is a valid way to maintain abnormal return. The abnormal return does not pertain via the maintain method, the pharmaceutical companies use their new innovative products to generate new profits. This is an evident instance about how to keep an out-performed profitability level. For the pharmaceutical industry, the imposing of the competition barrier is the patent that generated from the company, because of the protect of patenting. Companies can slow

the spillover effects that forbid another competitor to mimic the products, therefore keep the competitiveness of a specific product. The pharmaceutical industry is much simpler than the banking because the financial institutions have more competition factors to be taken into account.

'Quiet Life' hypothesis (Delis and Tsionas, 2009), on the other hand, argues that banks not exposed to competition because of the specialty of the banking industry. From his hypothesis, if market power prevails, bank managers may pursue objectives other than profit maximization, and they do not have incentives to work hard to sustain their profits level from the previous year. Hence, market power may have an adverse impact on the firm's profit persistence. This is phenomenon is very counterfactual since the behavior of bank managers is not plausible in an aggregate way, but it may explain some kind of specialty of the banking industry. In the traditional mean reversion study, the capital market effects have been considered as a predominant factor in determining the mean-reverting speed. But for the banking industry, this factor becomes ambiguous, because of the banking industry itself dominant the effectiveness of capital market somehow. Sometimes, the max profitability is not the primary concern of banks. Rather than that, the banks may concern more like a capital requirement, risk control etc. All these factors make the banking industry hard to predict in terms of profit persistence. So it is rather difficult to predict the impact of competition on profit persistence.

As banks expand the scope of their activities and identify new growth opportunities across national borders, they tend to gain market power (Arsis, 2009). The increasing market power of banks may improve their abilities to create entry barriers, protect its

transparent techniques or strategies, bid for its most profitable customers, or bid up the price of its managerial talent, and consequently increase their abilities to sustain profits from the previous year (Berger et al, 2000). The US banking has experienced significant changes in regulation, technology, and financial engineering techniques. After the financial deregulation on deposit prices and geographic expansion, regulators move their attention to capital adequacy standards, banks are somehow under heavy surveillance after the financial crisis. Before 1981, the US had no specific numerical capital adequacy standards, it was the regulators responsibility to judge how much capital a bank should hold, after 1981, the first explicit numerical capital requirements for those biggest banks were issued, now the Basel agreements have more detailed requirements on each tier of banking assets, obviously, regulative agreements will be the impediments to competition, as well as increase the barrier on entry . However, the managerial assets as loan loss provisions, give the bank managers potential space to manipulate the financial reports.

According to Berger A.N et al(2000), the profit persistence of US banking is sensitive to macroeconomic shocks as well as impediments to competition and informational opacity. This phenomenon can be summarized in two aspects, firstly, the market follows the economic theory that a more competitive environment erodes the abnormal profits thus reduce the consistency of the banks' profit. Secondly, banks are pro-cyclicality which means the profit persistence should be influenced by the macroeconomic factors, presenting upwards(expansion)and downwards(recession) trend within the period, if the banks can offset the positive and negative effects imposed by the outside macro-factors, it is plausible that managers are using accounting methods to hide its 'true profit'.

Schipper(1989) and Healy and Wahlen(1999) state that managers can use their discretion in financial reporting to overstate the true level of earnings as well as to hide the unwelcomed earnings losses. Mostly, the earnings management aims to mislead the outside investors, a smoothly positive earnings streams are able to consequently influence the stock price. According to Degeorge et al.(1999) and Burgastahler et al. (1997), between 1976 and 1994, the annual earnings of US firms shows a relatively smoothed single-peaked, bell-shaped distribution expected in the area of zero earnings, it suggests that firms managed to report earnings higher to avoid loss when the losses are relatively small. Meanwhile, Burgastahler et al. (1997) also find that the US firms employed accounting discretion to avoid the small decrease in earnings when earnings are positive. Hence maintain the profit persistence target. So the determinants of profit persistence are ambiguous.

Based on the two facts, how the bank managers strive to maintain the persistence of profit is worth digging. On the hand, for example, they can impose pressure on the regulators thus enhance the barrier of entry and exit, meanwhile, the managers can maintain the information disclosure on a limited level thus increase the informational opacity. On the other hand, in order to offset the cyclical impact from external macroeconomic factors, managers can apply financial reporting techniques such as big bath, window-dressing etc., therefore artificially influence the earnings that reported.

The key two determinants of competition and accounting quality will be measured via Lerner-index and specific accounting quality indicator respectively. Since the existing empirical studies have employed market-level market power proxies such as concentration

ratios or Herfindahl indices, while no study, to the author's knowledge, has ever used a bank-level measure of market power to account for the possibility that different banks operating in the same market might have different market power. This paper is able to fill this gap by investigating the impact of bank-level market power on profit persistence. Furthermore, the newly introduced comparison of accounting quality and market power on profit persistence can give a deep inspiration for how the bank managers' behaviors are influences the profit persistence.

Goddard.J, Liu Hong, Molyneux P, Wilson. J O.S(2011)test the competition on banking profitability in a universal scale including 65 countries resulting in a greater size of GDP, a high rate in GDP growth(which implicitly indicates more competitive market) reduce the persistence rapidly. Furthermore, the persistence is positively correlated with the size of entry barriers, proving that high market power help maintains profits persistence. However, empirical evidence on this relationship is not clear. Previous studies examined the relationship between bank market power and profit persistence by measuring market power as bank concentration variables, (for example, Gschwandtner,2005; Yurtoglu, 2004; Kambhampati, 1995; Waring, 1996; Geroski and Jacquemin, 1988; Scherer and Ross, 1990; Berger et al, 2000). The higher the concentration ratio, the higher market power banks may have. The main advantage of using bank-level market power is to allow for heterogeneity. In addition, by employing bank-level data, various different factors that influence bank short-run profit persistence can be examined.

On the other hand, incorporating different attitudes into the accounting system by the managers is necessary. Tomy.R.E(2012) argue that the earning persistence is significantly influenced by the

economic cycle since the managers have incentives to apply accounting method to 'change' profits that reported. He finds that firms' earnings are most persistent during an expansion, least persistent during a recession, which implies that managers have employed accounting method to influence the earnings in order to lead a more persistent profit. However, the firms measured in this paper are all manufacturing and consumer durables industries, which imply that the samples themselves are pro-cyclicality, it is plausible that the impacts from the economic cycle dummies are magnified. It is controversial whether banks are sensitive to those factors. Beatty and Liao(2011) tried to find the recession impact on banking lending willingness associated with the regulatory capital ratios show a profile how the managers tried to revise the assets structure in order to meet the capital requirements when the market is under recession or expansion. This indicates the bank managers have applied accounting techniques to meet targets when the economic cycle is changing.

The intensity of competition in the banking industry has implications for the level of economic vitality, including access to finance, the allocation of capital funds, monitoring investments and exerting corporate governance. Banks like business firms in other industries must attract outside funding in competitive capital markets, face competition in product and labor markets. Competition plays a significant role in fostering bank efficiency. The role of banks as efficient allocators of scarce capital to the economy and as important providers of liquidity make them extremely important macro-economically. However, the relationship between competition and earnings persistence is not widely assessed, and earnings management would also influence earnings persistence. In the next session, we will briefly review the development of earnings management in banking.

2.2 Earnings Management in Banking

Banks are different from non-financial firms in terms of financial reporting. Ordinary, financial reporting is targeting transparency, showing that more disclosure would lead to a better corporate act. However, there is ongoing debate arguing whether banks need to be as transparent as possible. For example, Freixas and Rochet (2008) state that transparency is important for banks to allow depositors monitoring borrowers' quality. In addition, bank opacity would induce agency problems and make banks less efficient. The higher asymmetric information would increase the financing cost on both issuing equity or debt. Bank financial reporting could possibly offer a channel to address agency problems arise in the banking industry. There are plenty of benefits of being financially transparent. For example, it would allow investors to better evaluate the fundamentals of each bank, thus mitigate agency problems. A regulator from another dimension could monitor banks more efficiently via a good financial reporting environment. Diamond(1984) argues that banks have incentives to monitor borrowers and produce information about credit risks. And Calomiris and Gorton(1991) state that the liquidity mismatch between assets and liabilities of banks will potentially increase the uncertainty of depositors. The information asymmetry between banks and depositors that arises from banks' delegated monitoring role might induce agency problem because banks might not behave on behalf of depositors. By contrast, banks may take the extra unnecessary risk to benefit themselves rather than depositors. A better disclosure system would mitigate asymmetric information between depositors and banks.

However, transparency might not optimal for banks. Dang et al(2013) suggest that banks should be opaque. Banks are unique in privately producing debt that is a money-like security that trades at par and does not vary in value over time. Banks need to have their own private portfolio to keep these money-like debts. Because debts need to be information-insensitive to serve as an efficient transaction medium. In order to make debt value at par, the underlying asset that backing debts should be unrevealed. Hence, bank money would not fluctuate in value, which will reduce its efficiency in trading. In this context, banks with higher transparency would lead to higher cost. A similar real-world example would be the selling of diamonds suggested by Holmstrom(2009). He argues that if diamonds are all allowed to be inspected by buyers before the transaction, the trade would be slowed down and reduce market liquidity, which might harmful to market efficiency. This might explain why banks had not been required to fully disclose financial reports until 1974. In 1974, Securities Amendments Act requires banks to issue substantially similar regulations with respect to periodic reporting, proxy regulation, and insider trading as those adopted by the SEC.

Depositors may not be informative as banks about the loan quality. Then, one potential issue is depositors may panic about their money if the macro environment is not healthy or some adverse news are disclosed regarding some particular banks. Because banks are opaque, depositors have difficulty to monitor banks. A bank run would induce adverse consequence, which substantially reduces liquidity or a bank. It happens, if depositors withdraw all money from banks when they have reasons to believe that there is an increased likelihood of bank failure despite they do not know the actual incidence of failure.

Holod and Peek(2007) find that listed banks with higher transparency are better able to issue uninsured large time deposits during periods of monetary tightening. Which means banks are less financial constrained if they have better financial reporting quality. This indicates market values the financial information transparency of public banks. Flannery et al. (2004) argue that banks' opacity to outsider investors are peculiar, which might need further regulation on them. Banks have undisclosed information of their non-tradable loans, this type of information is super difficult for outsiders to acquire. A similar evidence is that Moody's and S&P ratings on banks are more different for banks than other firms and this disagreement happens when banks hold greater assets in loans and trading assets and this disagreement would reduce if banks hold higher capital ratio and more physical assets(Morgon, 2002). This finding suggests that rating companies also face difficulty in determining a bank's stability level particularly if the bank holds a large stake in loans. The opacity of loan quality becomes a huge information barrier between banks and outsider investors. Flannery et al (2013) find that, compared to nonfinancial firms, banks higher bid-ask spread during the financial crisis, which indicates financial regulators could have more impact on economic downturns. This leads out a more scrutiny regulation environment for banks. Loan loss provision could also be a potential way for bank managers to convey their private information to equity holders and investors. For instance, Nichols et al(2009) find that public banks have more information asymmetry compared to other banks. Bank managers would make loan loss provisions more timely to alleviate opacity issues. In addition, loan loss provision could be applied to manipulate earnings, capital or on tax purpose in order to align with shareholders' interest. Literature has found a positive relationship between bank market value and loan loss reserves (Beaver et al, 1989). It indicates that banks managers have the power to manipulate earnings to market expectation when they have a higher ratio of loan loss provisions. Investors also value this type of extra

reserve as a good resort to manipulate earnings, therefore, showing a more optimistic market performance.

Bank regulation has evolved over time. The micro-prudential approach has been long employed within the banking industry. To prevent individual bank failure is a long time goal aims to protect depositors and investors from the cost of distress (Borio, 2003). Banks to be regulated on a micro level would encourage banks to internalize losses, thereby protecting the deposit insurance fund and mitigating moral hazard. Before the recent financial crisis, banks are regarded as independent units where systemic risks are assumed to be exogenous to the individual banks, and the correlation between banks are ignored. The macro-prudential approach has been recently getting popular. Banks are endogenous interconnected, to avoid system-wide distress with the ultimate objective to avoid reductions in GDP become the least goal for regulators. According to Hanson et al(2011), the target of systemic macro-prudential approach is to limit for excessive social costs associated with multiple financial institutions' value shrinkage caused by a common shock.

There are raising arguments concerning the measurements on the profits persistence. Holian(2010) contends that most of data sources that used are accounting-based, which will produce several errors. From his study, he applied both EVA(economic value added) model and traditional unadjusted accounting measures to compare the results. Stern, Stewart, and Co(1995) argue that the accounting profit(net income does not take into consideration the opportunity cost of capital), while the EVA method can incorporate the opportunity cost of capital. The EVA has a different measurement from the basic net income. It can be Obtained by the Net operating profits after taxes minus Capital charge (current cost of debt and

equity) plus the Adjustments made by Stern Stewart to correct accounting distortions.

Muller(1990) suggest that the outcomes of profit persistence should be smaller because of the availability of various accounting practices, that will allow managers to polish the profits. The EVA method aims to find the true profits. Intuitively, researchers believe that the profit persistence of accounting based method will be higher than the EVA method based profit persistence. However, the results from Holian(1990) suggest that the average persistence is higher when applying the Stern Stewart measure of economic profits rather than unadjusted accounting measures. It shows that the accounting based profits do not bias persistence upward. On the other hand, because of the incorporation of the opportunity cost, the result does suggest lower long-term profits in the context of using EVA, this research also confirms that the R-square will be higher when using the revised EVA rather the raw accounting profit, which also confirms that the managers do use accounting practices to manipulate the profits.

After all, the accounting-based measurement of profit persistence has a potential bias since the probability of artificial influence in relation to accounting practices. Despite the competition–persistence view, there are also numerical literature investigating the impact produced by economic shock/ cycle on accounting quality. Intuitively, how managers behave regarding economic factors will affect the profit persistence as well. This paper wills mainly focuses on the competition to profit persistence.

From another dimension of the persistence study, the profit persistence studies using accounting oriented methods contend that the various factors like macroeconomic cycles will influence the profit persistence because the managers have incentives to manage earnings in order to meet different targets within various business cycles. The profit persistence is affected by firms' performance and accounting system simultaneously. To be specific, the fundamental performance can be affected by both systemic and idiosyncratic factors. As influences exerted from external factors like the economic recession and inflation are not able to avoid, the managers may use the accounting system to manipulate earnings.

The incentives may be related to taking a big bath during recession periods, window-dressing financial statements before a public offering, etc(Healy and Wahlen, 1999). Empirical results from Collins and Kthari(1989) show a positive relationship between profit persistence and stock price changes, and Teoh et al(1998) also suggest that the companies tend to manage earnings upwards prior issuing equities. The intuition behind the earnings artificial management is that managers will strongly avoid underperformances when other competitors are well-performed, by contrast, they will write-down large assets in the balance sheet as losses when the whole industry is under recession, by this 'big bath', managers can make the subsequent earnings smoother and persistent.

Findings from Liu and Ryan(2006) support this behavior, they found that banks tried to manage the earnings upwards during the financial recession by delaying provisions for losses on heterogeneous loans, and the banks managed the earnings downwards during the expansionary period by accelerating charge-offs of homogeneous loans. All these manipulations will secure a

more smooth earnings curve, thus stabilizing the profit persistence. Another research from Beatty and Liao(2011) investigating the relationship between lending willingness and delays in expected loss incorporating two recession period March 2001 to December 2001 and December 2007 to June 2009 show that banks inclined to reduce lending during recessionary relative to expansionary periods, in addition, banks with small delays have smaller reductions on loans. The loan loss provisions rule magnifies the pro-cyclicality of banking, which increases the possibility and incentives for bank managers to manage profits in order to keep profit persistence.

Apart from the internal earnings management from bank managers, the regulations on the accounting system may change as well. It is plausible that banks are willing to disclose more information when they are outperforming, in contrast, when it comes to the recession, profitability is severely impaired, the transparency and accuracy of accounting quality are supposed to be lower than normal level. Magee and Bertomeu(2012)argue that the accounting quality becomes worst before a recession. All these imply the accounting quality has an impact on the profits persistence. However, the incentives for managers to manipulate the earnings may differ from each other, there are lots of both internal and external factors requiring considering when it comes to financial reporting.

For example, empirical results show that listed U.S firms have better accounting quality than those non-listed firms. In order to attract cheaper capitals through financial markets, the listed companies need to meet the requirements of sophisticated investors as well as establish the firms' reputation. Similarly, if the firm is operating in an advanced economic environment with sound supervision and regulations, the accounting quality will also

increase. Bharath S.T, Sunder.J, and Sunder.S.V(2008) find that the accounting quality is positively related to firms' financing choices. To be specific, with poorer accounting quality borrowers preferring private debt, bank lending will result in higher cost compared to the financial market. Firms with good accounting quality will benefit from the effective financial market as the low required rate on debt. However, firms with high potential growth will choose private funding resources rather than the public funding resources (i.e., corporate bond in financial market), this may due the consideration on the significant flexibility of the private debt. For example, the borrowing contract with a certain bank will be more customizable than with public investors. Additionally, the private-debt can be renegotiated to some extent before it matures, it is much favorable when a firm is growing fast.

Specific to the banking industry, empirical results show the regulation, SFAS 133, on how banks are required to report the value of the derivative have a significant impact on the banks' profit persistence(Kilic, E., et al 2012). SFAS 133, which enacted in 1998, changed accounting standard for derivatives substantially by enforcing recognition of all derivative instruments at their fair values and imposing stricter criteria for a derivative to classify as a hedge. Consequently, the profits of banks are more volatile responding to the uncertainty of the values of derivatives. As a result, banks lose the ability to smooth income via derivatives, the research finds empirical evidence that banks rely more on loan loss provisions to smooth profit. In this context, if the loan loss provisions changed significantly, the bank managers have intended to artificial smooth its earnings.

Other external factors can be auditing, economic shocks, tax-rate and so on. The incentives also can be influenced by the ownership of the firm in conjunction with size,financial leverage, and industry. Isidro and Raonic(2012)find that firms cross-listed generally have better information quality than their non-US listed peers. Since Cross-listed firm can access cheaper external funds. Similarly, the international conglomerates usually have higher accounting quality. All of the above factors probably affect the incentives of the firms' earnings manipulations.

A more deep discussion on the firm reporting incentives and institutional factors from Isidro and Raonic(2012) suggest that the financial reporting quality increases in the presence of strong monitoring mechanisms. It can be represented by ownership concentration, analyst scrutiny, effective auditing, external financial needs etc. Different incentives from managers and different endogenous and exogenous factors will affect the firms-accounting quality thus influence the quality of 'numbers' that observed from the financial reports. Since the main target is to measure the profit persistence. The importance of the accounting quality should not be ignored.

Li(2008) investigate how the earnings persistence correlated with the accounting readability. In this research, a measurement of accounting readability is introduced called FOG. It is developed by Robert Gunning, the mechanism is to capture the text complexity as a function of syllables per word and words per sentence. The index obtained is interpreted as how long (in years) that a formal educational reader with average intelligence needs to read the text once and understand that piece of writing with its word-sentence workload. Li argues that the managers can use the length of annual

reports as well as the complicity to hide adverse information thus making the annual reports less transparent. A high Fog index referred to a less transparent annual report, by contrast, low Fog index will result in the concise description and more comprehensible in the report, which indicates high transparency. After building a connection with earning persistence and the Fog Index, a negative relationship has been founded, suggesting that if the manager is trying to hide adverse information using more complicated words and longer sentences will lead a lower earnings persistence. Earnings forecasting is a big part of investment appraisals when considering to invest certain company. Baginsk. S.P, Hassell.J.M and Kimbrough M.D(2003) suggest that the managers are more likely to announce earnings forecast that containing external attributions(56.5%), such as macroeconomic changes or governmental issues compared to internal factors like strategic changes in price, advertising, new products, cutting cost, M&A etc. Additionally, 29.4% of samples that investigated using only external attributions rather than internal attributions. Since more relevant information released in the report, it will be beneficial for analysts and investors to compare different underlying companies, hence increase the transparency.

In hindsight, a bad performance will definitely lead to a low earnings persistence, thus managers trying to confuse investors in the annual report with more complicated words have no significant impact. Conversely, there should be an implication that the managers are trying to apply every possible mean to obscure the bad results. To some extent, Accounting quality is increasingly crucial since the earnings persistence has a large potential to be influenced artificially.

There has been a long time discussing whether bank opacity is beneficial or not. Some argue that banks need to be opaque hence preserve each loan value at par without discount. Some argue that banks need to be transparent to allow better public monitoring thus reducing agency cost. Regulators have gradually imposed stricter accounting standards to improve accountability of banks. When banks manipulate their financial statements, this can increase bank opacity and interfere with private governance and official regulation of banks. Banks are found to manipulate earnings in order to smooth earnings, match capital target and reduce tax and so on(Beatty and Liao, 2011; Jiang, et al 2016). Distortion of financial statement will reduce capital allocation efficiency hence drag down economic growth. Competition, on the other hand, is also a long-term topic in banking. The intensity of competition in the banking industry has implications for the level of economic vitality, including access to finance, the allocation of capital funds, monitoring investments and exerting corporate governance. Banks like business firms in other industries must attract outside funding in competitive capital markets, face competition in product and labor markets. Competition plays a significant role in fostering bank efficiency.

How bank competition affects financial quality is under-researched. Barth(2009) found that banks allocate capital more efficiently in countries that penalize top management team more for manipulation in financial reports. However, they do not examine the relationship between bank earnings management and competition. Jiang et al(2016) examined the connection between competition and earnings management, using interstate deregulation as a competition shock in the US from 1994, they found first competition could mitigate earnings management by reducing agency problem. Second, competition would increase bank transparency by facilitating peer-

firm comparisons. According to Holmstrom (1982), if competition encourages more bank entry and more similarity among banks, they are easier to mimic with each other thus could establish a more accurate benchmark in terms of financial accounting. Hence, a competitive market would allow investors and officials to detect earnings management easier ex-post, and this would reduce banks' incentive to manipulate financial reports ex-ante (Dichev et al. 2013). Due to high competition, peer-comparison has an effective impact on earnings management detection. Third, banks might reduce earnings management to lower financing cost. Studies show that financial accountability has a strong positive effect on reducing financing cost in both equity and debt(Graham, Liu and Qiu 2008; Lo 2015).

However, it is still possible that banks would be more opaque due to an increase of competition. Shleifer(2004) finds that stronger competition can stimulate executives to behave unethically, which including more earnings management. Competition would also increase the banks M&A activities, which spur higher earnings manipulation. For example, bank managers might use more earnings management to protective themselves from being acquired even if this manipulation increase the cost of capital(Armstrong, et al 2012). Also, high competition would also induce managers to report less poor outcomes. Therefore, how competition would impact on earnings management could go either way. In Jiang et al(2016), a gravity model of competition was used to measure the exogenous shock on competition of each state. They found that competition has a strong impact on earnings management and this effect is negative and significant. This indicates that competition would reduce earnings management. Their results are robust after considering the effect of deregulation itself on financial quality. As well as using restatement as alternative measures. However, this study mainly

uses loan loss provisions as potential earnings management measures. It is still worthwhile to research bank earnings persistence.

The recent financial crisis draws attention on the dark side of bank financial accounting. Flannery et al (2013) find that banks are unusually opaque during the financial crisis. The bank's equity trading behaviors are more volatile during the crisis period. Meanwhile, they discovered that banks' financial accounting composition has a significant impact on banks' equity opacity. It is still difficult to discover which specific subject of accounting standard would explain this type of opacity. During the financial crisis period, market participants become unsure about the portfolios held by financial institutions. They lose confidence in evaluating the intrinsic value of portfolio based on traditional methods. Because during the crisis, the insolvency risk rises as the whole economy has a downward trend. For example, the market is extremely illiquid because the interbank lending market froze during the financial crisis. A key issue in over-cautions about counterparty risk is opacity. When financial institutions are unable to read enough information about counterparties, the lending markets halt(Pritsker, 2010).

Credit flows from banks to firms are not efficient when there is a substantial amount of impaired assets in the bank's balance sheet. Because there is a strong asymmetric information problem between outsiders and insiders in terms of determining the asset value. In addition, this type of asymmetric information would lead market participants to undervalue banks' assets pool overall, thus lowering the overall bank assets value. In result, this would increase the cost of financing by overstating the underinvestment problem(Myers and Majlfuf, 1984). During the financial crisis, the US government

implemented a troubled asset relief program and public-private investment program to increase the possibility that banks have enough reserve to keep credit flows. In addition, after 2009, a stress testing was implemented to particularly test the insolvency risk of the systemic important banks. After stress testing result release, market participants have stronger confidence in investment banks, which resulting in a lower financing cost. Most large financial institutions are able to issue equities after the announcement of stress test results. Banks might issue equity to either meet regulatory requirements or as an extra reserve of capital.

There is a possibility that bank opacity makes a huge contribution to the recent financial crisis. Recent studies show that rating agencies have more disagreement in terms of banks rather nonfinancial firms (Morgan, 2002). Bank assets composition has a strong connection with rating disagreement. Some argue that disagreements increase because of the different status of capital ratio. Also, Hirtle(2006) discovered a strong market reaction after CEOs have certified financial statements. Stock price increases significantly as they perceive this as a signal of reduction in opacity. Morgan(2010) state that banks are neither totally opaque nor totally transparent. In addition, rating agencies normally issue a lower credit rating for unsolicited banks compared to those solicited ones. Because it is much more difficult for a rating agency to acquire information from unsolicited banks.

Banks might have lots of earnings management during the financial crisis, and indeed much of government's interventions during the financial crisis. Since the government face difficulties in judging solvent and insolvent institutions. Flannery et al(2013) apply three different factors to test bank opacity. First, the bid and ask spread of

a bank would reflect informative of an asset. Since a higher spread indicates that traders hold information that unknown to each other. A market maker, therefore, quotes a wider spread to protect herself from losing money when engaging into uninformed counterparties. This bid-ask spread difference might be more significant for banks since banks involve underwriting and loan monitoring, which is particularly difficult for external investors to observe. Second, they use the extent to which trades have a permanent effect on a stock's price as an indicator of information opacity. If the trade is more transparent, then the price changes upon stock would less likely to reverse. Specifically, if traders are informed, they will move the stock price towards its intrinsic values. However, if the traders are not informed, they are not able to influence stock price permanently. In another word, if the information is more opaque, then its impact on stock price would be more permanent. Kyle(1985) states that insiders have more information about an asset's future payoffs.

Third, they employ trading volume to indicate opacity among banks. However, there is no expectation of the relationship between trading volume and financial accounting quality. When a bank is more opaque, the trading would increase, because there is more disagreement between traders. On the other hand, if more information is disclosed, trading can be stopped because price precisely reflects all information.

Loan loss provisions are so far the most reliable subject in financial accounting to allow banks to manipulate earnings. The change in the effect of loan loss provision on regulatory capital calculations during the pre-BASEL and BASEL period affect the bank earnings management in financial accounting. In the pre-BASEL period, there is an opposite effect of the loan loss provision on earnings vs

capital requirement imposed by regulators. Thus, if a bank has low capital ratio they could easily increase loan loss provision to make a higher capital ratio, on the contrary, banks might report lower earnings. Beatty(1995) discovers a negative correlation between capital ratio and loan loss provisions in the pre-BASEL period. This suggests that bank use loan provisions match capital requirement.

The capital adequacy requirement was first adopted in early 1990, the initial requirement is only the minimum capital ratio. Since more loan loss provision was related to a higher capital ratio. The regulatory capital counts in loan loss allowances. After BASEL enacting, loan loss allowance was not considered into capital adequacy calculation anymore. So Tier 1 capital decrease with loan loss provisions in the new regime, and loan loss allowance was counted into Tier2 capital. In this context, banks with low capital might reduce provisions to avoid violation of minimum capital requirement. The negative correlation between earnings management using discretionary loan loss provisions and regulatory capital is more pronounced after the BASEL accord. Also, Beatty et al(2002) found that public banks tend to use discretionary loan loss provisions more to beat earnings forecast. This indicates that banks have different incentives in terms of earnings manipulation.

The change of financial reporting in banking has a strong impact on earnings manipulation incentives. It makes the measurement of earnings management difficult across time. Most common widely applied model is discretionary loan loss provision model. There have been multiple models to estimate earnings management, most of them are cross-sectional models. But different models have different assumptions of control variables, which explain the variation of loan loss provisions. For example, some are considered

loan charge-offs and loan loss allowance as exogenous variables that could explain the loan loss provisions. On the other hand, some are considered loan loss allowance and charge-offs as discretionary parts of banks. So far, there is no consensus on which model is the best measure of earnings management. Discretionary loan loss provision model is the most prominent model in measuring earnings management. But it is still possible that banks use other reporting discretion to manage reported earnings and regulatory capital. Also, it is possible that banks use gains and loss from available for sale securities to manipulate earnings. And the one time change in accounting for post-retirement benefits also could provide an opportunity to find accounting discretions.

Due to the particularity of banks, earnings management for bank researchers has been mainly focused on discretionary loan loss provisions. But it is worth noting that banks could use other methods to manipulate earnings. It becomes increasingly popular to study earnings management from realized gain and loss from available for sale securities in banks. A on-going research by Barth et al.,(2017) show that banks use AFS realized gains and losses to manage earnings and regulatory capitals. AFS is the largest category of securities on the balance sheet of a bank. Banks are detected by using AFS to avoid reporting losses, smoothing earnings and take a big bath if needed. This item has been widely showed that banks would also put their discretion and achieve the target in some way. The opportunistically application of earnings management via AFS is a general phenomenon.

Accounting Standard Codification (320) suggests a new treatment of available for sale securities in 1993. Prior that time, investments securities were measured using the amortization method. Upon that,

each bank needs to disclose the fair value of all investment securities. But banks were not required to report their income or losses of those securities, they will be finally realized as the gain or loss into earnings. ASC 320 requires all entities, including banks, to separate securities into three different ways. First, banks need to report securities that plan to sell in the near future into Trading securities. Secondly, banks need to report securities that plan to hold to maturity in to hold to maturity. Thirdly, banks need to report securities that are not for trading or hold either as available for sale securities. This act also allows banks to switch HTM securities to available for sale securities. Now, available for sale securities becomes the biggest securities categories. There are two parts of AFS: realized gains and losses are reported into income statement that would impact on financial earnings; unrealized gains and losses are reported in other comprehensive income that would not affect net income. The way of realization could be various, for example, banks could sell securities or dispose of them. Securities could also be impaired that is deemed other than temporary. However, unrealized gains and losses of AFS would no affect final earnings of a bank. Regarding capital requirement, unrealized gains and losses from AFS debt or equities are not considered from Tier 1 capital but realized one does. Therefore, it is possible that banks manipulate realized gains or losses from AFS to meet capital requirement. It is better for banks to manipulate earnings using AFS rather than trading or HTM. That is because the trading category is measured at fair value and HTM is too costly and risky.

After ASC 320, securities are now required to all reported as fair value, while they are subjected to changes in fair value recognition, and this recognition is realized in the comprehensive income rather than the income part. Therefore, ASC 320 does not disallow banks to manipulate earnings by selectively reporting realized gains and

loses. The difference is that the realized gains and losses will go to net income directly or comprehensive income on the other hand. AFS does not only affect earnings through realization but also affect regulatory capital. Barth et al(2017) find that banks with low regulatory capital will realize more net gains from AFS, in order to increase the capital. Furthermore, banks, in general, will use available for sale securities to manipulate earnings make it more persistent, which is consistent with traditional earnings management literature. It is interesting to find out that banks will still smooth earnings disregard of high or low regulatory capital.

Whether banks use AFS to take a big bath is also tested in their paper. Empirically, if banks are earnings positively, they would like to use AFS for smoothing earnings, while if they are losing earnings, AFS is more likely to be manipulated for a big bath. In addition, big bath has been constrained if banks have a low regulatory capital, thus indicating that a negative connection between capital requirement and earnings management.

Chapter 3

Competition and bank profit persistence

3.1 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 their states implement this deregulation. We find the impact from the competition on earnings persistence is solid and consistent using Lerner index as bank-level competition measure and a battery of placebo tests. Despite the negative impact of the competition on profit persistence, we didn't find any particular situation that alleviates or strengthen this tie(regarding profitability, Gaps).

3.2 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 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). Firms' ability to sustain earnings is limited by their market power, where the greater market competition firms face, the weaker earnings persistence will be. In this paper, 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).

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 dataset 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 broad or unduly narrowly defined. Second, the focus of analyzing the banking sector eliminates the concern of conglomerates that operate in different industries and thus face competitions in different markets.

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 relationship between competition and earnings persistence, which is in line with the prediction of the economic theory. 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 macroeconomic 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.

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).

3.3 Literature Review

Economic scholars tend to believe that competition could directly impact earnings persistence. Economic competition theory points out that competition could erode away all economic excessive returns and losses in the long run, so 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 specific, the excessive profit currently possessed by a firm could attract new competitors entering the market. Then, the new competing firms enter into the market by offering the similar or the same product at a lower price, leading to the decrease of profit margins. This process will not stop until the 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 underperformed firms from the market. Thus, competition could directly reduce earnings persistence.

There is a strong presumption in economics that the profitability is mean reverting, the basic logic behind this theory is the competition-profit persistence view: successful companies with advantages enable them to earn abnormal profits above the average are expected to try to maintain this advantages. However, the current success will attract more imitations, which will erode the abnormal profits. Schohl(1989)argued that competing firms will enter the market by offering comparable products at lower prices, thus reducing the profit margins. This is a continuous process until the market has met the average value of the economy. By contrast, if the profitability of a firm is lower than the market average, there

will be disinvestment, inducing a possible quit. Hence the long-run profitability will converge.

Although firms seek to maintain its profitability and strive to counter the mean reverting process, they are typically under the economic laws of competition (Aghion 2002). The outperformed firms are subjected to a lot of new competitors as well as the pressure from incumbents. New firms are that bring innovative technology can easily snatch away the abnormal earnings from the existing outperformers. The incumbents will benefit from the spillover effects through competition, which allows them to adjust faster and learn quicker, therefore again reduce the abnormal earnings from the existing outperformers. By contrast, if the incumbents cannot survive the process by improving the profitability, they will either quit or forced to bankrupt soon, which will further accelerate the mean-reverting speed.

The competitive environment hypothesis is one of the basic ideas in mainstream economic theory. When the market is not in equilibrium, the firm can earn excess profits due to its comparative advantages. The adjustment of resources and output into areas earning excess profits and away from areas earning below average profits will, in time, tend to bring returns back towards the firm's cost of capital (Jacobson and Hansen, 2001). This adjustment is 'the competitive process' and the speed at which these abnormal returns dissipate is of fundamental importance to the firm because it impacts the value of any strategic initiative.

Based on Mueller(1977), the requirement is the market is sufficiently free for exit and entry. With this premise, the abnormal profit will be eliminated rapidly and all firms' profit rates tend to converge towards an identical long-run average value. He tests how fast the market eliminates the abnormal profits. If the company strived to intervene the market competitiveness, in which way, for example, erect entry barriers through increased product differentiation, obtain legal protection such as patents, tariffs etc, thus preserving the existing monopoly, then the profit persistence will be last much longer. Additionally, He finds that the profit rate and market share are positively related, it underpins the hypothesis that a company with high profitability makes effort to keep their monopoly position hence maintain the profit persistence. Similarly, Persistence in profits may reflect the existence of impediments to product market competition, which generates market power in output markets, and informational opacity, which generates market power in input markets, Without market power, relatively high performance by a firm would be eliminated reasonably quickly as other firms enter its local market, imitate its transparent techniques or strategies, bid for its most profitable customers, or bid up the price of its managerial talent. Similarly, poorly performed firms would be forced by competitive pressures to exit the industry or imitate the strategies or bid for the customers and managers of the firms performing at the high end of the distribution. Such logic suggests that a firm's market power can have significant influences on its persistence in excess returns. (Berger.A.N et al,2000).

Since incumbents in highly concentrated industries might have the ability (market power) to prevent entry and therefore might be able to enjoy a higher degree of profit persistence (Yamawaki, 1989; Gschwandtner and Cuaresma, 2008), bank concentration measure might have a positive impact on bank profit persistence. However,

empirical evidence on this relationship is not clear (see Gschwandtner,2005; Yurtoglu, 2004; Kambhampati, 1995; Waring, 1996; Geroski and Jacquemin, 1988; Scherer and Ross, 1990).

One example of creating barriers is Isolating mechanisms(Rumelt ,1987), such as information impactedness (tacitness) that creates ambiguity on the part of competitors that prevents competitor response, organizational structures and incentives that make competitors slow to respond, buyer switching costs that create loyalty to the brand, the degree of innovativeness on the part of the firm and its competitors, and the manner in which the firm chooses to exploit its advantage, interact to determine the persistence of return. Profitable firms that face lower barriers to entry likely to see their profits eroded by competitors, therefore leading to a higher speed of mean reverting. Under-performed firms are more likely to quit the market voluntarily in order to seek higher rents. Because the lower rents in this market lead to an attractive situation. This kind of competition is referred to as product market competition. This kind of competition varies significantly across industries. For the banking industry, the legal barriers are the major determinant of market competition. Most banks are subjected to government regulations on capital requirements, loan portfolio, securitization and off-balance sheet behavior and other factors. The market is also quite opaque since all information within this industry is highly confidential which leads to a lower process of mean reversion.

A highly competitive market with low or without entry and exit barriers will accelerate the speed of imitations, therefore eliminate the economic value. So if there is intense competition, the persistence should be weak, companies those keep generating

abnormal incomes in a specific period will have lower abnormal profits in the subsequent periods. If the competition is less intense, the profitability differences between firms may be expected to be more persistent(Glen.J et al,2001). There are two cases here: 1) profitable firms with firm-specific advantages are likely to be successful in the future, and 2) the current success of a firm may have adverse effects on future profitability of the firm because of the imitation from competitors. The industry growth rate can be one indicator to explain the competition-persistence view, it might be more difficult for incumbents to maintain the market share and oligopolistic position in a slowed growing industry, on the contrary, in a rapid growth industry, the companies can maintain their price since the demand is increasing thus keep the profit differentials. It might also lead to high profitability persistence because the competition of price is low.

Based on this theory, there are two ways to maintain profit persistence, they are either putting efforts toward innovation thus obtain technological advantages or impose pressure on the market to reduce the competitiveness. A research from Roberts(1999) focusing on the pharmaceutical industry in the US indicating that the profit persistence positively correlated with the Innovation, which proved the technological advantages help maintain the profit persistence. He assumes innovation propensity will positively help companies keep abnormal profits, and competition will adversely influence the profit persistence. However, he did not find any empirical results between profit persistence and competition. In addition, the pharmaceutical industry is particular because it is heavily depending on the R&D and patent protections. However, from this study, we can assure that the internal breakthrough is a valid way to maintain abnormal return. The abnormal return does not pertain via the maintain method, the pharmaceutical companies

use their new innovative products to generate new profits. This is an evident instance about how to keep an out-performed profitability level. For the pharmaceutical industry, the imposing of the competition barrier is the patent that generated from the company, because of the protect of patenting. Companies can slow the spillover effects that forbid another competitor to mimic the products, therefore keep the competitiveness of a specific product. The pharmaceutical industry is much simpler than the banking because the financial institutions have more competition factors to be taken into account.

'Quiet Life' hypothesis (Delis and Tsionas, 2009), on the other hand, argues that banks not exposed to competition because of the specialty of the banking industry. From his hypothesis, if market power prevails, bank managers may pursue objectives other than profit maximization, and they do not have incentives to work hard to sustain their profits level from the previous year. Hence, market power may have an adverse impact on the firm's profit persistence. This is phenomenon is very counterfactual since the behavior of bank managers is not plausible in an aggregate way, but it may explain some kind of specialty of the banking industry. In the traditional mean reversion study, the capital market effects have been considered as a predominant factor in determining the mean-reverting speed. But for the banking industry, this factor becomes ambiguous, because of the banking industry itself dominant the effectiveness of capital market somehow. Sometimes, the max profitability is not the primary concern of banks. Rather than that, the banks may concern more like a capital requirement, risk control etc. All these factors make the banking industry hard to predict in terms of profit persistence. So it is rather difficult to predict the impact of competition on profit persistence.

As banks expand the scope of their activities and identify new growth opportunities across national borders, they tend to gain market power (Arsis, 2009). The increasing market power of banks may improve their abilities to create entry barriers, protect its transparent techniques or strategies, bid for its most profitable customers, or bid up the price of its managerial talent, and consequently increase their abilities to sustain profits from the previous year (Berger et al, 2000). The US banking has experienced significant changes in regulation, technology, and financial engineering techniques. After the financial deregulation on deposit prices and geographic expansion, regulators move their attention to capital adequacy standards, banks are somehow under heavy surveillance after the financial crisis. Before 1981, the US had no specific numerical capital adequacy standards, it was the regulators responsibility to judge how much capital a bank should hold, after 1981, the first explicit numerical capital requirements for those biggest banks were issued, now the Basel agreements have more detailed requirements on each tier of banking assets, obviously, regulative agreements will be the impediments to competition, as well as increase the barrier on entry . However, the managerial assets as loan loss provisions, give the bank managers potential space to manipulate the financial reports.

According to Berger A.N et al(2000), the profit persistence of US banking is sensitive to macroeconomic shocks as well as impediments to competition and informational opacity. This phenomenon can be summarized in two aspects, firstly, the market follows the economic theory that a more competitive environment erodes the abnormal profits thus reduce the consistency of the banks' profit. Secondly, banks are pro-cyclicality which means the profit persistence should be influenced by the macroeconomic factors, presenting upwards(expansion)and downwards(recession) trend

within the period, if the banks can offset the positive and negative effects imposed by the outside macro-factors, it is plausible that managers are using accounting methods to hide its 'true profit'.

Schipper(1989) and Healy and Wahlen(1999) state that managers can use their discretion in financial reporting to overstate the true level of earnings as well as to hide the unwelcomed earnings losses. Mostly, the earnings management aims to mislead the outside investors, a smoothly positive earnings streams are able to consequently influence the stock price. According to Degeorge et al.(1999) and Burgastahler et al. (1997), between 1976 and 1994, the annual earnings of US firms shows a relatively smoothed single-peaked, bell-shaped distribution expected in the area of zero earnings, it suggests that firms managed to report earnings higher to avoid loss when the losses are relatively small. Meanwhile, Burgastahler et al. (1997) also find that the US firms employed accounting discretion to avoid the small decrease in earnings when earnings are positive. Hence maintain the profit persistence target. So the determinants of profit persistence are ambiguous.

Based on the two facts, how the bank mangers strive to maintain the persistence of profit is worth digging. On the hand, for example, they can impose pressure on the regulators thus enhance the barrier of entry and exit, meanwhile, the managers can maintain the information disclosure on a limited level thus increase the informational opacity. On the other hand, in order to offset the cyclical impact from external macroeconomic factors, managers can apply financial reporting techniques such as big bath, window-dressing etc., therefore artificially influence the earnings that reported.

The key two determinants of competition and accounting quality will be measured via Lerner-index and specific accounting quality indicator respectively. Since the existing empirical studies have employed market-level market power proxies such as concentration ratios or Herfindahl indices, while no study, to the author's knowledge, has ever used a bank-level measure of market power to account for the possibility that different banks operating in the same market might have different market power. This paper is able to fill this gap by investigating the impact of bank-level market power on profit persistence. Furthermore, the newly introduced comparison of accounting quality and market power on profit persistence can give a deep inspiration for how the bank managers' behaviors are influences the profit persistence.

Goddard.J, Liu Hong, Molyneux P, Wilson. J O.S(2011)test the competition on banking profitability in a universal scale including 65 countries resulting in a greater size of GDP, a high rate in GDP growth(which implicitly indicates more competitive market) reduce the persistence rapidly. Furthermore, the persistence is positively correlated with the size of entry barriers, proving that high market power help maintains profits persistence. However, empirical evidence on this relationship is not clear. Previous studies examined the relationship between bank market power and profit persistence by measuring market power as bank concentration variables, (for example, Gschwandtner,2005; Yurtoglu, 2004; Kambhampati, 1995; Waring, 1996; Geroski and Jacquemin, 1988; Scherer and Ross, 1990; Berger et al, 2000). The higher the concentration ratio, the higher market power banks may have. The main advantage of using bank-level market power is to allow for heterogeneity. In addition, by employing bank-level data, various different factors that influence bank short-run profit persistence can be examined.

On the other hand, incorporating different attitudes into the accounting system by the managers is necessary. Tomy.R.E(2012) argue that the earning persistence is significantly influenced by the economic cycle since the managers have incentives to apply accounting method to 'change' profits that reported. He finds that firms' earnings are most persistent during an expansion, least persistent during a recession, which implies that mangers have employed accounting method to influence the earnings in order to lead a more persistent profit. However, the firms measured in this paper are all manufacturing and consumer durables industries, which imply that the samples themselves are pro-cyclicality, it is plausible that the impacts from the economic cycle dummies are magnified. It is controversial whether banks are sensitive to those factors. Beatty and Liao(2011) tried to find the recession impact on banking lending willingness associated with the regulatory capital ratios show a profile how the managers tried to revise the assets structure in order to meet the capital requirements when the market is under recession or expansion. This indicates the bank managers have applied accounting techniques to meet targets when the economic cycle is changing.

This paper aims to measure the impact of market power and earnings management on the profit persistence from a bank level perspective. The Partial adjustment model is applied for the main stage analysis. The paper is organized as follows: regarding profit persistence studies so far, section2 discuss the mainstream of literature from both competition and accounting quality perspectives. Section 3 presents the methodology that adopted within each stage of research. Section 4 summarizes data and section 5 states the results we found from estimations. Section 5 concludes the findings.

3.4 Methodology

This paper will use a two-step approach to conduct the analysis. The first step will focus on the persistence of profits, here the partial adjustment model is applied to determine the profit persistence level. Full model will be explained next. Then in the second step, we run regressions on these calculated profit persistence coefficients against a vector of bank-specific determinant factors, including market power, initial profitability, bank size, growth, managerial efficiency (cost to income ratio), diversification, etc., while controlling for macro-economic condition variables, such as real GDP growth, inflation rate, etc.

3.4.1 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 by 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.

Then, developments in data processing, telecommunications, and credit scoring erode the popularity of local banks, leading to the lower willingness of banks to make efforts to maintain restrictive regulations. There is no empirical evidence, in turn, to show that banks' earnings persistence affects the timing of deregulation. Thus, this Act of interstate bank deregulation 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 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 19th 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. To be specific, the IBEEA is an ordinal index that ranges from 0 to 4, 0 means the highest competition while 4 indicates lowest competition.

3.4.2 Bank level competition: Adjusted Lerner index

The Lerner index is a widely employed measure of market power that reveals the degree to which a bank can enhance its marginal price beyond its marginal cost (Jiménez et al., 2013). Higher index values indicate greater market power. Compared with another commonly used measure of bank competition, such as HHI, C5 and the Rosse–Panzar measure, the Lerner index is a bank-level measure of competition, rather than a country-level measure of competition. This advantage is important because banking markets could be local in nature, leading to the inaccuracy of measuring competition at the

national level. We thus adopt the Lerner Index as our alternative measure of bank competition, consistent with recent work on bank competition (Maudos and Fernandez de Guevara, 2007; Berger et al., 2009; Beck et al., 2013; Fungáčová et al., 2014; Ryan et al., 2014). We further adjust the Lerner Index by subtracting it from 1 to indicate the bank level competition.

The Lerner index is computed as the ratio of the difference between the price of output and marginal cost to the price. The price of output refers to the average price of bank production measured by total assets, defined as the ratio of total revenues to total assets. The marginal cost is predicted on the basis of a translog cost function with one output factor (total assets) and three input price factors (labor price, physical capital price, and borrowed funds price). Then, we add bank- and year-fixed effects into our cost function to control of heterogeneity of our sample. Input prices are subject to symmetry and linear homogeneity restrictions. The cost function is specified as:

$$\mathrm{LnTC_{it}} = a_0 + \sum_{j=1}^{2} a_1 ln\mathrm{W_{it}^{j}} + \frac{1}{2}\sum_{j=1}^{2}\sum_{k=1}^{2} a_{jk} lnW_{it}^{j}\, lnW_{it}^{k} + \beta_1 lnTA_{it} + \frac{1}{2}\beta_2 (lnTA_{it})^2 + \sum_{j=1}^{2} \beta_{2j} lnTA_{it}\mathrm{LnW_{it}^{j}} + \gamma_{1t}T + \frac{1}{2}\gamma_{2t}T^2 + \sum_{j=1}^{2}\gamma_{3t} TLn\mathrm{W_{it}^{j}} + \gamma_{4t}\mathrm{TLnTA_{it}} + \varepsilon_i \quad (3)$$

Where LTC represents the logarithm of bank's total costs, Ta_i is the total assets, W_1 represents the price of purchased funds equals interest expenses/ total deposits and short-term funding, W_2 is the

price of labor and physical capital equals non-interest expense/ fixed assets. T is the time trend that captures the technology influence about total cost over the time. From the SFA estimation, a string of coefficients is obtained from equation (3), which are going to be applied in the following formula to estimate the each bank-years marginal cost.

Then the Marginal cost can be estimated from the following formula:

$$MC_{TAit}=(\beta_1 + \beta_2 LnTA_{it}+\sum_{j=1}^{2} \beta_{2j} LnW_{it}^{j}+\gamma_{4t} T)\frac{TCit}{TAit} \quad (4)$$

Finally, the Lerner index can be calculated from equation (2). The Lerner index should range from 0 to 1 when it is 0, it means the Price is equal to marginal cost, and the underlying bank will have no market power. On the contrary, if Lerner equals 1, in other words, the marginal cost is equal to 0, representing the underlying bank gains the greatest market power. After the estimation of marginal costs and the calculation of the price of output, we compute the Lerner index for each bank and thus derive a direct measure of bank competition for the main estimations.

3.4.3 The partial adjustment model

In the partial adjustment model, the banks' current return level (ROA) is a weighted average of its target ROA ratio:

$$ROA_{it}-ROA_{it-1}=\lambda_i\ (ROA^*_{it}-ROA_{it-1})+\varepsilon_{it} \quad (3)$$

Where ROA_{it} is the return on total asset for bank I at year t. the ROA^*_{it} is the target return on total asset for bank I at year t. The λ_i means the proportional adjustment during one year for bank I, in this context, lambda captures how the sample banks are operating away from its expected returns. Alternatively, ROA is predicted to mean revert to a target level which is ROA^* here. Since our main interest is to see how the market competition could influence the profit persistence level, the partial adjustment model gives us a perfect match to capture each bank's persistence level. λ_i here is the adjustment speed for banks towards target rate, we can simply use $(1-\lambda_i)$ to represent our main persistence measure. By applying the dynamic property of the partial adjustment model, we could estimate each bank's profit persistence level at a time-varying frame.

Because the expected ROA is unknown in our model, we follow Healy, et al(2014) to use a cross-section model to estimate each bank's target ROA. Then, The ROA* can be determined by:

$$ROA^*_{it}=\beta_i X_{it}+U_{it}+\varepsilon_{it} \quad (4)$$

Where X_{it-1} is a vector of the bank and macroeconomic characteristics that can influence the ROA. By considering each bank has different idiosyncratic factors that would potentially affect the target ROA. We further control the bank fixed effects. In the model, The U_{it} is the fixed effects to control for unobserved firm

heterogeneity. Substituting eq(4) into eq(3) and rearranging yields, it becomes the following specification:

$$ROA_{it}=\lambda_i \beta_i X_{it}+(1-\lambda_i)ROA_{it-1}+\lambda_i (U_{it})+\varepsilon_{it} \qquad (5)$$

From equation(5), it can be seen that In the partial adjustment model, the bank's current ROA is a weighted average (with the λ_i between 0 and 1) of its expected ROA*, and the ROA of its previous period, as well as the unobservable fixed effects and random shocks. Regarding the adjustment speed, if the λ_i is small, it means the adjustment speed is slow, representing a long time for a bank to return to its target after a shock the bank's ROA. On the other hand, the $(1-\lambda_i)$ term before the lag value of ROA in equation (5) is treated as an inertial fact in the partial adjustment model. In our study, it is the profit persistence level. The smaller the λ_i is, the bigger the $(1-\lambda_i)$ will be, if the bank's speed of adjustment is equal to 0, it means the profit persistence coefficient '$(1-\lambda_i)$will be equal to 1, indicating an unchanged profit level forever. However, if the $(1-\lambda_i)$ equals 0, there is not any relationship between the current and last period profit, hence there is no persistence in profits.

In the partial adjustment model, the expected return(ROA*) is unavailable and it is not necessarily constant over time. Here we follow Fama and French(2006) to build a model to estimate the expected ROA.

The cross-sectional model for estimating ROA* can be summarized as:

$$ROA^*_{it} = \beta_0 + \beta_1 \text{Income Diversification}_{it} + \beta_2 \text{Non-Performing Loans}_{it} + \beta_3 \text{Revenue}_{it} + \beta_4 \text{Capital Ratio}_{it} + \beta_5 \text{Size}_{it} + \beta_6 \text{Management Efficiency}_{it} + \beta_7 \text{Loans}_{it} + \varepsilon_{it} \quad (6)$$

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. We follow Healy et al(2014) to construct our variables, ensuring that the expect ROA measured is suitable for the next stage analysis.

Our estimation of expected ROA differs from the standard partial adjustment model, which is widely used in the capital structure measure of the future target of the capital ratio(Flannery and Rangan 2006). Following the proposal from Healy.P etc(2014), the current explanatory variables are used to measure the expected current ROA. Differs from the measure of target capital ratio, the current period variables should be sufficient to predict the current period expected ROA, as long as the expected ROA does not contain the abnormal profits, the model will hold. We then plug the explanatory variables from equation (6) into equation (5), then the coefficient can be measured within one step. We use Fama-Macbeth regression to analyze the first stage partial adjustment model, while the estimated coefficients are further extracted for determining ROA*.

Under the assumption of partial adjustment model, the adjustments will be conducted if there is a gap between the expected ROA and the actual ROA. Here we use GAP to define the difference between them:

$$GAP_{it-1} = ROA^{*}_{it} - ROA_{it-1} \quad (7)$$

In the basic form of Partial adjustment model, the adjustment speed is fixed for all the banks across time. In another word, the persistence level for banks is firm and time-invariant. In order to test whether our competition measures could affect the profit persistence level, we need to relax the adjustment speed, and allow it to be firm and time variant. we, therefore, modify the partial adjustment model by inserting a vector of characteristics to allow the adjustment speed to become a dynamic indicator:

$$ROA_{it} - ROA_{it-1} = (\lambda_i + \gamma_{it-1} Z) GAP_{it-1} + \varepsilon_{it} \quad (8)$$

Here we assume the lambda is dynamic, it can vary over time and banks. From equation(5), we know that the profit persistence is determined by the adjustment speed(λ_i), and the persistence coefficients is calculated as (1- λ_i), since we assume the partial adjustment speed can be influenced by the potential internal and external factors, similarly, we can obtain a set of different profit persistence coefficients that vary over year and bank.

GAP_{it-1} is calculated as the result of ROA^*_{it}-ROA_{it-1}, Z is a vector of the bank-level and macroeconomic characteristics. γ is a vector of coefficients, it is the interaction term directly tests how the adjustment speed is influenced by the bank's particular variables representing market power(Lerner), deregulation index(IBBEA). The estimated coefficients represent the incremental mean reversion associated with those three particular indicators. The standard errors are clustered both in the firm and year levels to control for serial correlation. To explore which factors are related to the bank-level differences upon the adjustment speed. Firstly, we estimate the expected ROA from equation(6) to get the GAP, which is calculated as ROA^*_{it}-ROA_{it-1}. Secondly, we employ equation(8) to test the impact from the potential determinants on lambda.

In addition to those two primary factors that we interested, several bank-level control variables and macroeconomic determinants are included. All variables are introduced as follows:

Bank **Δ**LLP= change loan loss provisions. According to (Kilic, E., et al,2012), the bank's managers are able to use hedge derivatives and LLP to smooth income. After the SFAS 133, stricter standard on accounting required the value of derivatives to be marked to market, so banks are inclined to reply more on LLP to smooth the profit. The changes in LLP can capture the behavior of banks. It is also an indicator that the profit of persistence can be artificially affected by accounting methods.

Bank size = log(total assets). Previous findings are ambiguous on the relationship between firms size and profit persistence. A big

firm might have reached its present size because of constant superior performance; however, there is also evidence of the inefficiency of large firms (Yurtoglu, 2004; Gschwandtner, 2005).

Bank risks = Z-score. 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. Firms with low profitability are forced to take risks to try to raise their profitability levels and firms with persistent profits seem to be associated with lower risk. Mueller (1986) finds that the profits of companies with persistently above-normal returns seem to vary less over the business cycle than do the profits of the average firm and the profits of persistently below-normal companies exhibit greater than normal pro-cyclical variability.

Bank growth = growth rate of the bank assets. We expect a positive sign on the growth coefficient as suggested by Yurtoglu (2004). The positive relationship between can be explained because high growth banks have the better ability as management. The return is normally upward trending, which makes the bank easier to catch their target and make the return more persistent.

Managerial Efficiency = cost to income ratio. With common wisdom, we expect that more efficient banks tend to have higher profit persistence. This is because higher managerial efficiency indicates the higher capability of banks to maintain their

profitability. Please be noted, the Managerial Efficiency ratio is reversely correlated with the management. Because a higher ratio indicates high cost related to income, therefore, we believe this ratio is negatively correlated with persistence rate.

Diversification = non-interest income divided by total revenue reflects a business expansion opportunity for banks, contributing to an increased ability of banks to sustain their profitability. By diversifying into non-traditional banking businesses, banks have more sources of income, such as a fee or trading income, rather than solely relying on loan business. Hence, banks may have more ability to sustain their profits from the previous year. However, theoretical and empirical evidence on this is not clear and never examined. Therefore, we have no expectation on this relationship. (De Young and Rice, 2004; Stiroh and Rumble, 2006).

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).

The banking market is less likely to be competitive when it is subject to high inflation, as the prices of financial services, such as interest rates, are less informative (Claessens and Laeven, 2004), and will, in turn, exacerbate credit market frictions (Boyd et al, 2001). The banks can whether manager to reduce the GAP between the expected to profit or maintain their current profitability, the impact of inflation can be two sides. A positive relationship is expected between real GDP growth and business opportunities for banks. Similar, GDP per capita is expected to have a positive impact on earnings persistence. The increased business opportunities may help banks to sustain their profits. Therefore an association might be expected between growth in GDP and the persistence of profit. On the other hand, the availability of business opportunities might lead to an intensification of competition, in which case a negative relationship would be expected between GDP growth and the persistence of profit.

3.5 Data

To explore the impact of competition 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 the World Bank database. Finally, our full sample includes 15,546 banks with a total of 226153 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.

In the first stage analysis, the dependent variable lambda and three independent variables are estimated for the second estimation. To be specific, lambda stands for the profit persistence level for each bank. Then, Z-score represents the individual bank's risk, with higher value means greater stability. In terms of banks' market power, the Lerner Index measures each bank's market power ranges from 0 to 1, banks with high Lerner Index are considered to have strong market-power.

3.6 Summary statistics

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 the Call Reports database (Beatty et al., 2002; 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. Adjusted Lerner Index is equal to 0.8, which is 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 the 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%.

Regarding the Lerner Index. The correlation coefficient between Price and the Marginal cost is as high as 0.79, implying a high direct linear relationship between them. According to table1, the Price moves from -23% to 665%, with a mean value, stay around 7.7%. Besides, the Marginal Cost also deviated significantly with a range of (0.005%---333%), however, the average figure of Marginal Cost is close to Price(4.6%). After the basic calculation, the Lerner Index is obtained, with an average value of 0.30. The highest value is 0.60.

In addition, in Appendix 2, we input the summary statistics for different states across all the sample period. In which, N indicates the total observation for each state, Persistence of ROA is estimated using the first stage estimation(equation 6), and the detail results will be discussed in the very following section. The persistence level here is static and not dynamic, it means the statistics here illustrate the overall persistence rate across the sample period. ROA* is target ROA that also estimated via first stage regression. GAP is the estimated using ROA^*_{it}-ROA_{it-1}. And finally, the Branching Restrictions is the IBBEA index that indicates the state level competition intensity. Take New York as an example, the persistence level is around 56.31 %, comparing to the overall average of 54.67%. New York banks have a slightly higher

persistence degree. Meanwhile, the ROA is 0.87% which is lower than the all-state average of 0.97%. Target ROA has been over 1%, showing that most banks in New York have not met their expectation of profitability. Therefore we got a positive GAP around 0.1%. The states with the highest persistence ratio are Vermont (72.9%) and with the lowest ratio is Dis of Columbia(26.2%). Overall, the ROA for each state is close to 1%, the standard deviation is mighty small, and the target ROA is as expected slightly higher than the realized ROA, showing that bank does set their profitability target progressive based on the realized ones. Most of the statistics are estimates that collected from first stage regression, therefore in the next stage, the first stage analysis will be explained and discussed.

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
Adjusted Lerner Index	77929	0.793	0.085	0.557	0.962
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. An appendix presents the definitions of variables.

	Branching Restrictions Index	Adjusted Lerner Index	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											
Adjusted Lerner Index	0.2671*	1										
Z-score	0.0267*	-0.1880*	1									
Capital ratio	0.1970*	-0.2949*	0.3399*	1								
Loan to total asset	0.2542*	-0.1127*	-0.2191*	-0.1983*	1							
Size	0.3104*	-0.2629*	-0.0026	-0.1127*	0.3062*	1						
Total Assets Growth	0.0390*	-0.0134*	-0.1349*	-0.0899*	0.5593*	0.1602*	1					
Managerial efficiency	-0.2891*	0.2225*	-0.1934*	-0.2947*	-0.1186*	-0.2862*	-0.0205*	1				
Income diversification	0.1889*	-0.1233*	-0.1554*	0.0560*	0.0389*	0.2982*	0.0499*	-0.1032*	1			
Inflation	-0.4282*	0.2250*	-0.0239*	-0.1188*	-0.0893*	-0.1314*	-0.0162*	0.2305*	-0.1297*	1		
GDP growth	-0.1653*	-0.0259*	0.0101*	-0.0389*	-0.0445*	-0.1141*	0.0231*	-0.0117*	-0.0621*	-0.0031	1	
GDP per capita	0.3786*	-0.3077*	0.0115*	0.2171*	0.2440*	0.3250*	0.0155*	-0.3318*	0.2311*	-0.3904*	-0.3128*	1

3.7 First stage estimation

We estimate the expect ROA via equation (6), and the $GAP_{it-1}(ROA^*_{it}-ROA_{it-1})$ is obtained. Table 3 shows the results of the first stage regression results. In column (1), We follow Flannery (2006), Healy (2014) to use Fame-Macbeth regression to estimate ROA. Additionally, We use OLS estimation to test the first stage regression. In order to control for the bank level specific unobservable characteristics, we control for bank fixed effects and firm fixed effects using two different strategies. Finally, The fitted value of the regression has been obtained. All the coefficients of ROA are positive and significant at 1% level, showing all the banks have a positive static profit persistent level. When using the Fama-Macbeth strategy, the persistent degree is highest. On average, banks can maintain 51% of the profit. From column (2) and (3), the average profit persistent level is only 39%. Results from controls variables show that most bank individual factors have a significant impact on ROA: Loans, Diversification, Managerial Efficiency, Total assets etc. For example, Revenue shows significant positive coefficient on ROA, the impact on average is statistical and economically significant at 1% level. Loans have a negative impact on ROA, banks with loan business focused normally have lack of profitability. Interestingly, greater size will lead to lower profitability. On the other hand, we found that diversification is beneficial to bank profitability. Also, banks with higher Managerial Efficiency(lower cost to income ratio) would result in higher ROA. Finally, if a bank grows fast, the ROA will together show a growth trend. Comparing to the other two columns, the sign of coefficients before variables are the same, while the magnitudes are slightly different. Overall, all these 3 columns show similar outcomes. Then I only use the results from Fama-Macbeth to gauge the Target ROA. Please note, we also

tried used regression results that applied in column 2 and 3 to get the fitted value of ROA to make a comparison, the estimated ROA is very similar, and therefore we mainly use Fama-Macbeth results into our subsequent results. The estimates are presented in summary statistics.

The first row of table 1 shows the basic summary statistics of Target ROA, Comparing Target ROA(the estimated expected ROA) to ROA(reported ROA), Target ROA has a slightly higher mean value than ROA(1.04% vs 0.97%). The Target ROA has a value between -2.8% to 2.4%, while ROA has a wider range from -4.4% to 2.9%, this might be due to the random shocks. Thus, the ROA has a greater standard deviation than Target ROA (0.72% vs 0.53%). Based on the comparison between ROA* and realized ROA, we believe our estimation is accurate and efficient. Because (1) banks normally will set a higher target then the actually ROA, and the target is slightly higher than the realized one(mean: 1.04% vs 0.97%) shows that the target is not a random set. (2) the realized ROA has a wider bandwidth than the expected ROA since, in reality, performance can be affected by external random shocks, therefore it is reasonable that target ROA has a smaller range of values. (3) According to the profit persistence theory, the bank is willing to smooth ROA to keep a lower volatility on ROA, which in results show a lower standard deviation of ROA. In an ideal situation, the abnormal return should be last as long as possible, therefore we observe that the target ROA has a lower standard deviation compared to the realized ROA.

After ROA and target ROA comparison, we move forward to the GAP and DROA, In detail, $DROA_{it}$ is calculated as ROA_{it}-ROA_{it-1}, and the GAP_{it-1} is calculated as Target ROA_{it}-$ROA_{it-1.}$ From table 4, GAP ranges from -2.9% to 4.5%, on the other hand, DROA has a value between -7.4% and 7.4%. Interestingly, DROA has a smaller standard deviation than GAP. At least half of DROA is below 0, however, less than 50% of the GAP has a negative value. Furthermore, there is a significant constraint magnitude of

the mean value of DROA compared to GAP (0.03% vs 0.09%). This might be evidence that banks are smoothing their profits. However, the situation can be ambiguous since banks can be either objective to the target(TARGET ROA) or to the profit persistence. If the banks are operating worse than expectations, they should adjust fast to reach the target, conversely, if the banks are operating better than expectations, they might strive to smooth their profits.

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. ROAit =λiβXit-1 + (1- λi) ROAit-1+ εit, (1- λi) is the level of persistence of ROA. In column (1), We We follow Flannery (2006), Healy (2014) to use Fame-Macbeth regression to estimate ROA. Additionally, two additional analysis have been incorporated. We use OLS estimation to test the first stage regression. In order to control for the bank level specific unobservable characteristics, we controls for bank fixed effects and firm fixed effects using two different strategies. 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		ROAt+1	
	Fama-Mecbeth	OLS	OLS
ROA	0.512***	0.392***	0.380***
	(22.06)	(64.21)	(61.69)
Revenue	0.001*	0.000***	0
	(1.74)	(3.99)	(0.09)
Leverage	0	0.008***	0.005***
	(0.37)	(10.00)	(5.69)
Loans	-0.000***	-0.001***	-0.001***
	(-4.54)	(-33.47)	(-24.84)
Total Assets	-0.001**	-0.001***	-0.000*
	(-2.21)	(-10.21)	(-1.95)
Diversification	0.000***	0.000***	0.000***
	(3.42)	(12.17)	(11.4)
Managerial Efficiency	-0.001***	-0.002***	-0.001***
	(-13.97)	(-42.56)	(-37.22)
Growth Rate of Total Assets	0.000***	0.001***	0.000***
	(6.11)	(29.47)	(21.62)
Constant	-0.001**	0.000	0.005***
	(-2.02)	(0.59)	(11.26)
Time Fixed Effects	No	No	Yes
Bank Fixed Effects	No	Yes	Yes
Max VIF		4.58	4.32
N	77929	77929	77929
adj. R-sq		0.431	0.409

Following the previous conjecture, we further investigate the adjustment speed in various situations: 1) If the GAP<0 (GAP_{it-1}=ROA^*_{it}-ROA_{it-1}), the expected ROA is lower than the real ROA, indicating the banks are outperforming, when the banks are performing better than the expected

outcomes, they should slow the adjustment speed hence keep a high persistent profit preventing it revert to the mean level. We treat this situation as superior performance, in this context, the bank should have a strong incentive to maintain current profitability whether apply for accounting method or benefits from its current market power.

2)In contrast, if the GAP>0, the banks are underperforming, the banks should accelerate adjustment speed to catch the expect ROA. Assuming the expect ROA is the benchmark of the bank, then if the managers are pursuing the benchmark performance as their first target, they should strive to narrow the gap when the real performance is below the benchmark. Based on those conjectures, here we propose the first two hypotheses:

a) if the ROA is bigger than the expect ROA(GAP<0), the banks are outperforming, then banks should maintain a high persistence of profit.

b), if the ROA is smaller than the expect ROA(GAP>0), the banks are underperforming, then banks should accelerate the adjustment speed to narrow the GAP.

Additionally, within the hypotheses, the persistence coefficient from (1) should higher than that from (2). Since the motivation of bank managers have changed. We apply the OLS regression on equation (5) to estimate the profit persistence coefficients. In this specification, coefficients for ROA are the persistence coefficients.

Table 4

First Stage Partial Adjustment Model: GAP>0 vs GAP<0

This table reports the results of the first stage partial adjustment model assuming a static earnings adjustment speed. ROAit =λiβiXit-1 + (1- λi) ROAit-1+ εit, (1- λi) is the level of persistence of ROA. In column (1),We u se OLS estimation to test the first stage regression. In order to control for the bank level specific unobservable characteristics, we controls for bank fixed effects and firm fixed effects using two different strategies. 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.

Dep: ROA_{t+1}	GAP<0		GAP>0	
	Coef.	t	Coef.	t
ROA	0.770	25.55	0.107	7.93
Revenue	0.005	9.09	0.005	7.71
Leverage	-0.009	-3.91	-0.006	-2.19
Loans	0.004	1.32	0.029	7.01
Total Assets	-0.005	-8.95	-0.005	-7.57
Growth Rate of Total Assets	-0.003	-9.62	-0.004	-5.33
Diversification	-0.001	-1.27	-0.007	-3.53
Managerial Efficiency	-0.032	-15.60	-0.040	-20.17
Constant	0.050	21.58	0.055	18.70
Time Fixed Effects	Yes		Yes	
Bank Fixed Effects	Yes		Yes	
Max VIF	4.33		3.98	
N	39394		39021	
adj. R-sq	0.856		0.751	

Table 4 describes the regression results for testing the hypothesis regarding different GAP values. Please note, all the results are only based on first stage regression. The first column is for the subgroup that banks are outperforming, indicating the ROA has surpassed the expected ROA (GAP<0). The profit persistence coefficient is around 0.77. Further, there is a significant positive relationship between ROA and SALE, resulting 0.48% increase in ROA if SALE rises 1%. On the other hand, total liabilities, total loans, total assets, LLP, managerial efficiency show the negative significant impact on ROA. For example, a one percent increase in total liabilities, total

loans leads to a decrease in ROA by 0.9% and 0.1% respectively. These results are consistent with our hypothesis because the banks expect to save more abnormal return in terms of significant outperformance. Negative GAP shows that banks' target ROA is lower than obvious ROA. 77% persistence level is significantly higher than 10.7%, indicating when banks outperforming, and they are more willing to slow down the adjustment speed. On the other hand, when we observe ROA is from the underperformance side, the persistent level is significantly lower. This result again confirms the hypothesis if banks can beat their expected ROA, they will change swiftly, therefore showing that banks are less likely to maintain their profit.

Secondly, the column with GAP>0 shows the regression results where banks have ROA lower than the expect ROA. Differ to the first column, the Fixed asset has significant impact on the ROA, one percent increase in a fixed asset can level up the ROA by 2.8%, the influence is much stronger than other variables. However, when the GAP<0, there is no statistical significance on fixed assets in this context. Comparing to the persistence coefficient in the first column, 0.10 is smaller than 0.47. It verifies our hypotheses that banks endeavor to maintain the profit persistence when they are outperforming. The sample size is similar to the first column (39021vs 39394), the average R-square is slightly smaller (75% vs 85%). Additionally, both total liabilities and total loans become less significant, while diversification becomes statistical significant showing 0.7% negative impact on ROA if rises 1%.

Most importantly, when banks are underperforming (GAP>0), the profit persistence level is considerable small, representing just 0.10. It means the adjustment speed is 0.9(1-0.1), it is extraordinary fast and indicating the banks constantly narrow the gap between ROA and expected ROA. In comparison with the first column, where profit persistence coefficient stays

around 0.77, which is nearly 5 times of 0.1, in return, the adjustment speed is much slower (0.23 vs 0.9). Therefore, we can conclude that when the ROA is below the expect ROA, banks make more efforts to close gap rather than smooth earnings. Thus, the choice depends on the market. However, if the ROA is higher than the expect ROA, banks shift their target to maintain the earnings rather than match the long-term expect ROA.

The first stage regression shows that bank reacts actively to the target return. When banks are outperforming, they prone to actively manage their return to maintain the profit to be persistent. On the contrary, when banks are underperforming, they tend to slow down the profit persistent level, resulting in a lower profit persistent level. However, this stage only evaluates the static overall bank profit persistent level. In the following stage, I will assume the profit persistent rate varies over time and bank specific.

The first stage analysis has confirmed that the banks keep profit persistence at a certain level. On the economic theory, basic banks are prone to keep abnormal return, showing a high persistent profit rate. On average, we found that banks have a 50% profit persistence rate. After gauging the Target ROA using the Fama-Macbeth regression model, we found that Target ROA has a higher mean value than ROA(1.04% vs 0.97%). The Target ROA has a min and max value between -2.8% to 2.4%, while ROA has a wider range from -4.4% to 2.9% and the ROA has a greater standard deviation than Target ROA (0.72% vs 0.53%). These results suit with our expectation well because we believe banks would like to set a higher target while keeping the profitability as stable as possible. Secondly, via the hypothesis, we subsequently use our estimated target ROA to retrospectively test how banks react to positive and negative GAP. The results are reasonably rationale. If the GAP is positive, which means the realized ROA is lower than the target ROA, Banks are more willing to

accelerate the adjustment speed. It shows banks are unwilling to keep the persistent profit if the target is not achieved. Following similar logic, we found that if the realized ROA is higher than the target ROA, Banks are more willing to reduce the adjustment speed. In this context, profit persistence is far more welcome because banks are keen to keep the abnormal return.

3.8 Second stage estimation

In the second stage, we apply the model stated as equation(8) to estimate the impact from market power on adjustment coefficients. Before the interaction with GAP, we further standardize all the variables for better interpretation.

The main hypotheses:

1), Competition reduces profit persistence rate.

To test the main hypotheses, we use the following modified model to estimate the impact of Competition (IBBEA index):

$$ROA_{it}\text{-}ROA_{it\text{-}1}=(\lambda_i+\gamma_{it\text{-}1}Z)GAP_{it\text{-}1}+\varepsilon_{it} \quad (8)$$

Where: $\lambda_i = (\lambda_i + \gamma_{it-1} Z)$

Here we assume the lambda is dynamic, it can vary over time and banks. From equation(5), we know that the profit persistence is determined by the adjustment speed(λ_i), and the persistence coefficients is calculated as (1-λ_i), since we assume the partial adjustment speed can be influenced by the potential internal and external factors, similarly, we can obtain a set of different profit persistence coefficients that vary over year and bank. Again, a high adjustment speed indicates a low degree of profit persistence.

GAP_{it-1} is calculated as the result of ROA^*_{it}-ROA_{it-1}, Z is a vector of the bank-level and macroeconomic characteristics. γ is a vector of coefficients, it is the interaction term directly tests how the adjustment speed is influenced by the bank's particular variables representing market power(Lerner) or IBBEA, is our main interest. The estimated coefficients represent the incremental mean reversion associated with those three particular indicators.

Table 5 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 higher competition, a negative regression coefficient of Branching Restrictions 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, one inter-quartile increase of Branching Restriction Index

leads to an increase in earnings adjustment speed by 0.094%. This result is in accordance with economic competition theory that competition directly impacts earnings persistence through eroding away economic excessive returns and losses in the long run (Stigler, 1961).

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 adjusted Lerner index has a significantly positive impact on earnings adjustment speed. One standard deviation increase of bank competition(adjusted Lerner Index), leads to the increase of adjustment speed by 1.4% (0.170*0.085). This result 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).

Z-score does not have a substantial impact on profit persistence. Column (3) shows one standard deviation increase in Z-score leads to a decrease of 1.12% in profit persistence. It shows that regression results are safer banks can preserve more consistent earning stream. Similar results have been found

from column 2. We also find that high managerial efficiency is beneficial to profit persistence. For instance, Efficiency helps smooth earnings in two ways, first, intensive management in accounting reports subjects in the financial reports enable managers to manipulate earnings, hence smooth earnings. Second, active management in noninterest income reduce the overall risk of operations, unexpected losses and earnings might offset internal therefore the profits can be more persistence. In terms of assets structure, we find banks with more loans issued have a lower profit persistence level. In addition, larger banks have more persistent earnings, possibly because they usually have more market power. In the regression we consistently control time and bank fixed effects, the R-square is around 70% showing that our regression model has considerable explanatory power.

Table 5
Determinants of Bank Profit Adjustment Speed: a ten-year window of IBBEA

We assume λi 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: (ROAit - ROAit-1 = (λi + γit-1Z) GAPit-1 + ɛit ,G APit-1 = ROA*it-1 - ROAit-1) by the ten-year period in which no more than five years are distant from the IBBEA introduction year. Column(1) use Brthe anching Restrictions Index to measure competition and Column (2) use Lerner Index to measure competition. *, **, *** denote the 10%, 5% and 1% significance levels, respectively. Appendix presents the definitions of variables.

Branching Restrictions	-0.071***	
	(-18.33)	
Lerner Index		-0.349***
		(-6.82)
Z-score	-0.058***	-0.056***
	(-12.25)	(-12.08)
Capital Ratio	-0.201***	-0.178***
	(-3.27)	(-2.95)
Loan to Total Asset	0.049***	0.057***
	(11.66)	(12.64)
Size	-0.062***	-0.073***
	(-11.57)	(-13.51)
Total Assets Growth Rate	-0.011***	-0.014***
	(-3.25)	(-3.87)
Managerial Efficiency	0.025***	-0.326***
	(7.61)	(-6.27)
Income Diversification	0.000	0.010***
	(0.03)	(2.73)
GDP Growth Rate	-0.075***	-0.062***
	(-25.29)	(-21.25)
Inflation	-0.056***	-0.071***
	(-16.63)	(-21.95)
GDP Per Capita	-0.354***	-0.261***
	(-43.49)	(-45.37)
Constant	0.823***	0.672***
	(88.14)	(184.43)
Time Fixed Effects	Yes	Yes
Bank Fixed Effects	Yes	Yes
Max VIF	4.67	4.41
N	77929	77929
adj. R-sq	0.709	0.707

3.9 The placebo test

In the placebo test part, we conducted several robust tests. Table 6 reports the regression results. In column(1), we insert a dummy called Before(4,1) into the baseline regression. The IBBEA index is still negative and significant. The Before(4,1) is a dummy variable that equals one before the deregulation for each state, otherwise 0. The reason is to control for any proactive movements by banks. One possibility is that the banks can potentially foresee the deregulation. If this phenomenon is possible, then the setting of IBBEA will be affected. After controlling Before(4,1), we exclude the potential confounding effect. And the coefficient is still negative significant. In the second column(2), we falsified to build up an index, which Branching Restrictions Index variable is the actual index for one year prior to the actual deregulation.

We found that the falsified index is insignificant, showing that the negative sign of the coefficient is not a random result by IBBEA index. In the third column, we further interact IBBEA with large bank dummy. The underlying reason is that we believe that large banks may be less likely to be affected by competition, because big banks normally have significant local market power, and they have more power to preserve abnormal returns. Results fit our expectation, we found that IBBEA*Large Bank dummy has a negative significant coefficient, the coefficient is 0.139 which is greater than the one for those small banks(0.068), it shows that the large banks are more capable to preserve the abnormal results, and the persistence level is higher. In the last column, we use full data sample rather than the 10-year window. The result is still negative and significant. Furthermore, in all the columns, we have inserted a controlled variable called early deregulation index. The detailed early deregulation index definition is presented in the appendix. In brief, 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). By including the early deregulation index, we controlled the impact of early intrastate deregulation. Finally, in the placebo tests, all the tests have been successfully passed.

Table 6
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} - $ROA_{it-1} = (\lambda_i + \gamma_{it-1}Z)GAP_{it-1} + \varepsilon_{it}$, $GAP_{it-1} = ROA^*_{it-1} - ROA_{it-1}$). Column (1) shows the results controlling for the four years prior to the deregulation year. Before (4, 1) is a dummy variable equal to one for yea ar -4 to -1 relative to the deregulation year. Columns (2) display the results under which Branching Restrictions 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. *t*-statistics are in parentheses. *, **, *** denote the 10%, 5% and 1% significance levels, respectively. Appendix presents the definitions of variables.

	(1)	(2)	(3)	(4)
Branching Restrictions Index	-0.094***	-0.007		-0.071***
	(22.64)	(-1.36)		(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)	
Early Deregulation Index	-0.015**	-0.019**	-0.011**	-0.017**
	(-2.04)	(-2.31)	(-1.98)	(-2.21)
Z-score	-0.078***	-0.032***	-0.066	-0.058***
	(-15.98)	(-5.68)	(-1.51)	(-12.25)
Leverage Ratio	-0.002	0.017***	0.002***	-0.201***
	(-0.36)	(3.79)	(3.26)	(-3.27)
Loan to Total Asset	0.058***	0.000	0.066	0.049***
	(13.33)	(0.02)	(1.57)	(11.66)
Size	-0.067***	-0.076***	-0.054***	-0.062***
	(-13.03)	(-8.93)	(-11.68)	(-11.57)
Total Assets Growth	-0.011***	0.004	-0.019	-0.011***
	(-3.27)	(1.14)	(1.14)	(-3.25)
Managerial Efficiency	0.027***	0.038***	0.026***	0.025***
	(7.99)	(9.60)	(7.84)	(7.61)
Income Diversification	-0.001	-0.007*	-0.000	0.000
	(-0.21)	(-1.90)	(-0.01)	(0.03)
GDP Growth	-0.055***	0.001	-0.033	-0.075***
	(-17.66)	(0.29)	(-1.58)	(-25.29)
Inflation	-0.088***	-0.019***	-0.016	-0.056***
	(-25.17)	(-3.51)	(-1.62)	(-16.63)
GDP Per Capita	-0.230***	-0.121***	-0.008	-0.354***
	(-46.70)	(-37.27)	(-0.56)	(-43.49)
Constant	0.630***	0.857***	0.095***	0.823***
	(185.49)	(85.79)	(9.76)	(88.14)
Max VIF	5.43	4.97	5.44	5.99
Time Fixed Effects	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes
N	226153	77929	77929	226153
adj. R-sq	0.6931	0.8083	0.7099	0.709

3.10 The Mechanism

The previous sections have established causality between competition and the speed of bank earnings adjustments. 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 a higher level of ability to sustain their previous years' earnings.

Specifically, we expect that banks with the larger size, a higher level of diversification, more efficient in management and lower level of default risk have a higher level of ability to sustain earnings. The large size of banks usually indicates banks' comprehensive strength, which may help banks increase their earnings persistence. According to De Young and Rice (2004) and Stiroh and Rumble (2006), product diversification reflects banks' business expansion, which increases banks' attractiveness to customers. Further, income diversification effectively reduces earnings volatility caused by a particular external event. Banks' safety and soundness could reduce banks' default risk caused by a particular external shock. Efficient bank management not only reduces operating 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, 2009; Shehzad et al., 2010).

In the empirical analysis, we introduce four variables into our regression model that explains the variation in earnings adjustment speed, namely *size*, *diversification*, *managerial efficiency*, and *Z-score,* and their interaction terms with our competition measure *Adjusted Lerner Index* in the model. We use firm-level competition measure, *Adjusted Lerner Index*, rather than state-level competition measure, *IBBEA Index*, in accordance with the firm-level measures of bank size, diversification, managerial efficiency and Z-score. It is worth noting that the Adjusted Lerner index is calculated using 1- Lerner index. The reason behind the adjusted Lerner index is that we want higher index value indicates a higher level of competition, which will make readers easier to compare the results with the IBBEA index.

Table 7 presents the regression results. The relations between the four interaction terms and earnings adjustment speed are all negative and significant. These findings support our hypothesis and indicate that the relation between competition and the speed of bank earnings adjustments is less strong for banks with the larger size, a higher level of diversification, more efficient in management and lower level of default risk.

Table 7
Determinants of Bank Profit Adjustment Speed: Mechanism

This table investigates the potential mechanism between earnings adjustment speed with bank competition. The Branching Restrictions measure is a state level competition measure. Followed by Rice and Strahan(2010), Branching Restrictions is an index that captures the level of interstate branching restrictions for each state. The Lerner index is a bank-level indicator of bank competition, by adopting the stochastic frontier analysis approach, it is calculated as the difference between price and marginal cost as a percentage of prices, the detailed methodology of Lerner measure is described in the appendix. Earnings Management is calculated by applying the discretionary loan loss provision model (Liu and Ryan, 2006). The absolute value of the error term is regarded as the discretionary loan loss provision (DLLP) and the degree of Earnings Management. All other variables are defined in the appendix. *, **, *** represents the significance level of 10%, 5% and 1% respectively.

	(1)	(2)	(3)	(4)
Adjusted Lerner Index*Income Diversification	0.006*			
	(1.73)			
Adjusted Lerner Index*Size		-0.092***		
		(-3.63)		
Adjusted Lerner Index*Managerial Efficiency		2.198***		
			(5.66)	
Adjusted Lerner Index*Z-score				-0.009***
				(-4.53)
Adjusted Lerner Index	0.342***	0.256***	0.327***	0.388***
	(6.68)	(4.27)	(5.96)	(7.43)
Z-score	-0.063***	-0.064***	-0.068***	-0.101***
	(-12.85)	(-13.16)	(-14.38)	(-10.13)
Capital Ratio	-0.003	-0.003	-0.004	-0.003
	(-0.44)	(-0.44)	(-0.63)	(-0.53)
Loan to Total Asset	0.071***	0.071***	0.057***	0.072***
	(12.49)	(12.61)	(9.64)	(12.67)
Size	-0.071***	-0.046***	-0.076***	-0.072***
	(-12.87)	(-4.83)	(-13.63)	(-13.02)
Total Assets Growth Rate	-0.020***	-0.020***	-0.014***	-0.020***
	(-4.94)	(-4.94)	(-3.27)	(-4.97)
Managerial Efficiency	0.310***	0.325***	0.318***	0.355***
	(5.98)	(6.19)	(5.79)	(6.75)
Income Diversification	-0.001	0.010***	0.012***	0.010***
	(-0.20)	(3.08)	(3.52)	(2.96)
GDP Growth Rate	-0.070***	-0.070***	-0.069***	-0.070***
	(-21.35)	(-21.40)	(-21.64)	(-21.47)
Inflation	-0.077***	-0.076***	-0.075***	-0.078***
	(-22.56)	(-22.23)	(-22.40)	(-22.91)
GDP Per Capita	-0.274***	-0.277***	-0.269***	-0.276***
	(-39.06)	(-39.38)	(-37.55)	(-39.42)
Constant	0.666***	0.902***	0.710***	0.627***
	(72.55)	(14.51)	(108.38)	(48.51)
Time Fixed Effects	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes
Max VIF	5.55	4.87	4.41	4.33
N	226153	226153	226153	226153
adj. R-sq	0.7072	0.7074	0.7089	0.7073

3.10.1 How competition affect earnings persistence in different profitability

Then, we estimate the coefficients in terms of different profitability of banks. Tier 1-3 represents banks whose profitability is below 25%, 25%-75% and above 75% of all samples respectively. We found that among all the other banks, profitability is not a key issue that influences the relationship between earnings persistence and competition. Because all the coefficients are negative and significant before branching index, showing that the competition consistently exerts a negative impact on profit persistence level. The only difference is the magnitude of coefficients. A number of prior studies find the evidence that numerous companies report small positive abnormal earnings while rare companies report small negative abnormal earnings (Hayn, 1995; Burgstahler & Dichev, 1997), indicating that the small positive abnormal earnings are the ideal profitability for managers.

Apart from Branching restriction index, we also use Lerner index to check whether the results are consistent, the results are available in the appendix, we found similar results that market power has a significant impact on preserving profit persistence among all tiers of profits. This result once again verifies our main hypothesis that competition is the driver of earnings persistence.

Table 8

Determinants of Bank Profit Adjustment Speed And Profitability

This table presents the OLS results for Partial Adjustment Model (ROAit - ROAit-1 = (λi + γit-1Z) GAPit + εit ,GAPit = ROA*it-1 - ROAit-1) by applying Branching Restriction index. We assume that λi to be dynamic, so it varies among banks and over time. Z is a vector of all independent variables. We classify sample into 4 subsamples in terms of profitability to see the impact from earnings management and competition on profit persistence. Followed by Rice and Strahan(2010), Branching Restrictions is an index that captures the level of interstate branching restrictions, which is an alternative indicator of competition. Earnings Management is calculated by applying the discretionary loan loss provision model (Liu and Ryan, 2006). The absolute value of the error term is regarded as the discretionary loan loss provision (DLLP) and the degree of Earnings Management. All other variables are defined in the appendix. *, **, *** represents the significance level of 10%, 5% and 1% respectively.

	Profitability(ROA)			
	below 25%	25%-50%	50%-75%	above 75%
Branching Restrictions	-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)
Leverage Ratio	-0.004	-0.027**	-0.025***	0.001
	(-0.68)	(-2.42)	(-3.08)	(0.2)
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 Rate	-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 Rate	-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
Max VIF	4.13	5.42	5.87	4.32
N	46038	56833	61482	61744
adj. R-sq	0.760	0.745	0.743	0.626

3.10.2 Competition on profit persistence: Positive and Negative Gaps

We further investigate the adjustment speed in various situations. 1) When banks are underperforming (GAP > 0), the banks prone to accelerate adjustment speed to close the gap. As expected, the results in Table 9 show that Branching index has a significant negative impact on adjustment speed (-0.057). This outcome is compliant with the opinion that when firms experience negative surprises in earnings, the stock prices of the firms will suffer a decrease, which is a precaution from investors asking for firms to reach the market average returns shortly (Skinner & Sloan, 2001; Kinney et al., 2002).

2) Similarly, when banks are performing better than their expectation (GAP < 0), Competition still remains a significant factor that erode the abnormal returns. Whenever the banks have negative or positive unexpected returns. This signal suggests the persistently positive relationship between market power and profit persistence, complying with the economic competition theory (Stigler, 1961). In addition, we find that the impact of market power on profit persistence for banks with positive unexpected returns (GAP < 0) is smaller than those with negative unexpected returns (GAP > 0) (-0.057 vs -0.042). It indicates that banks under less competitive market can preserve the excessive return longer. This outcome sticks to the empirical results of Cefis (2003) that firms with continuous profits above the average economic rate show a large probability to remain their profits above the average rate. we then replace our Branching restriction index with Lerner index. We continue to find consistent results that market power has a significant impact on preserving profit persistence among disregard of positive or negative ROA Gaps. This result once again verifies our main hypothesis that competition is the driver of earnings persistence.

Altogether, these results show that the effect of the market power of individual banks is decided by the whole banks in the market rather than the managers of individual banks. Hence, the market power is objective and its effect on the profit persistence is constant regardless of different economic situations, complying with the economic competition theory (Stigler, 1961).

Table 9
Determinants of Bank Profit Adjustment Speed Under Different Scenarios

This table presents the OLS results for Partial Adjustment Model (ROAit - ROAit-1 = (λi + γit-1Z) GAPit + ɑit ,G APit = ROA*it-1 - ROAit-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 λi to be dynamic, so it varies among banks and over time. Z is a vector of all independent variables. Followed by Rice and Strahan(2010), Branching Restrictions is an index that captures the level of interstate branching restrictions, which is an alternative indicator of competition. All other variables are defined in the appendix. *, **, *** represents the significance level of 10%, 5% and 1% respectively.

	GAP>0	GAP<0
Branching Restrictions	-0.057***	-0.042***
	(-11.09)	(-7.11)
Z-score	-0.004	-0.116***
	(-0.68)	(-12.46)
Leverage Ratio	-0.005	0.007
	(-1.13)	(1.27)
Loan to Total Asset	0.062***	-0.003
	(9.13)	(-0.39)
Size	-0.051***	-0.074***
	(-5.34)	(-9.65)
Total Assets Growth Rate	-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 Rate	-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
Max VIF	4.55	5.31
N	128584	97513
adj. R-sq	0.659	0.613

3.10.3 The impact of competition on Available for Sale Securities (AFS securities)

After the announcement of Accounting Standard Codification (ASC) 320, it is increasingly popular that banks use available for sale securities to manage earnings due to the large size of this item and lower cost of managing this item (Nissim and Penman, 2007; Laux and Leuz, 2010). ASC 320 specifies that AFS securities be measured at fair value in the statement of financial position, with changes in fair value recognized in other comprehensive income. Following Barth et al. (2015) and Dong and Zhang (2015), we also use realized gains and losses of AFS securities model to measure bank earnings management.

$$\text{AFS Securities} = \beta_1 \text{Net Income}_{it} + \beta_2 \text{Competition}_{it} + \beta_3 \text{Net Income x Competition}_{it} + \text{Z-score}_{it} + \text{Capital Ratio}_{it} + \text{Loan to Total Asset}_{it} + \text{Size}_{it} + \text{Total Assets Growth Rate}_{it} + \text{Managerial Efficiency}_{it} + \text{Income Diversification}_{it} + \text{GDP Growth Rate}_{it} + \text{Inflation}_{it} + \text{GDP Per Capita}_{it} + \varepsilon$$

where AFS securities is arealized gains and losses on AFS securities and Net Income is net income before taxes and gains and losses on AFS securities, both deflated by beginning-of- quarter total assets. Competition is IBBEA Index or Adjusted Lerner Index. If banks employ AFS securities to maintain persistent earnings, the coefficient on Net Income β_1, should be negative and if banks under more competition realize more gains from AFS securities, the coefficient on Competition, β_2, is positive. Our interested coefficient is β_3, the interaction variable, Net Income X Competition. 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.

Prior research documents that banks tend to use the item of AFS securities to smooth earnings (Barth et al., 2015; Dong and Zhang, 2015). AFS securities are the largest category of banks' securities and contain a sizable proportion of bank assets (Nissim and Penman, 2007; Laux and Leuz, 2010). Accounting Standards Codification (ASC) Topic 320 specifies that AFS securities be measured at 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. Realizing gains and losses on AFS securities is an attractive way to smooth earnings due to its lower cost compared with accruals or real activity manipulation (Barth et al., 2015).

Therefore, it is plausible that the impact of bank competition on earnings persistence could be indirect through the channel of earnings management by manipulating AFS securities, rather than accruals. In order to eliminate this possibility that could bias our main results, we examine the impact of bank competition on realized gains and losses of AFS securities in Table 10. In both columns of Table 10, net income before tax is negatively related to realized gains and losses of AFS securities. This finding suggests that banks use AFS securities to persist earnings, consistent with Barth et al. (2015). Column (1) of Table 10 shows that the coefficients of Branching Restrictions Index and the interaction term of Branching Restrictions Index and Net Income are insignificant. Similarly, Column (2) of Table 10 shows that the coefficients of the Adjusted Lerner Index and the interaction term of Adjusted Lerner Index and Net Income are negative and significant. It suggests that when a bank has greater market power, the bank is more likely to use AFS to smooth earnings. However, the negative coefficient on the Lerner index shows that banks with more market power will have lower AFS. These results indicate that bank competition does not have a significant impact on realized gains and losses of AFS securities. Thus, we

rule out this channel of earnings management and further confirm our main findings that bank competition has a direct rather than indirect impact on bank earnings persistence.

Table 10
The impact of Competition on Bank Realized gain/loss of AFS

This table investigates whether competition induces banks earnings management using realized gain/loss of available for sale securities. The dependent variable is Realized gain/loss of AFS scaled by total assets. NI is net income before tax and realized gain/loss of AFS scaled by total assets. The Branching Restrictions measure is a state level competition measure. Followed by Rice and Strahan(2010), Branching Restrictions is an index that captures the level of interstate branching restrictions for each state. The Lerner index is a bank-level indicator of bank competition, by adopting the stochastic frontier analysis approach, it is calculated as the difference between price and marginal cost as a percentage of prices, the detailed methodology of Lerner measure is described in the appendix. All other variables are defined in the appendix. *, **, *** represents the significance level of 10%, 5% and 1% respectively.

Dependent Variable	Realized gain/loss of AFS	
NI	-0.048***	-0.054***
	(-26.62)	(-20.70)
Branching Restrictions Index	0.000	
	(0.16)	
NI*Branching Restrictions Index	-0.000	
	(-0.83)	
Lerner		-0.012***
		(-9.95)
NI*Lerner		-0.020**
		(-2.44)
Z-score	-0.000***	-0.001***
	(-2.91)	(-3.28)
Capital Ratio	0.000	0.000
	(0.22)	(0.23)
Loan to Total Asset	-0.002***	-0.001***
	(-6.34)	(-4.74)
Size	0.005***	0.000
	(2.73)	(0.35)
Total Assets Growth Rate	0.000***	0.000
	(3.43)	(1.24)
Managerial Efficiency	-0.003***	-0.009***
	(-23.05)	(-7.73)
Income Diversification	-0.000***	-0.000***
	(-7.84)	(-5.66)
GDP Growth Rate	0.003***	0.003***
	(8.72)	(10.74)
Inflation	-0.008***	-0.007***
	(-8.00)	(-7.23)
GDP Per Capita	-0.003***	-0.001***
	(-6.67)	(-9.94)
Constant	0.001	0.015***
	(1.51)	(9.84)
Time Fixed Effects	Yes	Yes
Bank Fixed Effects	Yes	Yes
Max VIF	5.41	3.28
N	146338	146338
adj. R-sq	0.1123	0.1172

3.11 Conclusion

This article evaluates the impact of the competition on profit persistence in US banking, using bank-level data spanning 11 years. We document that competition has a significant negative impact on bank profit persistence both at the market level and individual level in a dynamic fashion. Our design has successfully addressed the causal relationship between bank profit persistence and competition, and our measure of persistence innovatively allow for varying in terms of bank and time.

We contribute to bank and profit persistence literature streams in two ways: first, we investigate how profit persistence varies whether the profitability positively or negatively deviates from the expected return. Bank managers concern less on profit persistence when the banks' returns are under the expected to return, while stronger profit persistence has been found if the returns are above the expected return.

Secondly, the partial adjustment statistical results show that both market power and IBBEA index have a significant positive impact on profit persistence. Our findings assist the regulator in distinguishing, to what extent, the market power or the internal accounting techniques determine the profit persistence. From an academic point of view, this article introduces the artificial impact of traditional profit persistence researches.

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.

Appendix1

Definition of Variables

Variable Name	Definition
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 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 the highest competition and 0 means the lowest competition
Adjusted Lerner Index	The Adjusted Lerner index equals 1 minus 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 Adjusted Lerner index indicates greater bank 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. 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 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 growth rate
GDP per capita	GDP divided by the number of the people in the country

Appendix 2

Static Profit Persistence Level for Each State

This tables report the Static Profit Persistence Level for Each State and mean of key indicators, The ROA* is estimated using first stage partial adjustment model, ROAit =λiβiXit-1 + (1- λi)ROAit-1+ εit, For each state, (1- λi) is the level of persistence of ROA, GAPit=ROA*it-1-ROAit-1. We use Fama-Macbeth regression to estimate the static profit persistence level for each state. Followed by Rice and Strahan(2010), Branching Restrictions is an index that captures the level of interstate branching restrictions, which is an indicator of competition in statthe e level, this index ranges from 0 to 4, 0 means highest competition and 4 means lowethe st competition. The absolute value of the error term is regarded as the discretionary loan loss provision (DLLP) and the degree of Earnings Management. All other variables are defined in the appendix.

STATE	N	Persistence of ROA	ROA	ROA*	GAP	Branching Restrictions
Alabama	4370	51.102%	1.020%	1.080%	0.088%	1.986
Alaska	154	47.948%	1.150%	1.239%	-0.119%	1.429
Arizona	758	51.537%	0.785%	1.004%	0.278%	1.890
Arkansas	5110	50.087%	1.040%	1.118%	0.093%	2.279
California	7408	43.408%	0.805%	1.001%	0.267%	1.853
Colorado	5674	55.155%	0.966%	1.059%	0.100%	2.568
Connecticut	726	49.656%	0.536%	0.789%	0.151%	2.005
Delaware	632	51.525%	1.630%	1.126%	-0.413%	1.810
Dist Of Columbia	174	26.204%	0.634%	0.953%	0.282%	2.169
Florida	6136	53.644%	0.780%	0.946%	0.170%	2.090
Georgia	7837	56.488%	1.030%	1.101%	0.058%	2.471
Hawaii	228	48.319%	0.890%	0.887%	-0.059%	2.611
Idaho	409	54.630%	0.800%	1.013%	0.219%	1.768
Illinois	20161	55.930%	0.954%	0.997%	0.051%	2.129
Indiana	4975	58.113%	0.909%	0.978%	0.091%	1.902
Iowa	11757	53.150%	1.040%	1.091%	0.118%	1.962
Kansas	10858	50.329%	0.916%	0.982%	0.077%	1.865
Kentucky	6471	57.459%	1.060%	1.090%	0.045%	2.910
Louisiana	4333	51.837%	0.937%	1.012%	0.065%	2.034
Maine	428	67.119%	0.930%	1.039%	0.106%	1.486
Maryland	1837	66.005%	1.020%	1.214%	0.183%	1.495
Massachusetts	1188	57.291%	0.776%	0.934%	0.133%	1.981
Michigan	4549	61.085%	0.963%	1.049%	0.115%	1.671
Minnesota	12934	55.667%	1.000%	1.082%	0.094%	1.948
Mississippi	2711	57.020%	1.020%	1.067%	0.046%	2.055
Missouri	10573	58.505%	0.988%	1.074%	0.119%	1.905
Montana	2635	49.902%	1.070%	1.199%	0.144%	2.833
Nebraska	7966	49.136%	1.020%	1.068%	0.087%	2.172
Nevada	537	60.487%	1.270%	1.161%	0.030%	1.118
New Hampshire	582	56.269%	0.769%	0.864%	-0.027%	2.921
New Jersey	1822	50.278%	0.816%	0.956%	0.198%	1.751
New Mexico	1537	58.011%	1.100%	1.106%	0.044%	2.034
New York	2976	56.311%	0.876%	1.094%	0.101%	1.812
North Carolina	1497	53.807%	0.788%	0.945%	0.194%	1.247
North Dakota	3130	53.593%	1.010%	1.061%	0.084%	2.193
Ohio	5543	63.684%	1.030%	1.059%	0.062%	1.536
Oklahoma	8313	58.175%	1.030%	1.037%	0.013%	2.253

Oregon	922	50.550%	1.110%	1.215%	0.253%	2.007
Pennsylvania	5083	59.691%	1.020%	1.040%	0.058%	1.662
Rhode Island	163	53.532%	0.938%	1.050%	0.095%	1.505
South Carolina	1731	59.614%	0.890%	1.084%	0.175%	1.645
South Dakota	2681	54.696%	1.170%	1.105%	-0.025%	1.825
Tennessee	5281	55.645%	0.985%	1.074%	0.113%	2.194
Texas	21225	54.358%	0.919%	0.989%	0.041%	2.296
Utah	1164	46.383%	1.440%	1.338%	0.059%	1.503
Vermont	464	72.970%	0.936%	1.005%	0.022%	1.841
Virginia	3340	57.712%	1.000%	1.106%	0.116%	1.464
Washington	1863	47.864%	0.928%	1.037%	0.167%	2.088
West Virginia	2804	59.620%	0.999%	1.062%	0.066%	2.165
Wisconsin	9154	60.877%	1.010%	1.096%	0.111%	2.017
Wyoming	1349	55.855%	1.090%	1.122%	0.046%	2.116
Total	226153					
Average		54.671%	0.976%	1.055%	0.090%	1.970

Appendix Table 8B
Determinants of profit adjustment speed regarding different profit quintiles

This table presents the OLS results for Partial Adjustment Model by splitting the sample by profitability. The unit of analysis is the firm-year. 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 the price. All other variables are defined in the appendix. *,**,*** represents the significance level of 10%, 5% and 1% respectively.

	ROA in Tier1 (below 25%)		ROA in Tier2 (25%-50%)		ROA in Tier3 (50%-75%)		ROA in Tier4 (above 75%)	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
GAP	0.608***	50.69	0.652***	76.06	0.685***	95.1	0.702***	60.26
Market Power (Lerner Index)	-0.327***	(-4.11)	-0.276*	(-1.73)	-0.310**	(-2.02)	-0.399***	(-4.88)
Z-score	-0.126***	(-10.96)	-0.054***	(-6.80)	-0.044***	(-6.85)	-0.032***	(-4.31)
Leverage ratio	-0.006	(-0.95)	-0.030***	(-2.72)	-0.027***	(-3.37)	0	(-0.04)
Loan to total asset	0.077***	8.48	0.114***	11.72	0.117***	9.5	0.042***	4.55
Size	-0.068***	(-9.84)	-0.061***	(-5.13)	-0.077***	(-6.91)	-0.072***	(-6.35)
Total Assets Growth rate	-0.013**	(-2.12)	-0.037***	(-5.46)	-0.040***	(-3.77)	-0.006	(-0.97)
Managerial efficiency	-0.306***	(-3.82)	-0.213	(-1.32)	-0.251	(-1.61)	-0.364***	(-4.55)
Income diversification	0.005	0.86	0.007	0.73	0.009	1.16	0.020***	4.17
GDP growth rate	-0.075***	(-14.32)	-0.062***	(-8.01)	-0.051***	(-7.66)	-0.036***	(-4.78)
Inflation	-0.091***	(-14.49)	-0.107***	(-14.27)	-0.081***	(-11.16)	-0.045***	(-6.85)
GDP per capita	-0.282***	(-27.27)	-0.320***	(-23.60)	-0.282***	(-19.91)	-0.220***	(-18.08)
constant	-0.001***	(-3.44)	0.000	1.08	-0.001***	(-3.20)	-0.001***	(-5.10)
Time fixed effects	yes		yes		yes		yes	
Bank fixed effects	yes		yes		yes		yes	
Max VIF	6.45		4.22		3.69		5.10	
N	46163		56921		61554		61816	
adj. R-sq	0.75		0.73		0.73		0.62	

Chapter 4

Earnings management and Bank profit persistence

4.1 Abstract

This chapter examines the impact of earnings management on the persistence of profit in US banking industry. Results show earnings management have a positive influence. In addition, statistics illustrate managers are more willing to keep a high persistence of profit when they are outperformed than the expected return. However, when it comes to the different timing of outside market, the effect of earnings management on profit persistence might vary significantly.

4.2 Introduction

Earnings management is a hot topic in perspective of accounting literature. (Beatty and Liao, 2014; Goddard.J, Liu Hong, Molyneux P, Wilson. J O.S,2011; Dechow et al., 2010; Cumming et al., 2012; Beaver et al., 2012; Gao and Zhang, 2015; Peterson et al., 2015; Hui et al, 2016; Buchner et al., 2016). It is a core area that detects accounting quality. Earnings management has been widely researched via non-financial firms. It is important to mention that financial firms are less mentioned in accounting literature. During the last decade, bank financial accounting has been experienced considerable development, especially after the financial crisis (Beatty and Liao, 2014).

In accounting perspective, earnings persistence is a natural result of earnings management. Because persistent earnings would lead to a more stable income stream, resulting in a higher stock price, lower financing cost, and lower risk. Tomy.R.E(2012) argue that the earning persistence is significantly influenced by the economic cycle since the managers have incentives to apply accounting method to 'change' profits that reported. He finds that firms' earnings are most persistent during an expansion, least persistent during a recession, which implies that mangers have employed accounting method to influence the earnings in order to lead a more persistent profit. However, the firms measured in this paper are all manufacturing and consumer durables industries, which imply that the samples themselves are pro-cyclicality, it is plausible that the impacts from the economic cycle dummies are magnified. It is controversial whether banks are sensitive to those factors. Beatty and Liao(2011) tried to find the recession impact on banking

lending willingness associated with the regulatory capital ratios show a profile how the managers tried to revise the assets structure in order to meet the capital requirements when the market is under recession or expansion. This indicates the bank managers have applied accounting techniques to meet targets when the economic cycle is changing.

The newly introduced comparison of accounting quality and market power on profit persistence can give a deep inspiration for how the bank managers' behaviors are influences the profit persistence. This chapter aims to measure the impact of earnings management on the profit persistence from bank level perspective. By employing Partial adjustment model, we could observe the dynamic consequence of how earnings management impact on earnings persistence.

We use discretionary loan loss provisions to gauge earnings management from all US commercial banks. Beatty and Liao(2014) state that earnings management via loan loss provision is the most prominent channel for banks, which accounts for more than 60% of total discretionary accruals. The other one widely accepted banking earnings management measure is to discretionary realized gain or loss from available for sale securities. Discretionary accruals from this item accounts around 15%-20%.

Using the main stream DLLP model, we found banks earnings management has a significant negative impact on earnings persistence. These effect on average is robust to bank and year fixed effect. We further exploit SOX act as an exogenous shock to identify the causality relationship between bank earnings

management and earnings persistence. SOX act requires all NYSE listed banks to have a minimum independent ratio of 50%. There are fruitful literature find that board independence would lead to a better monitoring thus reduce earnings management. We borrow this evidence and hypothesize that large listed banks would reduce earnings management significantly after SOX act. Using a difference in difference strategy, we found that large banks drop the earnings persistence rate more after SOX compared to other banks. This helps us document the causal relationship between bank earnings management and earnings persistence.

We further check 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, and we find similar findings showing that banks have different incentives when ROA is under different quintile. Further, if banks are outperforming, they tend to use earnings management to pertain current earnings. On the other hand, if banks are underperforming, they intended to use earnings management to increase earnings adjustment speed, resulting in a more volatile stream of earnings. we also test whether banks apply earnings management differently when actual earnings deviate positively or negatively from earnings expectation.

The rest paper is organized as follows: regarding profit persistence studies so far, section2 discuss the main stream of literature from earnings management perspectives. Section 3 presents the methodology that adopted within each stage of research. Section 4 summarizes data and section 5 states the results we found from estimations. Section 5 concludes the findings.

4..3 Literature Review

4.3.1 Do banks need to be transparent?

Banks are different from non-financial firms in terms of financial reporting. Ordinary, financial reporting is targeting transparency, showing that more disclosure would lead to a better corporate act. However, there is ongoing debate arguing whether banks need to be as transparent as possible. For example, Freixas and Rochet (2008) state that transparency is important for banks to allow depositors monitoring borrowers' quality. In addition, bank opacity would induce agency problems and make banks less efficient. Higher asymmetric information would increase financing cost on both issuing equity or debt. Bank financial reporting could possibly offer a channel to address agency problems arise in banking industry. There are plenty benefits of being financially transparent. For example, it would allow investors to better evaluate fundamentals of each bank, thus mitigate agency problems.

Regulator from an other dimension, could monitor banks more efficiently via a good financial reporting environment. Diamond(1984) argues that banks have incentives to monitor borrowers and produce information about credit risks. And Calomiris and Gorton(1991) state that the liquidity mismatch between assets and liabilities of banks will potentially increase uncertainty of depositors. The information asymmetry between banks and depositors that arises from banks' delegated monitoring role might induce agency problem because banks might not behave on behalf of depositors. By contrast, banks may take extra

unnecessary risk to benefit themselves rather than depositors. A better disclosure system would mitigate asymmetric information between depositors and banks.

However, transparency might not optimal for banks. Dang et al(2013) suggest that banks should be opaque. Banks are unique in privately producing debt that is a money-like security that trades at par and does not vary in value over time. Banks need to have their own private portfolio to keep these money-like debts. Because debts need to be information-insensitive to serve as an efficient transaction medium. In order to make debt value at par, the underlying asset that backing debts should be unrevealed. Hence, bank money would not fluctuate in value, which will reduce its efficiency in trading. In this context, banks with higher transparency would lead to higher cost.

A similar real world example would be the selling of diamonds suggested by Holmstrom(2009). He argues that if diamonds are all allowed to be inspected by buyers before transaction, the trade would be slowed down and reduce market liquidity, which might harmful to market efficiency. This might explain why banks had not been required to fully disclose financial reports until 1974. In 1974, Securities Amendments Act requires banks to issue substantially similar regulations with respect to periodic reporting, proxy regulation, and insider trading as those adopted by the SEC.

Depositors may not be informative as banks about the loan quality. Then, one potential issue is depositors may panic about their money if macro environment is not healthy or some adverse news are

disclosed regarding some particular banks. Because banks are opaque, depositors have difficulty to monitor banks. A bank run would induce adverse consequence, which substantially reduces liquidity or a bank. It happens, if depositors withdraw all money from banks when they have reasons to believe that there is an increased likelihood of bank failure despite they do not know the actual incidence of failure.

Holod and Peek(2007) find that listed banks with higher transparency are better able to issue uninsured large time deposits during periods of monetary tightening. Which means banks are less financial constrained if they have better financial reporting quality. This indicates market values the financial information transparency of public banks. Flannery et al.(2004) argue that banks' opacity to outsider investors are peculiar, which might need further regulation on them. Banks have undisclosed information of their non-tradable loans, this type of information is super difficult for outsiders to acquire. A similar evidence is that Moody's and S&P ratings on banks are more different for banks than other firms and this disagreement happens when banks hold greater assets in loans and trading assets and this disagreement would reduce if banks hold higher capital ratio and more physical assets(Morgon, 2002).

This finding suggests that rating companies also face difficulty in determining a bank's stability level particularly if the bank holds large stake in loans. The opacity of loan quality becomes a huge information barrier between banks and outsider investors. Flannery et al (2013) find that, compared to nonfinancial firms, banks higher bid-ask spread during financial crisis, which indicates financial regulators could have more impact on economic downturns. This leads out a more scrutiny regulation environment for banks. Loan

loss provision could also be a potential way for bank managers to convey their private information to equity holders and investors. For instance, Nichols et al(2009) find that public banks have more information asymmetry compared to other banks. Bank managers would make loan loss provisions more timely to alleviate opacity issues. In addition, loan loss provision could be applied to manipulate earnings, capital or on tax purpose in order to align with shareholders' interest. Literature has found a positive relationship between bank market value and loan loss reserves (Beaver et al, 1989). It indicates that banks managers have the power to manipulate earnings to market expectation when they have a higher ratio of loan loss provisions. Investors also value this type of extra reserve as a good resort to manipulate earnings therefore showing a more optimistic market performance.

Bank regulation has evolved over time. Micro-prudential approach has been long employed within banking industry. To prevent individual bank failure is a long time goal aims to protect depositors and investors from cost of distress (Borio, 2003). Banks to be regulated on micro level would encourage banks to internalize losses, thereby protecting the deposit insurance fund and mitigating moral hazard. Before the recent financial crisis, banks are regarded as independent units where systemic risks are assumed to be exogenous to the individual banks, and correlation between banks are ignored. Macro-prudential approach has been recently getting popular. Banks are endogenous inter connected, to avoid system-wide distress with the ultimate objective to avoid reductions in GDP become the least goal for regulators. According to Hanson et al(2011), the target of systemic macro-prudential approach is to limit for excessive social costs associated with multiple financial institutions' value shrinkage caused by a common shock.

4.3.2 The arguments about financial reporting quality

There are raising arguments concerning the measurements on the profits persistence. Holian(2010) contends that most of data sources that used are accounting-based, which will produce several errors. From his study, he applied both EVA(economic value added) model and traditional unadjusted accounting measures to compare the results. Stern, Stewart and Co(1995) argue that the accounting profit(net income does not take into consideration the opportunity cost of capital), while the EVA method can incorporate the opportunity cost of capital. The EVA has a different measurement from the basic net income. It can be Obtained by the Net operating profits after taxes minus Capital charge (current cost of debt and equity) plus the Adjustments made by stern Stewart to correct accounting distortions.

Muller(1990) suggest that the outcomes of profit persistence should be smaller because of the availability of various accounting practices, that will allow managers to polish the profits. The EVA method aims to find the true profits. Intuitively, researchers believe that the profit persistence of accounting based method will be higher than the EVA method based profit persistence. However, the results from Holian(1990) suggest that the average persistence is higher when applying the Stern Stewart measure of economic profits rather than unadjusted accounting measures. It shows that the accounting based profits do not bias persistence upward. On the other hand, because of the incorporation of the opportunity cost, the result does suggest lower long-term profits in the context of using EVA, this research also confirms that the R-square will be higher when using the revised EVA rather the raw accounting profit, which also

confirms that the managers do use accounting practices to manipulate the profits.

After all, the accounting-based measurement of profit persistence has a potential bias since the probability of artificial influence in relation to accounting practices. Despite the competition–persistence view, there are also numerical literature investigating the impact produced by economic shock/ cycle on accounting quality. Intuitively, how managers behave regarding economic factors will affect the profit persistence as well. This paper wills mainly focuses on the competition to profit persistence.

4.3.3 The earnings persistence and earnings management

From another dimension of the persistence study, the profit persistence studies using accounting oriented methods contend that the various factors like macroeconomic cycles will influence the profit persistence because the managers have incentives to manage earnings in order to meet different targets within various business cycles. The profit persistence is affected by firms' performance and accounting system simultaneously. To be specific, the fundamental performance can be affected by both systemic and idiosyncratic factors. As influences exerted from external factors like economic recession and inflation are not able to avoid, the managers may use the accounting system to manipulate earnings.

The incentives may be related to taking a big bath during recession periods, window-dressing financial statements before a public

offering, etc(Healy and Wahlen, 1999). Empirical results from Collins and Kthari(1989) show a positive relationship between profit persistence and stock price changes, and Teoh et al(1998) also suggest that the companies tend to manage earnings upwards prior issuing equities. The intuition behind the earnings artificial management is that managers will strongly avoid underperformances when other competitors are well-performed, by contrast they will write-down large assets in the balance sheet as losses when the whole industry is under recession, by this 'big bath', managers can make the subsequent earnings smoother and persistent.

Findings from Liu and Ryan(2006) support this behaviour, they found that banks tried to manage the earnings upwards during the financial recession by delaying provisions for losses on heterogeneous loans, and the banks managed the earnings downwards during the expansionary period by accelerating charge-offs of homogeneous loans. All these manipulations will secure a more smooth earnings curve, thus stabilizing the profit persistence. Another research from Beatty and Liao(2011) investigating the relationship between lending willingness and delays in expected loss incorporating two recession period March 2001 to December 2001 and December 2007 to June 2009 show that banks inclined to reduce lending during recessionary relative to expansionary periods, in addition, banks with small delays have smaller reductions on loans. The loan loss provisions rule magnifies the pro-cyclicality of banking, which increases the possibility and incentives for bank managers to manage profits in order to keep profit persistence.

Apart from the internal earnings management from bank managers, the regulations on accounting system may change as well. It is plausible that banks are willing to disclose more information when they are outperforming, in contrast, when it comes to the recession, profitability is severely impaired, the transparency and accuracy of accounting quality are supposed to be lower than normal level. Magee and Bertomeu(2012)argue that the accounting quality becomes worst before a recession. All these imply the accounting quality has impact on the profits persistence. However, the incentives for managers to manipulate the earnings may differ from each other, there are lots of both internal and external factors requiring considering when it comes to financial reporting.

For example, empirical results show that listed U.S firms have better accounting quality than those non-listed firms. In order to attract cheaper capitals through financial markets, the listed companies need to meet the requirements of sophisticated investors as well as establish the firms' reputation. Similarly, if the firm is operating in an advanced economic environment with sound supervision and regulations, the accounting quality will also increase. Bharath S.T, Sunder.J, and Sunder.S.V(2008) find that the accounting quality is positively related to firms' financing choices. To be specific, with poorer accounting quality borrowers preferring private debt, bank lending will result in higher cost compared to the financial market. Firms with good accounting quality will benefit from effective financial market as low required rate on debt. However, firms with high potential growth will choose private funding resources rather than the public funding resources (i.e., corporate bond in financial market),this may due the consideration on the significant flexibility of the private debt. For example, the borrowing contract with a certain bank will be more customizable than with public investors. Additionally, the private-debt can be

renegotiated to some extend before it matures, it is much favourable when a firm is growing fast.

Specific to banking industry, empirical results show the regulation, SFAS 133, on how banks are required to report the value of the derivative have significant impact on the banks' profit persistence(Kilic, E., et al 2012). SFAS 133, which enacted in 1998, changed accounting standard for derivatives substantially by enforcing recognition of all derivative instruments at their fair values and imposing stricter criteria for a derivative to classify as a hedge. Consequently, the profits of banks are more volatile responding to the uncertainty of the values of derivatives. As a result, banks lose the ability to smooth income via derivatives, the research finds empirical evidence that banks rely more on loan loss provisions to smooth profit. In this context, if the loan loss provisions changed significantly, the bank managers have intended to artificial smooth its earnings.

Other external factors can be auditing, economic shocks, tax-rate and so on. The incentives also can be influenced by the ownership of the firm in conjunction with size,fianancial leverage and industry. Isidro and Raonic(2012)find that firms cross-listed generally have better information quality than their non-US listed peers. Since Cross-listed firm can access cheaper external funds. Similarly, the international conglomerates usually have higher accounting quality. All of above factors probably affect the incentives of the firms' earnings manipulations.

A more deep discussion on the firm reporting incentives and institutional factors from Isidro and Raonic(2012) suggest that the financial reporting quality increases in the presence of strong monitoring mechanisms. It can be represented by ownership concentration, analyst scrutiny, effective auditing, external financial needs etc. Different incentives from managers and different endogenous and exogenous factors will affect the firms-accounting quality thus influence the quality of 'numbers' that observed from the financial reports. Since the main target is to measure the profit persistence. The importance of the accounting quality should not be ignored.

Li(2008) investigate how the earnings persistence correlated with the accounting readability. In this research, a measurement of accounting readability is introduced called FOG. It is developed by Robert Gunning, the mechanism is to capture the text complexity as a function of syllables per word and words per sentence. The index obtained is interpreted as how long (in years) that a formal educational reader with average intelligence needs to read the text once and understand that piece of writing with its word-sentence workload. Li argues that the managers can use the length of annual reports as well as the complicity to hide adverse information thus making the annual reports less transparent. A high Fog index referred to a less transparent annual report, by contrast, low Fog index will result in concise description and more comprehensible in the report, which indicates high transparency. After building connection with earning persistence and the Fog Index, a negative relationship has been founded, suggesting that if the manager is trying to hide adverse information using more complicated words and longer sentences will lead a lower earnings persistence. Earnings forecasting is a big part of investment appraisals when considering to invest certain company. Baginsk. S.P, Hassell.J.M

and Kimbrough M.D(2003) suggest that the managers are more likely to announce earnings forecast that containing external attributions(56.5%), such as macro-economic changes or governmental issues compared to internal factors like strategic changes in price, advertising, new products, cutting cost, M&A etc. Additionally, 29.4% of samples that investigated using only external attributions rather than internal attributions. Since more relevant information released in the report, it will be beneficial for analysts and investors to compare different underlying companies, hence increase the transparency.

In hindsight, a bad performance will definitely lead to a low earnings persistence, thus managers trying to confuse investors in the annual report with more complicated words have no significant impact. Conversely, there should be an implication that the managers are trying to apply every possible mean to obscure the bad results. To some extend, Accounting quality is increasingly crucial, since the earnings persistence has large potential to be influenced artificially.

4.4 Methodology

This paper will use two-step approach to conduct the analysis. The first step will focus on the persistence of profits, here the partial adjustment model is applied to determine the profit persistence level. Full model will be explained next. Then in the second step, we run regressions on these calculated profit persistence coefficients against a vector of bank-specific determinant factors, including market power, initial profitability, bank size, growth, managerial efficiency (cost to income ratio), diversification, etc., while controlling for macro-economic condition variables, such as real GDP growth, inflation rate, etc.

4.4.1 Earnings Management Measure: Discretionary loan loss provision

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).

The loan loss provision is crucial to banks. In banking literature, loan loss provision is the heart of examination of accruals. In contrast to non-financial firms, which tends to study overall accruals, total current accruals or total earnings. Loan loss provision is the foundation of measuring bank performance, because loan loss provision is not only about loan loss of a bank, but also reflecting information asymmetry degree. According to Beatty Liao(2014), information asymmetry is the heart of bank, and loan loss provision explains much of variability in total accruals of a bank. Specifically, loan loss provision accounts for 56% of total accruals, while it also explains 34% of variation of total accruals.

A good virtue of using loan loss provision to measure earnings management is the reliability. When using LLP, the discretion accruals estimated is less subjective to measurement issues than measures that combine many accounts are combined in an aggregated accrual measure. Another issue with banking study is data availability. To detect the total operating accruals for banks has been more challenging than ordinary companies. Because banks are lack of statement of cash flows in either regulatory or databases. On the other hand, regulators require detailed information related to bank loan loss provision, they do not require a statement of cash flows. It is obvious that bank regulators regard loan loss provisions more importantly compared to cash flow statements.

Bank cash flow statements are less attractive to loan loss provision reports in the eye of bank regulators. However, a recent focus on bank cash flow arises from investors. For example, the market analyst forecasts on cash flow for banks have been increased from 2.8% in 1995 to 34.5% in 2005, the figure for nonfinancial firms was 14.3% in 1995 and 57.1% in 2005. It indicates a strong

emphasis from market analysts on cash flow statement for banks during the last decade compared to other industries.

The development of loan loss provision is also vital particularly to US banks. Before 1993, FAS 5 instructed bank in terms of how to report impaired all receivables and loans. Since the adoption of FAS 114 in 1995, regulator offered a more detailed guidance for banks specifically on those potential losses from loan defaults. It clarifies the importance of reporting both collectivities of interests and principal on loans. FAS 114 requires impairment recognition when a loss is probable based on the past events and conditions at financial statement date. The possible loss calculation is based on the present value of loans which accounting for all future cash flows.

Loan loss provision not only affects bank accruals, but also affect bank regulatory capitals. According to Basel accord, loan loss allowance is included in primary capital, a one-dollar increase in the loan loss provision increased regulatory capital by the tax rate multiplied by one dollar. Therefore, banks might increase loan loss provision to meet regulatory standard.

In this study, we use Discretionary loan loss provision model to estimate bank earnings management. 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. This model states as follows:

$$\text{Loan Loss Provision}_{it} = \beta_1 \text{ Size}_{it} + \beta_2 \text{ ΔLoan Charge-offs}_{it} + \beta_3 \text{ ΔLoans}_{it} + \beta_4 \text{ ΔNon-performing Loans}_{it} + \beta_5 \text{ ΔNon-performing Loans}_{it-1} + \beta_6 \text{ΔNon-performing Loans}_{it+1} + \varepsilon_i, \quad (1)$$

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

4.4.2 The partial adjustment model

In the partial adjustment model, the banks' current return level (ROA) is a weighted average of its target ROA ratio:

$$ROA_{it}-ROA_{it-1}=\lambda_i\ (ROA^*_{it}-ROA_{it-1})+\varepsilon_{it} \qquad (3)$$

Where ROA_{it} is the return on total asset for bank i at year t. the ROA^*_{it} is the target return on total asset for bank i at year t. The λ_i means the proportional adjustment during one year for bank i, in this context, lambda captures how the sample banks are operating away from its expected returns. Alternatively, ROA is predicted to mean revert to a target level which is ROA^* here. Since our main interest is to see how the market competition could influence the profit persistence level, the partial adjustment model gives us a perfect match to capture each bank's persistence level. λ_i here is the adjustment speed for banks towards target rate, we can simply use $(1-\lambda_i)$ to represent our main persistence measure. By applying the dynamic property of partial adjustment model, we could estimate each bank's profit persistence level at a time-varying frame.

Because the expected ROA is unknown in our model, we follow Healy, et al(2014) to use a cross-section model to estimate each bank's target ROA. Then, The ROA* can be determined by:

$$ROA^{*}_{it} = \beta_i X_{it} + U_{it} + \varepsilon_{it} \qquad (4)$$

Where X_{it-1} is a vector of bank and macroeconomic characteristics that can influence the ROA. By considering each bank has different idiosyncratic factors that would potentially affect the target ROA. We further control the bank fixed effects. In the model, The U_{it} is the fixed effects to control for unobserved firm heterogeneity. Substituting eq(4) into eq(3) and rearranging yields, it becomes the following specification:

$$ROA_{it} = \lambda_i \beta_i X_{it} + (1 - \lambda_i) ROA_{it-1} + \lambda_i (U_{it}) + \varepsilon_{it} \qquad (5)$$

From equation(5),it can be seen that In the partial adjustment model, the bank's current ROA is a weighted average (with the λ_i between 0 and 1) of its expected ROA*,and the ROA of its previous period, as well as the unobservable fixed effects and random shocks. Regarding the adjustment speed, if the λ_i is small, it means the adjustment speed is slow, representing a long time for a bank to return to its target after a shock the bank's ROA. On the other hand, the $(1 - \lambda_i)$ term before the lag value of ROA in equation (5) is treated as an inertial fact in the partial adjustment model. In our study, it is the profit persistence level. The smaller the λ_i is, the bigger the $(1 - \lambda_i)$ will be, if the bank's speed of adjustment is equal to 0, it means the profit persistence coefficient '$(1 - \lambda_i)$'will be equal to 1, indicating an unchanged profit level forever. However, if the $(1 - \lambda_i)$ equals 0, there is not any relationship between current and last period profit, hence there is no persistence in profits.

In the partial adjustment model, the expected return(ROA*) is unavailable and it is not necessarily constant over time. Here we follow Fama and French(2006) to build a model to estimate the expected ROA.

The cross-sectional model for estimating ROA^* can be summarized as:

$$ROA^*_{it} = \beta_0 + \beta_1 \text{ Income Diversification}_{it} + \beta_2 \text{ Non-Performing Loans}_{it} + \beta_3 \text{ Revenue}_{it} + \beta_4 \text{ Capital Ratio}_{it} + \beta_5 \text{ Size}_{it} + \beta_6 \text{Management Efficiency}_{it} + \beta_7 \text{Loans}_{it} + \varepsilon_{it} \quad (6)$$

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. We follow Healy et al(2014) to construct our variables, ensuring that the expect ROA measured is suitable for the next stage analysis.

Our estimation of expected ROA differs from the standard partial adjustment model, which is widely used in the capital structure measure of the future target of capital ratio(Flannery and Rangan 2006). Following the proposal from Healy.P etc(2014), the current explanatory variables are used to measure the expected current ROA.

Differs from the measure of target capital ratio, the current period variables should be sufficient to predict the current period expected ROA, as long as the expected ROA does not contain the abnormal profits, the model will hold. We then plug the explanatory variables from equation (6) into equation (5), then the coefficient can be measured within one step. We use Fama-Macbeth regression to analyse the first stage partial adjustment model, while the estimated coefficients are further extracted for determining ROA*.

Under the assumption of partial adjustment model, the adjustments will be conducted if there is a gap between the expected ROA and the actual ROA. Here we use GAP to define the difference between them:

$$GAP_{it-1} = ROA^{*}_{it} - ROA_{it-1} \quad (7)$$

In the basic formation of Partial adjustment model, the adjustment speed is fixed for all the banks across time. In another word, the persistence level for banks is firm and time-invariant. In order to test whether our competition measures could affect the profit persistence level, we need to relax the adjustment speed, and allow it to be firm and time variant. we therefore modify the partial adjustment model by inserting a vector of characteristics to allow the adjustment speed to become a dynamic indicator:

$$ROA_{it} - ROA_{it-1} = (\lambda_i + \gamma_{it-1} Z) GAP_{it-1} + \varepsilon_{it} \quad (8)$$

Here we assume the lambda is dynamic, it can vary over time and banks. From equation(5), we know that the profit persistence is determined by the adjustment speed(λ_i), and the persistence coefficients is calculated as (1- λ_i), since we assume the partial adjustment speed can be influenced by the potential internal and external factors, similarly, we can obtain a set of different profit persistence coefficients that vary over year and bank.

GAP_{it-1} is calculated as the result of ROA^*_{it}-ROA_{it-1}, Z is a vector of the bank-level and macroeconomic characteristics. γ is a vector of coefficients, it is the interaction term directly tests how the adjustment speed is influenced by the bank's particular variables representing market power(Lerner), deregulation index(IBBEA). The estimated coefficients represent the incremental mean reversion associated with those three particular indicators. The standard errors are clustered both in the firm and year levels to control for serial correlation. To explore which factors are related to the bank-level differences upon the adjustment speed. Firstly, we estimate the expected ROA from equation(6) to get the GAP, which is calculated as ROA^*_{it}-$ROA_{it-1.}$ Secondly, we employ equation(8) to test the impact from the potential determinants on lambda.

In addition to those two primary factors that we interested, several bank-level control variables and macroeconomic determinants are included. All variables are introduced as follows:

Bank **Δ**LLP= change loan loss provisions. According to (Kilic, E., et al,2012), the bank's managers are able to use hedge derivatives and LLP to smooth income. After the SFAS 133, stricter standard

on accounting required the value of derivatives to be marked to market, so banks are inclined to reply more on LLP to smooth the profit. The changes in LLP can capture the behaviour of banks. It is also an indicator that the profit of persistence can be artificially affected by accounting methods.

Bank size = log(total assets). Previous findings are ambiguous on the relationship between firms size and profit persistence. A big firm might have reached its present size because of constant superior performance; however, there is also evidence of the inefficiency of large firms (Yurtoglu, 2004; Gschwandtner, 2005).

Bank risks = Z-score. 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. Firms with low profitability are forced to take risks to try to raise their profitability levels and firms with persistent profits seem to be associated with lower risk. Mueller (1986) finds that the profits of companies with persistently above-normal returns seem to vary less over the business cycle than do the profits of the average firm and the profits of persistently below-normal companies exhibit greater than normal pro-cyclical variability.

Bank growth = growth rate of the bank assets. We expect a positive sign on the growth coefficient as suggested by Yurtoglu (2004). The positive relationship between can be explained because high growth

banks have better ability as management. The return is normally upward trending, which makes bank easier to catch their target and make the return more persistent.

Managerial Efficiency = cost to income ratio. With common wisdom, we expect that more efficient banks tend to have higher profit persistence. This is because higher managerial efficiency indicates the higher capability of banks to maintain their profitability. Please be noted, the Managerial Efficiency ratio is reversely correlated with the management. Because higher ratio indicates high cost related to income, therefore, we believe this ratio is negatively correlated with persistence rate.

Diversification = non-interest income divided by total revenue, reflects a business expansion opportunity for banks, contributing to an increased ability of banks to sustain their profitability. By diversifying into non-traditional banking businesses, banks have more sources of income, such as fee or trading income, rather than solely relying on loan business. Hence, banks may have more ability to sustain their profits from previous year. However, theoretical and empirical evidence on this is not clear and never examined. Therefore, we have no expectation on this relationship. (De Young and Rice, 2004; Stiroh and Rumble, 2006).

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).

The banking market is less likely to be competitive when it is subject to high inflation, as the prices of financial services, such as interest rates, are less informative (Claessens and Laeven, 2004), and will in turn exacerbate credit market frictions (Boyd et al, 2001). The banks can whether manager to reduce the GAP between the expected profit or maintain their current profitability, the impact of inflation can be two sides. A positive relationship is expected between real GDP growth and business opportunities for banks. The increased business opportunities may help banks to sustain their profits. Therefore an association might be expected between growth in GDP and the persistence of profit. On the other hand, the availability of business opportunities might lead to an intensification of competition, in which case a negative relationship would be expected between GDP growth and the persistence of profit.

4.5 Data

To explore the impact of 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 226153 firm-year observations from 51 states over the period of 1986-2013.

4.5.1 Measure of Earnings Management

Earnings management is calculated using formula (1), and the results for regression results are shown in table 1. We found that Size has significant impact on loan loss provisions. The coefficients are positive and significant at 1% level. In column(1) and column(2) where the fixed effects are not controlled. The t-statistics are over 80, showing that bigger bank has higher loan loss provisions. For example, if size increases by 1%, loan loss provision to total loans ratio will increase by 14.6% percent. In terms of other variables, we found that the Non performing loans at different timing windows also has positive relationship between loan loss provision.

Column(3) and column(4) show the regression results after controlling bank fixed effects. We now found that on average the t-statistics have reduced significantly, while the coefficients are still

significant at 1% level. By running different design of regression models, we get consistent analysis estimates. Then we use estimates from Colum(4) to analyze discretionary loan loss provisions. To be specific, the error term of the column(4) is collected and transferred into absolute value term to indicate the degree of earnings management. The reason for taking absolute value of error term is because bank can either use LLP to magnify(negative error) or hide(positive error) earnings. As a consequence, the absolute value of the error can effectively indicate the degree of earnings management. The estimated earnings management is summarized in the basic statistics section.

Table 1
Measure of Bank earning management

This table presents the earnings management measure of banks. Using the Discretionary LLP model that following Beatty & Liao(2014), All the variables except Size in Equation (1) are deflated by the book value of total assets of each bank.

Dependent Variable	Loan Loss Provisions			
	(1)	(2)	(3)	(4)
$Size_{it}$	0.146***	0.138***	0.077***	0.077***
	(93.12)	(87.88)	(2.68)	(2.68)
$D.Charge\text{-}off_{it}$	0.020***	0.020***	0.021***	0.021***
	(302.37)	(307.56)	(3.42)	(3.42)
$D.loans_{it}$	-0.003***	-0.003***	-0.009*	-0.009*
	(-35.39)	(-33.89)	(-1.90)	(-1.90)
$D.NPL_{it-1}$	0.126***	0.140***	-0.007	-0.007
	(38.57)	(42.46)	(-0.09)	(-0.09)
$D.NPL_{it}$	0.346***	0.334***	0.273**	0.273**
	(196.31)	(190.26)	(2.10)	(2.10)
$D.NPL_{it+1}$	0.028***	0.068***	0.080***	0.080***
	(11.34)	(16.70)	(4.22)	(4.22)
Constant	0.001***	0.001***	0.006**	0.006**
	(22.62)	(10.63)	(2.35)	(2.35)
Time fixed effects	No	Yes	Yes	Yes
Firm fixed effects	No	No	No	Yes
Max VIF	6.10	7.21	7.43	5.67
N	226153	226153	226153	226153
adj. R-sq	0.4486	0.4607	0.3860	0.3860

4.5.2 Summary statistics

Table 2 displays summary statistics of variables based for the whole sample period which includes 15,546 banks with a total of 226153 firm-year observations from 51 states over the period of 1986-2013. 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). 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. Adjusted Lerner Index is equal to 0.8, which is 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%.

Table 2

Summary Statistics

This table reports the summary statistics include 15,546 banks with a total of 226153 firm-year observations from 51 states over the period of 1986-2013. 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*)	226153	1.048	0.530	-2.834	2.424
ROA	226153	0.974	0.723	-4.440	2.961
GAP	226153	0.091	0.766	-2.908	4.520
ΔROA	226153	0.030	0.682	-7.401	7.401
Discretionary Loan Loss Provisions	226153	0.435	0.270	0.011	1.319
Adjusted Lerner Index	226153	0.793	0.085	0.557	0.962
Z-score	226153	24.132	17.069	0.428	83.816
Capital Ratio	226153	9.799	3.460	3.992	36.872
Loan to Total Asset	226153	63.118	20.751	13.274	148.805
Size	226153	11.339	1.296	8.679	15.734
Total Assets Growth	226153	8.686	15.879	-18.691	125.575
Managerial Efficiency	226153	79.205	8.741	54.076	104.290
Income Diversification	226153	10.131	7.519	0.492	53.253
Inflation	226153	2.463	0.763	0.879	3.793
GDP Growth	226153	2.746	1.585	-3.109	4.869
GDP Per Capita	226153	10.307	0.304	9.822	10.819

Table 3
Correlation Matrix

This table report the correlation covariance, Earnings Management is calculated by applying the discretionary loan loss provision model (Beatty & Liao, 2014). The absolute value of the error term is regarded as the discretionary loan loss provision (DLLP) and the degree of Earnings Management. All other variables are defined in the appendix. *represents the significance level of 5%.

	Earnings Management	Z-score	Leverage ratio	Loan to total asset	Size	Total Assets Growth rate	Managerial efficiency	Income diversification	GDP growth rate	Inflation	GDP per capita
Earnings Management	1										
Z-score	-0.2256*	1									
Leverage ratio	0.2161*	-0.3399*	1								
Loan to total asset	0.4713*	-0.2200*	0.1978*	1							
Size	0.1193*	-0.0048*	0.1136*	0.3053*	1						
Total Assets Growth rate	0.1413*	-0.1356*	0.0901*	0.5595*	0.1605*	1					
Managerial efficiency	0.1338*	-0.1936*	0.2945*	-0.1183*	-0.2847*	-0.0209*	1				
Income diversification	0.0042*	-0.1550*	-0.0564*	0.0388*	0.2958*	0.0499*	-0.1031*	1			
GDP growth rate	-0.2517*	0.0110*	0.0389*	-0.0452*	-0.1143*	0.0227*	-0.0119*	-0.0621*	1		
Inflation	-0.001	-0.0232*	0.1187*	-0.0897*	-0.1314*	-0.0166*	0.2297*	-0.1294*	-0.0028	1	
GDP per capita	-0.2041*	0.0082*	-0.2167*	0.2455*	0.3253*	0.0170*	-0.3298*	0.2303*	-0.3134*	-0.3902*	1

4.6 First stage estimation

We estimate the expect ROA via equation (6), and the $GAP_{it-1}(ROA^*_{it}-ROA_{it-1})$ is obtained. Table 3 shows the results of the first stage regression results. In column (1), We follow Flannery (2006), Healy (2014) to use Fame-Macbeth regression to estimate ROA. Additionally, we use OLS estimation to test the first stage regression. In order to control for the bank level specific unobservable characteristics, we control for bank fixed effects and firm fixed effects using two different strategies. Finally, The fitted value of the regression has been obtained. All the coefficients of ROA are positive and significant at 1% level, showing all the banks have a positive static profit persistent level. When using the Fama-mecbeth strategy, the persistent degree is highest. On average, banks can maintain 51% of the profit. From column (2) and (3), the average profit persistent level is only 39%.

Results from controls variables show that most bank individual factors have significant impact on ROA: Loans, Diversification, Managerial Efficiency, Total assets etc. For example, Revenue shows significant positive coefficient on ROA, the impact on average is statistical and economically significant at 1% level. Loans have negative impact on ROA, banks with loan business focused normally have lack of profitability. Interestingly, greater size will lead to lower profitability. On the other hand, we found that diversification is beneficial to bank profitability. Also, banks with higher Managerial Efficiency(lower cost to income ratio) would result in higher ROA. Finally, if a bank grows fast, the ROA will together show a growth trend. Comparing to other two

columns, the sign of coefficients before variables are the same, while the magnitudes are slightly different. Overall, all these 3 columns show similar outcomes. Then I only use the results from Fama-Macbeth to gauge the Target ROA. Please note, we also tried used regression results that applied in column 2 and 3 to get the fitted value of ROA to make a comparison, the estimated ROA is very similar, and therefore we mainly use Fama-Mecbeth results into our subsequent results. The estimates are presented in summary statistics.

The first row of table 2 shows the basic summary statistics of Target ROA, Comparing Target ROA(the estimated expected ROA) to ROA(reported ROA), Target ROA has a slightly higher mean value than ROA(1.04% vs 0.97%). The Target ROA has a value between -2.8% to 2.4%, while ROA has a wider range from -4.4% to 2.9%, this might be due to the random shocks. Thus, the ROA has a greater standard deviation than Target ROA (0.72% vs 0.53%). Based on the comparison between ROA* and realized ROA, we believe our estimation is accurate and efficient. Because (1) banks normally will set a higher target then the actually ROA, and the target is slightly higher than the realized one(mean: 1.04% vs 0.97%) shows that the target is not a random set. (2) the realized ROA has a wider bandwidth than the expected ROA, since in reality, performance can be affected by external random shocks, therefore it is reasonable that target ROA has a smaller range of values. (3) According to the profit persistence theory, the bank is willing to smooth ROA to keep a lower volatility on ROA, which in results show a lower standard deviation of ROA. In ideal situation, the abnormal return should be last as long as possible, therefore we observe that the target ROA has a lower standard deviation compared to the realized ROA.

After ROA and target ROA comparison, we move forward to the GAP and DROA, In detail, $DROA_{it}$ is calculated as ROA_{it}-ROA_{it-1}, and the GAP_{it-1} is calculated as Target ROA_{it}-ROA_{it-1}. From table 4, GAP ranges from -2.9% to 4.5%, on the other hand, DROA has a value between -7.4% and 7.4%. Interestingly, DROA has a smaller standard deviation than GAP. At least half of DROA is below 0, however, less than 50% of GAP has a negative value. Furthermore, there is a significant constraint magnitude of mean value of DROA compared to GAP (0.03% vs 0.09%). This might be evidence that banks are smoothing their profits. However, the situation can be ambiguous since banks can be either objective to the target(TARGET ROA) or to the profit persistence. If the banks are operating worse than expectations, they should adjust fast to reach the target, conversely, if the banks are operating better than expectations, they might strive to smooth their profits.

Table 4
First Stage Partial Adjustment Model

This table reports the results of first stage partial adjustment model assuming a static earnings adjustment speed. ROAit =λiβXit-1 + (1- λi) ROAit-1+ εit, (1- λi) is the level of persistence of ROA. In column (1), We We follow Flannery (2006), Healy (2014) to use Fame-Macbeth regression to estimate ROA. Additionally, two additional analysis have been incorporated. We use OLS estimation to test the first stage regression. In order to control for the bank level specific unobservable characteristics, we controls for bank fixed effects and firm fixed effects using two different strategies. 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	ROAt+1		
	Fama-Mecbeth	OLS	OLS
ROA	0.512***	0.392***	0.380***
	(22.06)	(64.21)	(61.69)
Revenue	0.001*	0.000***	0.032
	(1.74)	(3.99)	(0.09)
Leverage	0.021	0.008***	0.005***
	(0.37)	(10.00)	(5.69)
Loans	-0.000***	-0.001***	-0.001***
	(-4.54)	(-33.47)	(-24.84)
Total Assets	-0.001**	-0.001***	-0.000*
	(-2.21)	(-10.21)	(-1.95)
Diversification	0.000***	0.000***	0.000***
	(3.42)	(12.17)	(11.4)
Managerial Efficiency	-0.001***	-0.002***	-0.001***
	(-13.97)	(-42.56)	(-37.22)
Growth Rate of Total Assets	0.000***	0.001***	0.000***
	(6.11)	(29.47)	(21.62)
Constant	-0.001**	0.000	0.005***
	(-2.02)	(0.59)	(11.26)
Time Fixed Effects	No	No	Yes
Bank Fixed Effects	No	Yes	Yes
MAX VIF	5.29	4.38	4.35
N	226097	226097	226097
adj. R-sq		0.431	0.409

4.7 Second stage estimation

In the second stage, we apply the model stated as equation(8) to estimate the impact from earnings management on earnings adjustment coefficients. Before the interaction with GAP, we further standardize all the variables for better interpretation.

The main hypotheses:

1), Earnings Management increases profit persistence rate.

To test the main hypotheses, we use the following modified model to estimate the impact from market power and earnings management:

$$ROA_{it}\text{-}ROA_{it-1}=(\lambda_i+\gamma_{it-1}Z)GAP_{it-1}+\varepsilon_{it} \qquad (8)$$

Here we assume the lambda is dynamic, it can vary over time and banks. From equation(5), we know that the profit persistence is determined by the adjustment speed(λ_i), and the persistence coefficients is calculated as (1- λ_i), since we assume the partial adjustment speed can be influenced by the potential internal and external factors, similarly, we can obtain a set of different profit persistence coefficients that vary over year and bank. Again, a high

adjustment speed of earnings indicates a low degree of profit persistence.

GAP_{it-1} is calculated as the result of ROA^{*}_{it}-ROA_{it-1}, Z is a vector of the bank-level and macroeconomic characteristics. γ is a vector of coefficients, it is the interaction term directly tests how the adjustment speed is influenced by the bank's particular variables representing earnings management, is our main interest. The estimated coefficients represent the incremental mean reversion associated with those three particular indicators.

Table 5 reports the regressions results for the second stage estimation of Equation (7). We standardize all variables in the regression. The coefficient of Earnings Management is negative and significant across all the 4 columns. A negative regression coefficient of Earnings management indicates that banks manipulated more earnings tend to slow their earnings adjustment speed. The coefficients are significant at 1% level. This result is in accordance with earnings management and profit persistence theory that banks tried to increase profit persistence by applying earnings management vehicles (Healy and Wahlen, 1999). In addition, the impact of earnings management on earnings adjustment speed remain strong after controlling bank level market power and risk. In particular, we input Lerner index into our regression analysis we control for potential bias occurred by the bank market power. For instance, a bank with higher market power might have stronger incentive to pertain a persistent ROA. Because the cost to manipulate earnings could be less compared to those with lower market power. In Table 5, results suggest a strong and negative correlation between Lerner index and earnings adjustment speed. The coefficient is both statistically and economically significant. A

one standard deviation increase in Lerner index would induce a decrease of 34.9 percent on the speed of earnings adjustment. These results show that bank earnings management is unassociated with competition when considering the earnings persistence.

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. Z-score also has significant impact on profit persistence. It shows that regression results are safer banks can preserve more consistent earning stream. Similar results have been found in column (2). We also find that high managerial efficiency is beneficial to profit persistence.

For instance, Efficiency helps smooth earnings in two ways, first, intensive management in accounting reports subjects in the financial reports enable managers to manipulate earnings, hence smooth earnings. Second, active management in noninterest income reduce the overall risk of operations, unexpected losses and earnings might offset internal therefore the profits can be more persistence. In terms of assets structure, we find banks with more loans issued have a lower profit persistence level. In addition, larger banks have more persistent earnings, possibly because they usually have more market power. In the regression we consistently control time and bank fixed effects, the R-square is around 70% showing that our regression model has considerable explanatory

Table 5

Determinants of Bank Profit Adjustment Speed

This table presents the OLS results for Partial Adjustment Model (ROAit - ROAit-1 = (λi + γit-1Z) GAPit-1 + εit ,GAPit-1 = ROA*it-1 - ROAit-1). We assume that λi to be dynamic, so it varies among banks and over time. Z is a vector of all independent variables. The Lerner index is a bank-level indicator of bank competition, by adopting the stochastic frontier analysis approach, it is calculated as the difference between price and marginal cost as a percentage of prices, the detailed methodology of Lerner index measure is described in appendix. Earnings Management is calculated by applying the discretionary loan loss provision model (Liu and Ryan, 2006). The absolute value of the error term is regarded as the discretionary loan loss provision (DLLP) and the degree of Earnings Management. All other variables are defined in the appendix. T-statistics are reported in the parentheses ,*, **, *** represents the significance level of 10%, 5% and 1% respectively.

Earnings Management	-0.018***	-0.018***	-0.025***	-0.020***
	(-4.28)	(-4.28)	(-5.87)	(-4.71)
Lerner Index		-0.349***		-0.365***
		(-6.82)		(-7.04)
Z-score			-0.066***	-0.063***
			(-13.72)	(-13.06)
Capital Ratio	-0.178***	-0.185***	-0.195***	-0.173***
	(-2.95)	(-2.91)	(-3.18)	(-2.85)
Loan to Total Asset	0.057***	0.065***	0.065***	0.071***
	(12.64)	(12.33)	(12.63)	(12.6)
Size	-0.073***	-0.061***	-0.060***	-0.072***
	(-13.51)	(-11.09)	(-10.78)	(-12.95)
Total Assets Growth Rate	-0.014***	-0.016***	-0.019***	-0.020***
	(-3.87)	(-4.25)	(-5.06)	(-5.03)
Managerial Efficiency	-0.326***	0.026***	0.025***	-0.342***
	(-6.27)	(7.58)	(7.63)	(-6.50)
Income Diversification	0.010***	-0.001	0.000	0.010***
	(2.73)	(-0.19)	(-0.03)	(2.82)
GDP Growth Rate	-0.062***	-0.071***	-0.085***	-0.070***
	(-21.25)	(-21.89)	(-25.60)	(-21.46)
Inflation	-0.071***	-0.077***	-0.062***	-0.077***
	(-21.95)	(-22.55)	(-17.77)	(-22.62)
GDP Per Capita	-0.261***	-0.265***	-0.376***	-0.275***
	(-45.37)	(-40.89)	(-40.50)	(-39.28)
Constant	0.672***	0.680***	0.841***	0.680***
	(184.43)	(164.45)	(85.75)	(165.91)
Time Fixed Effects	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes
Max VIF	3.98	4.55	6.78	6.47
N	226097	226097	226097	226097
adj. R-sq	0.707	0.707	0.710	0.708

4.8 Identification strategy

Since the earnings management and earnings persistence are significantly correlated. But all the behaviors are firm internally stemmed, therefore it is possible that earnings management could be influenced by earnings persistence rather than the other way around. In order to solve this type of reverse causality issue, 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).

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:

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

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

In Column (1) of Table 6 A, 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 2002, 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 A 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.

In column(1), we found that the largest banks on general have more earnings management their counterparties. This finding is consistent with our previous analysis suggesting bank with higher market power tend to manipulate more earnings. We also see a negative and significant coefficient on SOX act, this suggests that banks on average tend to reduce earnings management after SOX. To validate our identification, we observe a negative and significant coefficient before the interaction term of large banks multiplied with SOX act dummy. The coefficient is -0.091 with a t-statistic of -4.98 showing that the gap of earnings management between large banks and other banks have been significantly reduced after SOX act. This finding proves our hypothesis that large banks have been affected more compared to small banks by SOX act.

Then, we use SOX act as a validated exogenous shock to earnings management especially for greater banks. We use equation 9 to retest how earnings management affects bank earnings persistence. Column 2 indicates the standard difference in difference results, we found that largest banks after SOX, have a strong increase in earnings adjustment speed relative to small banks. This finding shows that due to reduced earnings management by largest banks after SOX, they lose their power to retain a persistent ROA, ending with a higher speed of earnings adjustment. The t-statistics are substantial (48.92), showing a strong statistical significance. In Column(3), we further control for bank and year fixed effects. The largest banks and Introduction of SOX act, these two dummies have been consumed by bank fixed effects and time fixed effects, respectively.

We still found a positive and significant coefficient on the interaction term. The t-statistic has been dropped from 48.92 to 3.62.

But it is still significant at 1% level. Again, it assures our hypothesis that earnings management significantly reduce earnings adjustment speed by any means. Hence, we could confirm that the relationship between earnings management and earnings adjustment speed is not endogenously connected. Earnings management has a casual impact on earnings adjustment speed. Overall, the results in this section provide further support on the causal impact of bank earnings management on earnings adjustment speed.

In Table 6 B, we conduct an additional analysis that taking Auditing, analysts and state level tax into considerations. We extract the data of number of analysts, type of auditors and state tax rate from I/B/E/S and US Census Bureau. First of all, the coefficients of earnings management on earnings adjustment speed are negative and statistically significant, which are consistent with our baseline findings. In Column(1), we find No of Analysts that following the bank have no significant impact on bank earnings adjustment speed, which implies that banks' earnings persistence is insensitive to outsider analysts. Results from column(2) describe the relationship between earnings adjustment speed and auditor type. Big4 is a binary variable that equals one if the underlying bank is audited by one of the big 4 auditors. The results show that high auditing standard would enhance bank earnings persistence. Column(3) includes the State level tax rates as an additional explanatory variable. The coefficient is insignificant. As a result, our result is robust to outsider auditors, analysts and other tax rates.

Table 6 A

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} + ε_{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)
	Earnings Management	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)
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
Max VIF	4.35	5.66	6.52
N	74731	74731	74731
adj. R-sq	0.0256	0.6939	0.8163

Table 6 B

Determinants of Bank Profit Adjustment Speed: Robust test

This table presents the OLS results for Partial Adjustment Model (ROAit - ROAit-1 = (λi + γit-1Z) GAPit-1 + εit ,GAPit-1 = ROA*it-1 - ROAit-1). We assume that λi to be dynamic, so it varies among banks and over time. Z is a vector of all independent variables. The Lerner index is a bank-level indicator of bank competition, by adopting the stochastic frontier analysis approach, it is calculated as the difference between price and marginal cost as a percentage of prices, the detailed methodology of Lerner index measure is described in appendix. Earnings Management is calculated by applying the discretionary loan loss provision model (Liu and Ryan, 2006). The absolute value of the error term is regarded as the discretionary loan loss provision (DLLP) and the degree of Earnings Management. All other variables are defined in the appendix. T-statistics are reported in the parentheses ,*, **, *** represents the significance level of 10%, 5% and 1% respectively.

	(1)	(2)	(3)	(4)
Earnings Management	-0.018***	-0.018***	-0.018***	-0.018***
	(-4.24)	(-4.23)	(-4.39)	(-4.30)
NO. of Analysts	-0.000			-0.000*
	(-1.50)			(-1.69)
Big4		-0.021***		-0.021***
		(-4.50)		(-4.51)
Tax rate			0.000	0.000
			(0.15)	(0.08)
Z-score	-0.063***	-0.065***	-0.063***	-0.064***
	(-12.65)	(-12.91)	(-12.36)	(-12.46)
Capital Ratio	-0.002	-0.002	-0.003	-0.003
	(-0.32)	(-0.34)	(-0.46)	(-0.46)
Loan to Total Asset	0.065***	0.065***	0.066***	0.065***
	(12.27)	(12.21)	(12.49)	(12.29)
Size	-0.061***	-0.062***	-0.059***	-0.060***
	(-11.11)	(-11.28)	(-10.61)	(-10.82)
Total Assets Growth Rate	-0.016***	-0.016***	-0.016***	-0.016***
	(-4.22)	(-4.21)	(-4.29)	(-4.21)
Managerial Efficiency	0.025***	0.023***	0.026***	0.024***
	(7.53)	(6.73)	(7.74)	(6.84)
Income Diversification	-0.001	-0.001	-0.001	-0.002
	(-0.20)	(-0.47)	(-0.28)	(-0.56)
GDP Growth Rate	-0.071***	-0.071***	-0.072***	-0.072***
	(-21.87)	(-21.94)	(-21.94)	(-21.97)
Inflation	-0.077***	-0.077***	-0.078***	-0.077***
	(-22.43)	(-22.58)	(-22.50)	(-22.40)
GDP Per Capita	-0.265***	-0.263***	-0.267***	-0.266***
	(-40.88)	(-40.51)	(-41.12)	(-40.73)
Constant	0.688***	0.717***	0.681***	0.729***
	(101.35)	(75.80)	(165.91)	(64.78)
Time Fixed Effects	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes
Max VIF	5.42	4.42	4.19	5.59
N	226097	226097	225972	225972
adj. R-sq	0.7072	0.7078	0.7084	0.7091

4.9 Earnings Management on profit persistence: Positive and Negative Gaps

Previously, we have found a casual impact from earnings management on earnings persistence. 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 finding is intuitive, indicating a bank's earnings persistence is a situational consequence by earnings management. If a bank has a lower ROA than expectation, smoothed earnings become meaningless to bank managers. By contrast, to achieve a higher return, banks will employ earnings management to close gaps between target and actual return. However, if a bank has a higher ROA then expectation, the result would be the opposite. As illustrated in column(2), we find that banks that outperforming their target would strive to maintain their profitability, resulting a negative connection between earnings management and speed of earnings adjustment.

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). In regards control variables, we observe Z-score is only significant to earnings adjustment speed when Gap is negative. It implies that when banks have higher return than expected, more stable bank would result in more persistent earnings. This association is not found between Z-score and adjustment speed when ROA is lower than expected. Similarly, we found Capital ratio and Loan to total asset ratio are only statistically significant when GAP is greater than 0. For capital ratio, a negative and significant coefficient means higher capital ratio would lead to a more stable return when GAP>0. For loan to total assets, we found higher loan proportion would lead to more volatile ROA when GAP>0.

Table 7

Determinants of Bank Profit Adjustment Speed Under Different Scenarios

This table presents the OLS results for Partial Adjustment Model ($ROA_{it} - ROA_{it-1} = (\lambda_i + \gamma_{it-1}Z)GAP_{it} + \varepsilon_{it}$, $GAP_{it} = ROA^{*}_{it-1} - ROA_{it-1}$) 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
Earnings Management	0.061***	-0.064***
	(9.66)	(-10.21)
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
Max VIF	4.98	5.23
N	128584	97513
adj. R-sq	0.659	0.613

Next, we analyse 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.

Table 8
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)
Subsample Analysis	Profitability (ROA)			
	below 25%	25%-50%	50%-75%	above 75%
Earnings Management	-0.005	-0.078***	-0.113***	-0.056***
	(-0.67)	(4.82)	(-10.62)	(-6.22)
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
Max VIF	4.35	6.55	5.56	4.80
N	46038	56833	61482	61744
adj. R-sq	0.760	0.745	0.743	0.626

4.10 Earnings Management on profit persistence: Before and after SOX act

As stated in the identification section, we believe the Sarbanes-Oxley Act (SOX) imposed significant impact on financial reporting therefore purified the accounting quality of all listed companies. In this section, we split the sample using SOX as a special event to

check how earnings management influences earnings persistence. We suspect the relationship between earnings management and earnings persistence might be alleviated after 2002. After the act, the room for banks to earnings management is considerably squeezed, which might increase the opportunity cost for earnings smoothing.

To test our expectation, we use secondary partial adjustment model on subsample of year before 2002 and year after 2001 respectively. Results are presented in table 9. Firstly, we found earnings management consistently draw negative and significant effect on earnings adjustment speed, showing that banks have a strong intention to smooth earnings. On the other hand, we interestingly found that the coefficient on earnings management is greater after the SOX act. It increases from 0.011 to 0.106. This result indicates the sensitivity of earnings management to earnings persistence amplified after the SOX act. One possible explanation is that the earnings smoothing behavior is more likely to be neglected in terms of financial reporting quality. Results showing that banks have switched their earnings manipulation aims on earnings persistence after the shock.

Table 9
Determinants of Bank Profit Adjustment Speed and SOX act

This table presents the regression results for Partial Adjustment Model (ROA_{it} - ROA_{it-1} = (λ_i + γ_{it-1}Z) GAP_{it} + ε_{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 2 subsamples to examine the impact of earnings management on profit persistence. We treat the introduction year of SOX(2002) as a split event. Column(1) uses subsample of year before 2002, and (2) uses subsample of year after 2001. *t*-statistics are in parentheses. *, **, *** denote the 10%, 5% and 1% significance levels, respectively. Appendix presents the definitions of variables.

	(1)	(2)
Subsample Analysis	Before SOX	After SOX
Earnings Management	-0.011**	-0.106***
	(-2.17)	(-11.55)
Z-score	-0.044***	-0.023***
	(-9.06)	(-4.46)
Capital Ratio	0.009**	0.000
	(2.39)	(0.05)
Loan to Total Asset	0.000	-0.026***
	(0.07)	(-3.57)
Size	-0.056***	-0.020***
	(-7.64)	(-3.34)
Total Assets Growth	-0.004	0.009*
	(-1.42)	(1.85)
Managerial Efficiency	0.024***	0.029***
	(6.38)	(6.58)
Income Diversification	-0.013***	-0.002
	(-4.04)	(-0.49)
GDP Growth	-0.003	-0.119***
	(-0.76)	(-15.86)
Inflation	0.022***	0.088***
	(6.60)	(8.02)
GDP Per Capita	-0.047***	-1.077***
	(-4.69)	(-57.74)
Constant	0.894***	1.886***
	(142.54)	(72.56)
Time Fixed Effects	Yes	Yes
Bank Fixed Effects	Yes	Yes
Max VIF	5.44	4.75
N	155516	69719
adj.R-sq	0.8566	0.5223

4.11 Earnings Management on profit persistence: Financial Crisis

In this section, we discuss whether financial crisis would have impact on the relationship between bank earnings management and earnings persistence. To perform this analysis, we split our sample into three different subsamples by time. Before Financial Crisis is the years before 2007, during financial crisis is from 2007 to 2009, while after financial crisis is years after 2009. Table 10 describes the results; it shows earnings management is statistically negatively significant to earnings persistence before financial crisis, this result is consistent with our main finding. During financial crisis, the coefficient becomes positive and significant. This suggests that during financial crisis, banks are not going to use earnings management for the purpose of earnings persistence. By contrast, earnings management now increases earnings adjustment speed. A possible reason is that during financial crisis, banks have to reserve a large amount of loan loss provisions to defend huge systematic risk. Then earnings persistence is not a huge priority anymore. During financial crisis, ROA is more volatile than ordinary times, that might also be due to the earnings management issue. Banks might engage into more "big bath" during financial crisis, rather than earnings smoothing. After financial crisis, we didn't find any statistical correlation between earnings management and earnings persistence. The coefficient is negative but insignificant, it could be suspected that earnings management starts to smooth earnings again.

Table 10
Determinants of Bank Profit Adjustment Speed And Financial Crisis

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 3 subsamples to examine the impact of earnings management on profit persistence. We treat the financial crisis(2008-2009) as a split event. Column(1) uses subsample of year before 2002, and (2) uses subsample of year after 2001. *t*-statistics are in parentheses. *, **, *** denote the 10%, 5% and 1% significance levels, respectively. Appendix presents the definitions of variables.

	Before Financial Crisis	During Financial Crisis	After Financial Crisis
	(1)	(2)	(3)
Earnings Management	-0.009***	0.072***	-0.010
	(-4.18)	(3.56)	(-0.84)
Z-score	-0.069***	-0.090***	-0.047***
	(-9.23)	(-6.32)	(-9.00)
Leverage Ratio	0.017***	0.007	0.001
	(5.68)	(1.15)	(0.22)
Loan to Total Asset	-0.005	-0.029	0.027***
	(-0.65)	(-1.57)	(3.05)
Size	-0.110***	-0.079***	-0.010
	(-12.68)	(-6.47)	(-1.62)
Total Assets Growth Rate	0.003	0.021**	-0.024***
	(0.71)	(2.43)	(-3.46)
Managerial Efficiency	0.060***	0.059***	0.013***
	(8.73)	(5.50)	(2.93)
Income Diversification	-0.023***	-0.041***	0.002
	(-3.80)	(-4.61)	(0.86)
GDP Growth Rate	-0.010*	0.050	0.099***
	(-1.81)	(0.77)	(20.56)
Inflation	-0.001	-0.070	-1.175***
	(-0.10)	(-0.97)	(-27.41)
GDP Per Capita	0.017*	0.578***	3.342***
	(1.71)	(9.31)	(17.21)
Constant	0.752***	0.334***	-5.753***
	(107.11)	(190.26)	(-17.46)
Time Fixed Effects	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes
Max VIF	6.34	5.44	3.46
N	190795	18175	21896
adj. R-sq	0.8037	0.7361	0.5234

4.12 Earnings Management on profit persistence: Cross-sectional Analysis

So far, we have classified the data into different subsamples by time. It is a horizontal analysis that could test how banks change earnings management attitude by time. In this section, we run cross-sectional analysis to test whether different type of banks would use earnings management differently from earnings persistence. In this section, we split sample into sub-samples based on the median point of bank Size, Loan to total assets, Z-score, Diversification, Managerial Efficiency, and ROA, respectively.

Table 11 display the results. We found the relationship between earnings management and earnings persistence does not vary regarding different Z-score and size of banks. In addition, banks with lower loan to total assets ratio tend to maintain earnings persistence more than others. More diversified banks are prone to use earnings management to reduce earnings adjustment speed. Banks with lower managerial efficiency will engage more earnings manipulation towards earnings persistence. Similar, bank with higher profitability would sustain earnings persistence using earnings management more than low profitable ones.

Table 11

Determinants of Bank Profit Adjustment Speed: Cross-sectional Analysis

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. In this cross-sectional analysis, we spilt sample into different subsamples according to different firm characteristics, such as Z-score, Loan to total assets ratio, Size..etc. The cutting point is the median of each variable. For reading convenience, I have omitted all the results from control variables. *t*-statistics are in parentheses. *, **, *** denote the 10%, 5% and 1% significance levels, respectively. Appendix presents the definitions of variables.

	Z-score		Loans/total asset		Size	
	Below Median	Above Median	Below Median	Above Median	Below Median	Above Median
	(1)	(2)	(3)	(4)	(5)	(6)
Earnings management	-0.014*	-0.067***	-0.018**	-0.004	-0.037***	-0.018*
	(-1.95)	(-5.57)	(-2.35)	(-0.47)	(-7.59)	(-1.78)
Controls	yes	yes	yes	yes	yes	yes
Time Fixed Effects	yes	yes	yes	yes	yes	yes
Bank Fixed Effects	yes	yes	yes	yes	yes	yes
Max VIF	4.55	4.39	4.87	4.59	4.96	4.44
N	110441	114794	112284	112951	113793	111442
adj. R-sq	0.7094	0.5589	0.7199	0.6475	0.7997	0.5232
	Diversification		Managerial Efficiency		ROA	
	Below Median	Above Median	Below Median	Above Median	Below Median	Above Median
	(7)	(8)	(9)	(10)	(11)	(12)
Earnings management	-0.007	-0.011***	0.002	-0.024***	-0.005	-0.055***
	(-1.30)	(-4.29)	(0.17)	(-3.49)	(-0.78)	(-4.18)
Controls	yes	yes	yes	yes	yes	yes
Time Fixed Effects	yes	yes	yes	yes	yes	yes
Bank Fixed Effects	yes	yes	yes	yes	yes	yes
Max VIF	5.18	3.86	4.86	4.58	5.29	4.87
N	112472	112763	112673	112562	108468	116767
adj. R-sq	0.7241	0.6542	0.4998	0.7579	0.7374	0.5959

4.13 Conclusion

This article evaluates the impact of earnings management on earnings persistence in US banking, using bank-level data spanning 11 years. We document that earnings management has significant negative impact on bank profit persistence in a dynamic fashion. By employing the SOX act as an exogenous shock, our design has successfully addressed the causal relationship between bank profit persistence and earnings management, and our measure of persistence innovatively allow for varying in terms of bank and time. We found banks are less likely to manipulate earnings after SOX act. During financial crisis, banks are more likely to use earnings management as a big bath tool rather than for profit persistence goals.

We contribute to bank and profit persistence literature streams in two ways: first, we investigate how profit persistence varies whether the profitability positively or negatively deviates from the expected return. Bank managers concern less on profit persistence when the banks' returns are under the expected return, while stronger profit persistence has been found if the returns are above the expected return.

Secondly, the partial adjustment statistical results show that earnings management have significant positive impact on profit persistence. Our findings assist the regulator in distinguishing, to what extend, the market power or the internal accounting techniques determine the profit persistence. From an academic point of view, this article introduces the artificial impact of traditional profit persistence researches.

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.

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.
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.
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.
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

Chapter 5

What are the key determinants of bank profit persistence: Competition or Earnings management?

In this chapter, we try to compare the economic and statistical significance between competition and earnings management on earnings persistence. We use a battery of tests to check the economic impact of both competition and earnings management on bank profit persistence. We also introduce investment sentiment as an exogenous variation of market vitality to see how bank profit persistence changes. We find both competition and earnings management have significant impact on profit persistence. We also discovered that competition would increase earnings management.

Then, if higher competition reduces earning persistence and increase earnings management. while, we also observe that higher earnings management would increase earnings persistence. Therefore, we conclude that the effect of competition on earnings persistence is not from earnings management. Furthermore, we find competition has stronger effects on earnings persistence than the one generated by earnings management. We additionally found that earnings management is sensitive to investment sentiment.

5.1 Competition and Earnings management

So far, we have identified both competition and earnings management have statistical impact bank earnings persistence. However, it still remains unknown which factor impact on bank earnings persistence. To find out the major determinant, we first check the relationship between earnings management and competition. Jiang (2018) stated competition may increase transparency, while Betty and Liao(2014) argue banks may increase earnings management due to high competition.

The main hypotheses:

1), Competition has significant impact on Earnings Management.

Table 1 presents the impact of competition on earnings management. The coefficients of both Branching Restriction Index and adjusted Lerner Index are significantly positive, indicating the positive impact of bank competition on earnings management. One inter-quartile increase of Branching Restriction Index leads to the increase of Discretionary Loan Loss Provisions by 0.008%. One standard deviation increase of bank competition leads to the increase of Discretionary Loan Loss Provisions by 0.085% (0.01*0.085). This result is not consistent with those reported in most studies that competition reduces earnings management by increasing the cost of misreporting (Graham et al., 2005; Burks et al., 2016; Jiang et al., 2016). However, this result supports the recent growing studies which find that bank competition encourages bank earnings management (Dou et al., 2016; Lin et al., 2016; Tomy et al., 2016).

Column (3) of Table 1, 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). Overall, we fail to find a negative relation between bank competition and earnings management, although our results reveal a positive relation between earnings management and earnings persistence. Thus, competition could not indirectly reduce earnings persistence through the channel of earnings management. We further control for auditors and analysts that following number. Both competition measures are still statistically significant at least 10% level. Further, we discover that number of analysts are negatively associated with earnings management. However, we do not find any significant association between auditor types and earnings management. Different tax rates in states have also no significant impact on bank earnings management. In Table 1C, we further analyze whether the relationship between competition and earnings management vary in terms of positive and negative earnings management. As mentioned by Beatty and Liao(2014), if banks overstate LLP(positive EM), then the reported earnings will be reduced, but banks could report a higher capital ratio in this context. Since LLP is allowed to be accounted into equity. Hence, bank might reserve more precautionary capital when competition is high, which will lead to more positive EM (positive EM would result in high Equity). On the other hand, banks may also overstate earnings to brag their competitiveness when competition is high. As reported in Table 1C, we find Branching Restriction Index has a positive and significant impact on both positive and negative EM. The coefficient is positive and significant in 1% level. This means banks will use both positive and negative EM to manipulate earnings. This finding is consistent with our initial results.

Apart from Discretionary Loan Loss Provisions model, we also use Available for sale securities as an alternative earnings management channel to test the robustness between competition and earnings management. We follow Beatty and Liao(2014), M.M Cornett et al(2009) to construct a new earnings management derived from available for sale securities:

$$RSGL_{it}=\beta 0 + \beta 1 Sizeit + \beta 2 URSGLit + \epsilon it$$

Where RSGL is the realized security gains and losses as a percentage of total assets, which incorporates realized gains and losses from available for sale securities and held-to-maturities. Size is the natural logarithm of total assets, URSGL is the unrealized gain and loss from available for sale securities to total assets ratio. We do not lag all control variables, which allow us to make count in the impact of contemporary variations in URSGL and Size. We further derive the error term ϵ out, and take the absolute value of it as our new measure of earnings management. Accruals from AFS could count for 15%-25% of total bank accruals. Comparing to accruals from loan loss provisions, which accounts for more than 50% of total bank accruals. The discretionary realized securities gains and losses is the second largest earnings management tool that banks could employ.

Table 2 describes impact from competition on bank discretionary realized securities gains and losses. We found no empirical evidence showing competition would impact on Discretionary realized gain and loss on securities. This result supports our previous findings that showing competition have limited impact on competition. It also indicates that competition has less evidential impact on the variation of available for sale securities. Coefficients on Branching restriction index and adjusted Lerner index are both insignificant in Column (1) and (2). In addition, we found

safer banks are more likely to use DRSGL to manipulate earnings. Capital ratio remains insignificant to DRSGL, showing that banks do not apply DRSGL to influence capital ratio. Big banks tend to manipulate earnings more than small banks, while banks with more loans are less likely to manipulate earnings. This finding assists our argument that competition influences earnings persistence through earnings management channel. Our empirical result suggests competition and earnings management is marginal connected and relationship is not statistically significant enough.

The recent financial crisis draws attention on the dark side of bank financial accounting. Flannery et al (2013) find that banks are unusually opaque during the financial crisis. The bank's equity trading behaviors are more volatile during the crisis period. Meanwhile, they discovered that banks' financial accounting composition has significant impact on banks' equity opacity. It is still difficult to discover which specific subject of accounting standard would explain this type of opacity. During the financial crisis period, market participants become unsure about the portfolios hold by financial institutions. They lose confidence in evaluating intrinsic value of portfolio based on traditional methods. Because during crisis, the insolvency risk rises as whole economy has a downward trend. For example, the market is extremely illiquid because the interbank lending market froze during financial crisis. A key issue in over-cautions about counterparty risk is opacity. When financial institutions are unable to read enough information about counterparties, the lending markets halt(Pritsker, 2010).

Credit flows from banks to firms are not efficient when there is substantial amount of impaired assets in bank's balance sheet. Because there is a strong asymmetric information problem between outsiders and insiders in terms of determining the asset value. In addition, this type of asymmetric information would lead market participants to undervalue banks' assets pool overall, thus lowering the overall bank assets value. In result, this would

increase the cost of financing by overstating the underinvestment problem(Myers and Majlfuf, 1984). During the financial crisis, the US government implemented troubled asset relief program and public private investment program to increase the possibility that banks have enough reserve to keep credit flows. In addition, after 2009, a stress testing was implemented to particularly test the insolvency risk of the systemic important banks. After stress testing result release, market participants have stronger confidence in investing banks, which resulting a lower financing cost. Most large financial institutions are able to issue equities after the announcement of stress test results. Banks might issue equity to either meet regulatory requirements or as an extra reserve of capital.

There is a possibility that bank opacity makes a huge contribution to the recent financial crisis. Recent studies show that rating agencies have more disagreement in terms of banks rather non financial firms (Morgan, 2002). Bank assets composition has a strong connection with rating disagreement. Some argue that disagreements increase because of different status of capital ratio. Also, Hirtle(2006) discovered a strong market reaction after CEOs have certified financial statements. Stock price increases significantly as they perceive this as a signal of reduction in opacity. Morgan(2010) state that banks are neither totally opaque nor totally transparent. In addition, rating agencies normally issue a lower credit rating for unsolicited banks compared to those solicited ones. Because it is much more difficult for rating agency to acquire information from unsolicited banks.

Banks might have lots of earnings management during financial crisis, and indeed much of government's interventions during financial crisis. Since government face difficulties in judging solvent and insolvent institutions. Flannery et al(2013) apply three different factors to test bank opacity. First, the bid and ask spread of a bank would reflect informative of an asset. Since a higher spread indicates that traders hold information that unknown to each

other. A market maker therefore quotes a wider spread to protect herself from losing money when engaging into uninformed counterparties. This bid-ask spread difference might be more significant for banks, since banks involve underwriting and loan monitoring, which is particularly difficult for external investors to observe. Second, they use the extent to which trades have a permanent effect on a stock's price as an indicator of information opacity. If the trade is more transparent, then the price changes upon stock would less likely to reverse. Specifically, if traders are informed, they will move the stock price towards its intrinsic values. However, if the traders are not informed, they are not able to influence stock price permanently. In another word, if the information is more opaque, then its impact on stock price would be more permanent. Kyle(1985) states that insiders have more information about an asset's future payoffs.

Third, they employ trading volume to indicate opacity among banks. However, there is no expectation of the relationship between trading volume and financial accounting quality. When a bank is more opaque, the trading would increase, because there is more disagreement between traders. On the other hand, if more information is disclosed, trading can be stopped because price precisely reflects all information.

Loan loss provisions are so far the most reliable subject in financial accounting to allow banks to manipulate earnings. The change in the effect of loan loss provision on regulatory capital calculations during the pre-BASEL and BASEL period affect the bank earnings management in financial accounting. In pre-BASEL period, there is an opposite effect of the loan loss provision on earnings vs capital requirement imposed by regulators. Thus, if a bank has low capital ratio they could easily increase loan loss provision to make a higher capital ratio, on the contrary, banks might report lower earnings. Beatty(1995) discovers a negative correlation

between capital ratio and loan loss provisions in the pre-BASEL period. This suggests that bank use loan loan provisions match capital requirement.

The capital adequacy requirement was first adopted in early 1990, the initial requirement is only the minimum capital ratio. Since more loan loss provision was related to higher capital ratio. The regulatory capital counts in loan loss allowances. After BASEL enacting, loan loss allowance was not considered into capital adequacy calculation anymore. So Tier 1 capital decrease with loan loss provisions in the new regime, and loan loss allowance was counted into Tier2 capital. In this context, banks with low capital might reduce provisions to avoid violation of minimum capital requirement. The negative correlation between earnings management using discretionary loan loss provisions and regulatory capital is more pronounced after the BASEL accord. Also, Beatty et al(2002) found that public banks tend to use discretionary loan loss provisions more to beat earnings forecast. This indicates that banks have different incentives in terms of earnings manipulation.

The change of financial reporting in banking has strong impact on earnings manipulation incentives. It makes the measurement of earnings management difficult across time. Most common widely applied model is discretionary loan loss provision model. There have been multiple models to estimate earnings management, most of them are cross-sectional models. But different models have different assumptions of control variables, which explain the variation of loan loss provisions. For example, some are considered loan charge-offs and loan loss allowance as exogenous variables that could explain the loan loss provisions. On the other hand, some are considered loan loss allowance and charge-offs as discretionary parts of banks. So far, there is no consensus on which model is the best measure earnings management. Discretionary loan loss provision model is the most prominent model in measuring earnings management. But it is still possible

that banks use other reporting discretion to manage reported earnings and regulatory capital. Also, it is possible that banks use gains and loss from available for sale securities to manipulate earnings. And the one time change in accounting for post retirement benefits also could provide an opportunity to find accounting discretions.

Due to particularity of banks, earnings management for bank researchers has been mainly focused on discretionary loan loss provisions. But it is worth noting that banks could use other methods to manipulate earnings. It becomes increasingly popular to study earnings management from realized gain and loss from available for sale securities in banks. A on-going research by Barth et al.,(2017) show that banks use AFS realized gains and losses to manage earnings and regulatory capitals. AFS is the largest category of securities on the balance sheet of a bank. Banks are detected by using AFS to avoid reporting losses, smoothing earnings and take a big bath if needed. This item has been widely showed that banks would also put their discretion and achieve target in someway. The opportunistically application of earnings management via AFS is a general phenomenon.

Accounting Standard Codification (320) suggests a new treatment of available for sale securities in 1993. Prior that time, investments securities were measured using amortization method. Upon that, each bank needs to disclose the fair value of all investment securities. But banks were not required to report their income or losses of those securities, they will be finally realized as the gain or loss into earnings. ASC 320 requires all entities, including banks, to separate securities into three different ways. First, banks need to report securities that plan to sell in the near future in to Trading securities. Secondly, banks need to report securities that plan to hold to maturity in to hold to maturity. Thirdly, banks need to report report securities that are not for trading or hold either as available for sale

securities. This act also allows banks to switch HTM securities to available for sale securities.

Now, available for sale securities becomes the biggest securities categories. There are two parts of AFS: realized gains and losses are reported into income statement that would impact on financial earnings; unrealized gains and losses are reported in other comprehensive income that would not affect net income. The way of realization could be various, for example, banks could sell securities or dispose them. Securities could also be impaired that is deemed other than temporary. However, unrealized gains and losses of AFS would no affect final earnings of a bank. Regarding capital requirement, unrealized gains and losses from AFS debt or equities are not considered from Tier 1 capital but realized one does. Therefore, it is possible that banks manipulate realized gains or losses from AFS to meet capital requirement. It is better for banks to manipulate earnings using AFS rather than trading or HTM. That is because trading category is measured at fair value and HTM is too costly and risky.

After ASC 320, securities are now required to all reported as fair value, while they are subjected to changes in fair value recognition, and this recognition is realized in the comprehensive income rather than the income part. Therefore, ASC 320 does not disallow banks to manipulate earnings by selectively reporting realized gains and loses. The difference is that the realized gains and losses will go to net income directly or comprehensive income on the other hand. AFS does not only affect earnings through realization, but also affect regulatory capital. Barth et al(2017) find that banks with low regulatory capital will realize more net gains from AFS, in order to increase the capital. Furthermore, banks in general will use available for sale securities to manipulate earnings make it more persistent, which is consistent with traditional earnings management literature. It is

interesting to find out that banks will still smooth earnings disregard of high or low regulatory capital.

Whether banks use AFS to take a big bath is also tested in their paper. Empirically, if banks are earnings positively, they would like to use AFS for smoothing earnings, while if they are losing earnings, AFS is more likely to be manipulated for a big bath. In addition, big bath has been constrained if banks have a low regulatory capital, thus indicating that a negative connection between capital requirement and earnings management.

After the announcement of Accounting Standard Codification (ASC) 320, it is increasingly popular that banks use available for sale 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). ASC 320 specifies that AFS securities be measured as fair value in the statement of financial position, with changes in fair value recognized in other comprehensive income. Following Barth et al. (2015) and Dong and Zhang (2015), we also use realized gains and losses of AFS securities model to measure bank earnings management.

$$\text{AFS securities}_{it} = \beta_1 \text{Net Income}_{it} + \beta_2 \text{ Competition}_{it} + \beta_3 \text{ Net Income x Competition}_{it} + \beta_4 \text{Discretionary Loan Loss Provisions}_{it} + \beta_5 \text{Z-score}_{it} + \beta_6 \text{Capital Ratio}_{it} + \beta_7 \text{ Loan to Total Asset}_{it} + \beta_8 \text{Size}_{it} + \beta_9 \text{Total Assets Growth Rate}_{it} + \beta_{10} \text{Managerial Efficiency}_{it} + \beta_{11} \text{Income Diversification}_{it} + \beta_{12} \text{GDP Growth Rate}_{it} + \beta_{13} \text{Inflation}_{it} + \beta_{14} \text{GDP Per Capita}_{it} + \varepsilon_{it} \quad (4)$$

where AFS securities are realized gains and losses on AFS securities and Net Income is net income before taxes and gains and losses on AFS securities, both deflated by beginning-of- quarter total assets. Competition is IBBEA Index or Adjusted Lerner Index. If banks employ AFS securities to maintain persistent earnings, the coefficient on Net Income β_1, should be negative and if banks under more competition realize more gains from AFS securities, the coefficient on Competition, β_2, is positive. Our interested coefficient is β_3, the interaction variable, Net Income X Competition. 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.

Prior research documents that banks tend to use the item of AFS securities to smooth earnings (Barth et al., 2015; Dong and Zhang, 2015). AFS securities are the largest category of banks' securities and contain a sizable proportion of bank assets (Nissim and Penman, 2007; Laux and Leuz, 2010). Accounting Standards Codification (ASC) Topic 320 specifies that AFS securities 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. Realizing gains and losses on AFS securities is an attractive way to smooth earnings due to its lower cost compared with accruals or real activity manipulation (Barth et al., 2015).

In Appendix of this Chapter, we show the Barth model, and check whether competition influence earnings management via AFS model. In table A1, we found that banks are not going to use earnings management via AFS if the competition is high and they missed their target ROA. It is also interesting to show that banks use more earnings management via AFS if

the performance is above their target. It shows that banks use different fundamentals to manipulate earnings into smoothing behavior. It is also worth mentioning that we also find negative coefficient before the interaction term NI*Adjusted Lerner index. It again manifests our hypothesis that competition impacts on earnings management based on banks' individual circumstance.

Table 1

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)	
Adjusted 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
Max VIF	4.36	4.56
N	214403	214403
adj. R-sq	0.776	0.776

Table 1 B
Competition and Earnings Management: Robust test

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	
Adjusted Lerner Index	0.010***	
	(4.34)	
Branching Restrictions Index		0.00009**
		(2.37)
No. of Analysts	-0.000**	-0.000**
	(-2.40)	(-2.41)
Big 4	-0.000	-0.000
	(-1.34)	(-1.38)
Tax rate	0.000	0.000
	(0.66)	(0.66)
Z-score	-0.000***	-0.000***
	(-10.00)	(-9.99)
Capital Ratio	-0.001	-0.001
	(-1.13)	(-1.12)
Loan to Total Asset	0.008***	0.008***
	(133.45)	(133.72)
Size	0.000***	0.000***
	(6.53)	(6.57)
Total Assets Growth Rate	-0.000***	-0.000***
	(-71.73)	(-72.03)
Managerial Efficiency	-0.000***	-0.000***
	(-3.73)	(-3.76)
Income Diversification	0.000***	0.000***
	(6.20)	(6.19)
GDP Growth Rate	-0.000***	-0.000***
	(-89.09)	(-89.06)
Inflation	-0.003***	-0.003***
	(-186.84)	(-186.90)
GDP Per Capita	0.043***	0.043***
	(53.03)	(53.02)
Constant	-0.446***	-0.446***
	(-49.45)	(-49.43)
Time Fixed Effects	Yes	Yes
Bank Fixed Effects	Yes	Yes
Max VIF	5.68	4.93
N	214403	214304
adj. R-sq	0.7766	0.7767

Table 1 C
Competition and Earnings Management: Positive vs Negative EM

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 and Lerner Index.*t*-statistics are in parentheses. *, **, *** denote the 10%, 5% and 1% significance levels, respectively. Appendix presents the definitions of variables.

	Positive EM	Negative EM
	(1)	(2)
Branching Restriction Index	0.000012***	0.00018***
	(3.21)	(8.96)
No of analysts	-0.000	-0.000
	(-1.06)	(-0.59)
Big 4	-0.000***	-0.000***
	(-2.95)	(-3.31)
Tax rate	0.000***	0.000
	(2.80)	(0.79)
Z-score	-0.000***	0.000
	(-3.52)	(1.59)
Capital Ratio	-0.000	0.001***
	(-0.21)	(2.64)
Loan to Total Asset	0.009***	0.001***
	(80.31)	(27.87)
Size	0.000***	0.000***
	(5.47)	(8.35)
Total Assets Growth Rate	-0.000***	-0.000***
	(-14.20)	(-21.42)
Managerial Efficiency	0.000***	-0.000***
	(6.43)	(-2.82)
Income Diversification	0.000***	0.000
	(2.76)	(1.24)
GDP Growth Rate	-0.000***	-0.000***
	(-17.28)	(-15.91)
Inflation	-0.003***	-0.000***
	(-36.73)	(-22.83)
GDP Per Capita	0.045***	0.005***
	(32.50)	(20.92)
Constant	-0.477***	-0.057***
	(-28.07)	(-21.31)
Time Fixed Effects	Yes	Yes
Bank Fixed Effects	Yes	Yes
Max VIF	5.90	4.91
N	214304	214304
adj. R-sq	0.4133	0.1281

Table 2

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 Realized gain and loss on AFS. 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.

Dependent Variable	DRSGL	
	(1)	(2)
Branching Restrictions Index	-0.00000	
	(-0.19)	
Adjusted Lerner Index		0.00147
		(1.39)
Z-score	0.00000***	0.00000***
	(2.95)	(2.86)
Capital Ratio	0.00017	0.00016
	(0.80)	(0.77)
Loan to Total Asset	-0.00007*	-0.00008**
	(-1.88)	(-2.14)
Size	0.00002**	0.00002***
	(2.26)	(2.90)
Total Assets Growth Rate	0.00000	0.00000
	(1.02)	(1.31)
Managerial Efficiency	0.00000***	0.00002
	(5.35)	(1.57)
Income Diversification	0.00000	-0.00000
	(0.10)	(-0.51)
GDP Growth Rate	-0.00000	-0.00000
	(-0.50)	(-0.63)
Inflation	-0.00001	-0.00001
	(-1.21)	(-1.10)
GDP Per Capita	0.00003	0.00004
	(0.79)	(1.11)
Constant	-0.00067*	-0.00230*
	(-1.79)	(-1.85)
Time Fixed Effects	Yes	Yes
Bank Fixed Effects	Yes	Yes
Max VIF	5.92	4.96
N	125815	125815
adj. R-sq	0.0156	0.0157

5.2 Pure impact from earnings management on earnings persistence

Since we have discovered a direct channel impact from competition on earnings persistence. It is still unknown the relationship between earnings management and earnings persistence when excluding the influence from competition. In this section, we employ orthogonal earnings management from competition to analyse the pure impact of earnings management on earnings persistence. We primarily use Branching restriction index to orthogonize earnings management, since we believe inter state deregulation is a more robust exogenous competition estimate. Table 3 present the results, showing how purely derived earnings management, which is independent of competition, influence on earnings persistence.

Table 3

Bank earnings persistence and Orthogonal EM

This table presents the OLS results for Partial Adjustment Model (ROAit - ROAit-1 = (λi + γit-1Z) GAPit-1 + εit ,GAPit-1 = ROA*it-1 - ROAit-1). We assume that λi to be dynamic, so it varies among banks and over time. Z is a vector of all independent variables. We use Branching restriction index to Orthogonal bank earnings management. Followed by Rice and Strahan(2010), Branching Restrictions is an index that captures the level of interstate branching restrictions, which is an alternative indicator of competition. Lerner index is an alternative measure of competition. The Lerner index is a bank-level indicator of bank competition, by adopting the stochastic frontier analysis approach, it is calculated as the difference between price and marginal cost as a percentage of prices, the detailed methodology of Lerner index measure is described in appendix. All other variables are defined in the appendix. T-statistics are reported in the parentheses ,*, **, *** represents the significance level of 10%, 5% and 1% respectively.

Dependent Variable	Earnings Adjustment Speed	
	(1)	(2)
Orthogonal EM	-0.020***	-0.020***
	(-4.78)	(-4.58)
Adjusted Lerner Index		0.363***
		(6.98)
Z-score	-0.059***	-0.059***
	(-12.53)	(-12.53)
Leverage Ratio	-0.003	-0.003
	(-0.46)	(-0.46)
Loan to Total Asset	0.071***	0.071***
	(12.60)	(12.60)
Size	-0.072***	-0.072***
	(-12.91)	(-12.91)
Total Assets Growth Rate	-0.020***	-0.020***
	(-5.05)	(-5.05)
Managerial Efficiency	-0.342***	-0.342***
	(-6.47)	(-6.47)
Income Diversification	0.010***	0.010***
	(2.83)	(2.83)
GDP Growth Rate	-0.070***	-0.070***
	(-21.42)	(-21.42)
Inflation	-0.077***	-0.077***
	(-22.63)	(-22.63)
GDP Per Capita	-0.276***	-0.276***
	(-39.15)	(-39.15)
Constant	0.680***	0.680***
	(165.42)	(165.42)
Time Fixed Effects	Yes	Yes
Bank Fixed Effects	Yes	Yes
Max VIF	4.55	6.94
N	225235	225235
adj. R-sq	0.7071	0.7071

We found earnings management still has a strong impact on bank earnings adjustment. The coefficient is 0.20 at significant at 1% level. This indicates that banks earnings management increase earnings persistence disregard to the impact of competition. Economically, if there is none competition, a one standard deviation increase in earnings management will cause banks to reduce earnings adjustment speed by 5.4%. We see the pure earnings management itself still have strong impact on bank earnings persistence. 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 column(2), we insert Adjusted Lerner index as an endogenous competition measure, and regression result of Orthogonal earnings management still remains negative and significant. The economic magnitude remains unchanged.

We so far documented that earnings management itself has pure negative and significant impact on bank earnings persistence. However, most studies only focus on the connections between discretionally loan loss provision perspective. We now innovatively use Discretionary realized gain and loss on available for sale securities to see whether banks smooth earnings using securities purchase and selling.

Table 4
Bank earnings persistence and DRSGL

This table presents the OLS results for Partial Adjustment Model (ROAit - ROAit-1 = (λi + γit-1Z) GAPit-1 + εit ,GAPit-1 = ROA*it-1 - ROAit-1). We assume that λi to be dynamic, so it varies among banks and over time. Z is a vector of all independent variables. We use DRSGL as our alternative earnings management measure, which is derived from the AFS model from Beatty and Liao(2014), The Lerner index is a bank-level indicator of bank competition, by adopting the stochastic frontier analysis approach, it is calculated as the difference between price and marginal cost as a percentage of prices, the detailed methodology of Lerner index measure is described in appendix. All other variables are defined in the appendix. T-statistics are reported in the parentheses ,*, **, *** represents the significance level of 10%, 5% and 1% respectively.

Dependent Var	Earnings Adjustment Speed
	(1)
AFS	0.538***
	(4.19)
Z-score	-0.056***
	(-11.35)
Leverage Ratio	-0.010***
	(-2.82)
Loan to Total Asset	0.050***
	(8.85)
Size	-0.045***
	(-7.69)
Total Assets Growth Rate	-0.013***
	(-2.88)
Managerial Efficiency	0.030***
	(7.43)
Income Diversification	-0.006
	(-1.54)
GDP Growth Rate	-0.134***
	(-30.19)
Inflation	-0.021***
	(-2.85)
GDP Per Capita	-0.529***
	(-51.15)
Constant	1.017***
	(85.29)
Time Fixed Effects	Yes
Bank Fixed Effects	Yes
Max VIF	5.33
N	137162
adj. R-sq	0.5724

In table 4, we use discretionary realized securities gains and losses(DRSGL) as an alternative of earnings management to test the relationship between earnings management and bank earnings adjustment using partial adjustment speed model. Results show that DRSGL has strong positive and significant impact on bank earnings adjustment speed. It means banks do not use realized gain and loss on AFS to smooth earnings, on the contrary, DRSGL would continuously close the GAP between target ROA and actual ROA.

Table 5
The Impact of Competition on Bank Earnings Management: GAP>0 vs GAP<0

This table presents the OLS results between competition and earnings management with the full sample 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 Branching Restrictions Index Adjusted Lerner Index. *t*-statistics are in parentheses. *, **, *** denote the 10%, 5% and 1% significance levels, respectively. Appendix presents the definitions of variables.

Dependent variable	Discretionary Loan Loss Provisions			
	Below target GAP>0 (1)	Above target GAP<0 (2)	Below target GAP>0 (3)	Above target GAP<0 (4)
Branching Restrictions Index	0.00000	0.00002**		
	(0.77)	(2.32)		
Adjusted Lerner Index			0.00377	0.01188***
			(1.32)	(4.01)
Z-score	-0.000	-0.000***	-0.000	-0.000***
	(-1.52)	(-14.93)	(-1.59)	(-15.24)
Leverage Ratio	0.002**	-0.003***	0.002**	-0.003***
	(1.98)	(-3.29)	(2.00)	(-3.44)
Loan to Total Asset	0.008***	0.009***	0.008***	0.008***
	(108.44)	(94.53)	(106.65)	(97.32)
Size	0.000***	0.000***	0.000***	0.000***
	(3.41)	(7.71)	(4.32)	(9.67)
Total Assets Growth Rate	-0.000***	-0.000***	-0.000***	-0.000***
	(-49.13)	(-53.47)	(-48.86)	(-55.27)
Managerial Efficiency	-0.000	-0.000***	0.000***	0.000***
	(-0.89)	(-3.81)	(11.30)	(3.36)
Income Diversification	0.000***	0.000***	0.000***	0.000***
	(6.23)	(4.07)	(5.97)	(3.06)
GDP Growth Rate	-0.000***	-0.000***	-0.000***	-0.000***
	(-49.22)	(-49.38)	(-49.64)	(-49.50)
Inflation	-0.003***	-0.003***	-0.003***	-0.003***
	(-177.35)	(-95.00)	(-176.89)	(-94.81)
GDP Per Capita	0.037***	0.044***	0.037***	0.044***
	(30.66)	(34.03)	(30.62)	(33.94)
Constant	-0.388***	-0.457***	-0.391***	-0.469***
	(-29.25)	(-31.92)	(-30.27)	(-33.49)
Time Fixed Effects	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes
Max VIF	4.71	4.20	5.28	5.89
N	128584	97513	128584	97513
adj. R-sq	0.778	0.771	0.778	0.771

Effect from competition on earnings management now are not consistent. For example, we found competition have marginal positive and significant impact on discretionary loan loss provisions. However, we do not find statistical relationship between competition and DRSGL. Further, we divide sample into positive and negative GAPs to see how competition would influence bank earnings management. Table 5 presents the results between competition and *Discretionary Loan Loss Provisions*, we found competition continues to induce bank earnings management, but only under the situation of GAP<0(ROA above target). The coefficients of *Branching restriction index* and *Adjusted Lerner index* are statistically insignificant when GAP>0 and statistically significant at 1% when GAP<0. It shows that the correlation between competition and earnings management is conditional on bank earnings performance.

In this section, we test how pure earnings management would influence earnings persistence. Since competition would impact on earnings management therefore the relationship between earnings management and earnings persistence would be biased. We use competition to orthogonalize discretionary loan loss provisions to estimate a new earnings management measure that is independent to competition. We then use the newly estimated variable into main specification, we found consistent results showing earnings management have strong effect in smoothing earnings persistence. 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).

5.3 Dynamic effect of Interstate branching deregulation on earnings persistence

In this section, we check the dynamic effect of interstate branching deregulation on earnings persistence. According to Bertrand and Mullianathan(2003), and Thomas J. Chemmanur, Shan He and Debarshi K. Nandy(2010), this method could effectively capture the dynamic variation of difference between treatment and control group around a particular event. Here, we treat the introduction year of IBBEA for each state as our event year. we use the following model to test the dynamic impact of IBBEA on earnings adjustment speed:

$$ROA_{it} - ROA_{it-1}=(\sum Before^{t}+\sum After^{t}+\gamma_{it-1}Z)\ GAP_{it-1}+ \varepsilon_{it},$$

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. The results are available ainTable 6 Column(4) to Column(6). We found that coefficients on After1, After2, After3, After4 are 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. Before 5 and Before 4 are also sstatisticallysignificant. It suggests that banks tend to preserve more earnings before the state started to deregulate. We use bank level cluster, state level cluster and state year level cluster for column(4), (5) and (6) respectively. All three columns show consistent results, which further asserts our basic findings. In addition, we employ these three different clustering methods on Branching restriction index. Column(1) to (3) describe the results, we found results remain

positive and significant, the difference is that t-statistics decreases as the cluster levels sstartfrom bank to state and state-year level.

Table 6
Determinants of Bank Profit Adjustment Speed: Robust test

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. Column (1) to (3) follow baseline model using *Branching Restrictions Index* as interested variable. Column (4) to (6) use the event DID results. [ROAit - ROAit-1=($\sum$Before^t+$\sum$After^t+γi_{t-1}Z) GAP_{it-1}+ ε_{it}, GAPit-1 = ROA*it-1 - ROAit-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. All columns apply OLS regression. Discretionary Loan Loss Provisions are the proxy for earnings management across all columns. For Column(1) and (4), standard errors are clustered at bank level. For Column(2) and (5), standard errors are clustered at state level. For Column(3) and (6), standard errors are clustered at state-year level. 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)	(6)
Branching Restrictions Index	0.091***	0.091***	0.091***			
	(12.01)	(3.80)	(4.74)			
Before ^{5}				-0.037**	-0.037***	-0.037**
				(-2.57)	(-2.68)	(-2.27)
Before ^{4}				-0.031*	-0.031*	-0.031
				(-1.82)	(-1.68)	(-1.48)
Before ^{3}				0.006	0.006	0.006
				(0.37)	(0.27)	(0.25)
Before ^{2}				-0.020	-0.020	-0.020
				(-1.21)	(-1.29)	(-0.96)
Before ^{1}				0.011	0.011	0.011
				(0.90)	(0.76)	(0.55)
After ^{1}				0.034***	0.034**	0.034*
				(2.59)	(2.15)	(1.67)
After ^{2}				0.258***	0.258***	0.258***
				(4.02)	(12.64)	(14.30)
After ^{3}				0.1190*	0.1190***	0.1190***
				(1.78)	(7.31)	(8.51)
After ^{4}				0.032**	0.032**	0.032**
				(2.56)	(2.52)	(2.19)
After ^{5}				0.008	0.008	0.008
				(0.61)	(0.49)	(0.53)
Discretionary Loan Loss provisions	-0.126**	-0.126*	-0.126***	-0.113*	-0.113	-0.113**
	(-2.32)	(-1.89)	(-2.63)	(-1.89)	(-1.45)	(-2.11)
Constant	0.7025***	0.7025***	0.7025***	0.7585***	0.7585***	0.7585***
	(19.55)	(21.07)	(16.69)	(112.92)	(95.80)	(127.02)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	No	Yes	Yes	No	Yes	Yes
State Fixed Effects	Yes	No	No	Yes	No	No
Level of Standard Errors Clustering	Bank	State	State-year	Bank	State	State-year
Max VIF	4.86	4.78	5.11	4.14	4.55	5.10
N	77929	77929	77929	59377	59377	59377
adj. R-sq	0.7379	0.7979	0.7979	0.6870	0.7870	0.7870

5.4 Investment sentiment and bank earning persistence

Investment sentiment has recently attracted considerable attention in finance research. As mentioned by Baker and Wurgler's (2007), stocks price is not solely determined by the firm cash flows and investment risks by the facts at hand. In the presence of investor sentiment, managers will respond to investors' sentiment-driven expectations by manipulating the firms' current assets into a most appealing way to the potential investors. One of the obvious ways to such manipulation is earnings management. In Simpson's(2013) study, a strong connection between earnings management and investor sentiment is found, showing that managers prone to use discretionary accruals to fit with investor sentiments. For example, managers inflate earnings when investor sentiment is high to attract more attention. On the other hand, managers will report more conservatively when the market is under low sentiment. This evidence shows that managers intentionally use earnings management in the need for increased attention from investors.

However, the relationship between investor sentiment and earnings persistence is yet researched. And none prior studies have focused on banking side. Similar to traditional industries, banks' managers might also manipulate earnings responding to different investor sentiment.

There is a possibility that banks smooth earnings for market performance. Then, bank earnings manipulation towards more persistent earnings should be affected by different market situations. We then introduce investment sentiment measure into earnings persistence model to see whether banks

react differently when market is under different sentiment. Our sentiment index is borrowed from Lee (2014), then we split the market timing into high sentiment(index>0) and low sentiment(index<0) period. By running the subsample analysis, we could check whether banks changed earnings management target responding to different situations of investment sentiment. From table 7 panel A column (1) and (2), coefficients on earnings management show different outcomes. Specifically, when market has a positive sentiment, banks have no interest in manipulating earnings persistently. On the other hand, when market has a negative sentiment, earnings management becomes negative and significant to earnings adjustment speed. The coefficient is -0.049 and it is statistically significant at 1% level. It indicates a one standard deviation increase of earnings management would increase earnings adjustment speed by 1.35%.

Results show that banks manipulate earnings to persistence level based on market situations. We further test subsample regression based on crisis period or non-crisis period to check whether our findings are consistent. In table7 panel A column (3) and (4), results show that banks are reluctant to use earnings management to smooth earnings when market is under unhealthy circumstance, the coefficient is positive but insignificant in column (3). While during non-financial crisis period, coefficient before earnings management is negative and significant at 1 % to earning adjustment speed. The magnitude of coefficient is 0.4, which in term generate 1.08% adjustment reduction. The economic impact is similar during low sentiment and financial crisis.

Table 7 Panel A

Investment Sentiment and Bank earnings persistence

Dependent variables $\Delta ROA=ROA_t-ROA_{t-1}$. The unit of analysis is the firm-year. EM is earnings management indicator, by applying the discretionary loan loss provision model (Liu and Ryan,2006), the absolute value of the error term is regarded as the discretionary loan loss provision(DLLP) and the degree of Earnings Management. 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 price. All other variables are defined in the appendix.

Dependent Variable	Earnings Adjustment Speed							
Sentiment and Crisis	Sentiment >0		Sentiment <0		2007-2009		Other	
	High Sentiment		Low Sentiment		During Crisis		No Crisis	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
GAP	0.756***	69.43	0.750***	156.73	1.630***	4.73	0.657***	152.2
Earnings Management	-0.006	(-0.99)	-0.049***	(-8.29)	0.013	0.88	-0.040***	(-9.33)
Market Power(Lerner Index)	-0.096	(-1.20)	-0.290***	(-5.13)	0.117	0.59	-0.275***	(-5.26)
Z-score	-0.055***	(-8.02)	-0.045***	(-9.63)	-0.065***	(-6.32)	-0.051***	(-11.46)
Leverage ratio	0.010*	1.85	0.002	0.58	0	0.05	0	0.05
Loan to total asset	0.037***	3.5	0.014**	2.11	-0.008	(-0.43)	0.072***	12.94
Size	-0.088***	(-9.22)	-0.066***	(-11.30)	-0.072***	(-5.37)	-0.068***	(-11.09)
Total Assets Growth rate	-0.015**	(-2.23)	0.001	0.22	0.005	0.44	-0.026***	(-6.43)
Managerial efficiency	-0.091	(-1.14)	-0.268***	(-4.66)	0.142	0.71	-0.262***	(-4.97)
Income diversification	-0.013**	(-2.20)	0.006	1.49	-0.039***	(-3.24)	0.018***	5.41
GDP growth rate	0.045***	5.24	-0.047***	(-11.81)	-0.261**	(-2.56)	0.032***	8.3
Inflation	0.057***	10.1	-0.126***	(-31.04)	0.287**	2.24	-0.046***	(-12.07)
GDP per capita	-0.053***	(-3.58)	-0.352***	(-46.75)	-0.729**	(-2.20)	-0.281***	(-42.08)
Constant	0.009***	4.36	0	1.12	-0.002***	(-32.79)	-0.000*	(-1.71)
Time fixed effects	Yes		Yes		Yes		Yes	
Bank fixed effects	Yes		Yes		Yes		Yes	
Max VIF	4.51		6.10		4.18		5.35	
N	65736		160718		26325		200129	
adj. R-sq	0.8541		0.6605		0.793		0.7191	

Table 7 Panel B

Investment Sentiment and Bank earnings persistence: GAP>0 or GAP<0

Notes: This table presents the OLS results for Partial Adjustment Model by splitting the sample by considering investment sentiment. The unit of analysis is the firm-year. EM is earnings management indicator, by applying the discretionary loan loss provision model (Liu and Ryan, 2006). The absolute value of the error term is regarded as the discretionary loan loss provision (DLLP) and the degree of Earnings Management. 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 price. All other variables are defined in the appendix. *, **, *** represents the significance level of 10%, 5% and 1% respectively.

Determinants of Profit Adjustment Speed	GAP>0				GAP<0			
	Sentiment >0 Coefficient	t-value	Sentiment <0 Coefficient	t-value	Sentiment >0 Coefficient	t-value	Sentiment <0 Coefficient	t-value
GAP	0.845***	37.45	0.788***	79.71	0.759***	53.87	0.714***	74.1
Earnings Management	0.036***	3.93	0	(-0.02)	-0.064***	(-5.94)	0.111***	12.2
Market Power(Lerner Index)	0.360**	2.34	-0.274***	(-2.96)	-0.460***	(-4.05)	-0.252***	(-2.78)
Z-score	0.014	0.75	-0.010*	(-1.75)	-0.112***	(-9.00)	-0.090***	(-7.75)
Leverage ratio	0.006	0.68	-0.002	(-0.41)	0.016***	6.44	0.006	1.22
Loan to total asset	0.030**	2.31	0.031***	3.29	-0.023*	(-1.66)	-0.048***	(-4.16)
Size	-0.083***	(-4.48)	-0.050***	(-5.45)	-0.120***	(-8.88)	-0.075***	(-7.92)
Total Assets Growth rate	-0.015*	(-1.91)	-0.016***	(-2.79)	0.019**	2.47	0.043***	5.52
Managerial efficiency	0.323**	2.12	-0.279***	(-3.00)	-0.377***	(-3.27)	-0.182**	(-1.99)
Income diversification	-0.022***	(-2.93)	0.025***	5.29	-0.007	(-0.62)	-0.037***	(-4.86)
GDP growth rate	0.064***	3.04	-0.021***	(-3.06)	0.002	0.11	-0.046***	(-6.56)
Inflation	0.022**	2.47	-0.183***	(-25.87)	0.144***	12.82	-0.056***	(-7.16)
GDP per capita	-0.023	(-1.09)	-0.397***	(-29.92)	0.060***	3.34	-0.243***	(-18.00)
Constant	-0.011***	(-3.66)	-0.001***	(-10.68)	0.027***	13.2	0.004***	15.52
Time fixed effects	Yes		Yes		Yes		Yes	
Bank fixed effects	Yes		Yes		Yes		Yes	
Max VIF	4.19		4.81		5.24		5.51	
N	31625		34111		97133		63585	
adj. R-sq	0.84		0.73		0.57		0.56	

Based on current findings that bank only smooth earnings during low sentiment period, we further split the sample into positive and negative GAPs to test whether banks have different functionality in terms of earnings management decisions. We find that earnings management has a strong

connection with bank earnings persistence when GAP <0 and investment sentiment is greater than 0. Intuitively, banks have a strong incentive to persistent earnings when their return is bigger than the original target, also when the market shows a high investment sentiment. In addition, when GAP>0 and sentiment>0, earnings management are positively correlated to earning adjustment speed, showing that banks want to catch up with target ROA strongly if market has a high sentiment. It is intuitive that if banks would like to keep themselves beating their target if they sense the market is energetic and sensitive to firm performance. When market is booming, investors are more active in seeking for good investment opportunities, thereby evaluating financial information deeper, which would drive banks to have a greater incentive to generate nicer financial performance. In this context, bank managers use greater earnings management to boost ROA, thereby attracting more investment.

Interestingly, if sentiment is low, even banks are outperforming their target, earnings management was applied to reduce profit persistence. It is possibly because lack of incentive to smooth earnings when macro situation is bad. In contrast, they would increase profitability mean reverting process by increase earning adjustment speed using earnings management. This is consistent to the big bath story(Dou et al., 2016; Lin et al., 2016; Tomy et al., 2016), when market is under adverse condition, firms are more likely do a big bath and reserve earnings for future.

5.5 Investment sentiment and earnings management

In the last section, we show that relationship between earnings management and earnings persistence would vary depending on different investment sentiment. The main idea is that banks might change their earnings management strategy solely based on investment sentiment. Therefore, we regress earnings management on investment sentiment to check the relationship between sentiment and earnings management. Table 8 presents the results. In panel A, we use DLLP as earnings management, we found investment sentiment is strongly negatively connected to earnings management. This indicates that banks apply fewer earnings management in high investment sentiment period. It is not only statistically but also economically significant. And this effect is insensitive to positive or negative GAPs, which means high market sentiment is beneficial to bank transparency overall. In table 8 panel B, we change our dependent variable to discretionary realized gain and loss on available for sale securities. A consistent relationship is found between earnings management and investment sentiment, showing that AFS manipulation reduces as investment increases. Therefore, we could conclude that a good market sentiment would increase transparency and discipline banks behaviour.

Table8 Panel A

Investment Sentiment and Bank earnings Management: DLLP

This table presents the OLS results between earnings management and investment sentiment with the full sample. The dependent variable, earnings management, is measured by Discretionary loan loss provisions (DLLP).*t*-statistics are in parentheses. *, **, *** denote the 10%, 5% and 1% significance levels, respectively. Appendix presents the definitions of variables.

Dependent Variable	DLLP		
	All Sample	GAP>0	GAP<0
	(1)	(2)	(3)
Investment Sentiment	-0.005***	-0.005***	-0.006***
	(-62.27)	(-36.50)	(-36.59)
Z-score	-0.000***	-0.000	-0.000***
	(-10.29)	(-1.58)	(-14.93)
Leverage Ratio	-0.001	0.002**	-0.003***
	(-1.14)	(2.00)	(-3.29)
Loan to Total Asset	0.008***	0.008***	0.009***
	(131.75)	(106.66)	(94.53)
Size	0.000***	0.000***	0.000***
	(8.63)	(4.32)	(7.71)
Total Assets Growth Rate	-0.000***	-0.000***	-0.000***
	(-70.69)	(-48.86)	(-53.47)
Managerial Efficiency	0.000***	0.000***	-0.000***
	(13.91)	(11.30)	(-3.81)
Income Diversification	0.000***	0.000***	0.000***
	(4.95)	(5.96)	(4.07)
GDP Growth Rate	-0.000***	-0.000***	-0.000***
	(-53.45)	(-27.00)	(-24.56)
Inflation	-0.002***	-0.003***	-0.002***
	(-184.72)	(-179.04)	(-90.60)
GDP Per Capita	-0.023***	-0.023***	-0.025***
	(-54.23)	(-34.17)	(-27.08)
Constant	0.255***	0.246***	0.288***
	(54.60)	(34.40)	(26.78)
Time fixed effects	yes	yes	yes
Bank fixed effects	yes	yes	yes
Max VIF	4.19	4.27	4.66
N	213545	119985	93560
adj. R-sq	0.7764	0.7783	0.7717

Table8 Panel B

Investment Sentiment and Bank earnings Management: DRSGL

This table presents the OLS results between earnings management and investment sentiment with the full sample. The dependent variable, earnings management, is measured by Discretionary realized gain and loss from available for sale securities(DRSGL).*t*-statistics are in parentheses. *, **, *** denote the 10%, 5% and 1% significance levels, respectively. Appendix presents the definitions of variables.

Dependent Variable	DRSGL		
	All Sample	GAP>0	GAP<0
	(1)	(2)	(3)
Investment Sentiment	-0.0004***	-0.0004***	-0.0004***
	(-9.01)	(-5.57)	(-8.02)
Z-score	0.0000***	0.0000	0.0000***
	(3.09)	(1.64)	(3.21)
Leverage Ratio	0.0002	0.0000	0.0004
	(0.82)	(0.14)	(1.49)
Loan to Total Asset	-0.0001***	-0.0000*	-0.0001**
	(-3.42)	(-1.74)	(-2.22)
Size	0.0000**	0.0000*	0.0000*
	(2.07)	(1.85)	(1.65)
Total Assets Growth Rate	0.0000	0.0000	0.0000
	(1.61)	(1.29)	(0.61)
Managerial Efficiency	0.0000***	0.0000**	0.0000
	(5.33)	(2.41)	(0.57)
Income Diversification	0.0000	0.0000	-0.0000
	(0.11)	(0.48)	(-0.43)
GDP Growth Rate	0.0000	0.0000	0.0000
	(0.46)	(0.17)	(1.53)
Inflation	-0.0000***	-0.0000***	-0.0001***
	(-5.56)	(-2.61)	(-5.25)
GDP Per Capita	-0.0010***	-0.0010***	-0.0012***
	(-7.18)	(-4.68)	(-4.63)
Constant	0.0107***	0.0103***	0.0115***
	(6.75)	(4.38)	(3.66)
Time fixed effects	yes	yes	yes
Bank fixed effects	yes	yes	yes
Max VIF	4.10	4.51	5.22
N	125815	78491	47324
adj. R-sq	0.0156	0.0126	0.0221

5.6 Discussion

In this supplement chapter, we further discussed whether competition itself would impact on earnings management. We use a battery of tests to check the economic impact of both competition and earnings management on bank profit persistence. We also introduce investment sentiment as an exogenous variation of market vitality to see how bank profit persistence changes. We find both competition and earnings management have significant impact on profit persistence. We also discovered that competition would increase earnings management. Then, if higher competition reduces earning persistence and increase earnings management. while, we also observe that higher earnings management would increase earnings persistence. Therefore, we conclude that the effect of competition on earnings persistence is from earnings management. Furthermore, we find that competition impacts on earnings persistence is strong enough to overcome the marginal effect that boosted from earnings management due to high competition. We additionally found that earnings management is sensitive to investment sentiment.

We reveal a positive relation between earnings management and earnings persistence. Our further analysis in this sub-section does not find a negative relation between bank competition and earnings management. We found earnings management still has a strong impact on bank earnings adjustment. This indicates that banks earnings management increase earnings persistence disregard to the impact of competition. We see the pure earnings management itself still have strong impact on bank earnings persistence. 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 column(2) , we insert Adjusted Lerner index as an endogenous competition measure, and regression result of Orthogonal earnings management still

remains negative and significant. The economic magnitude remains unchanged.

we test how pure earnings management would influence earnings persistence. Since competition would impact on earnings management therefore the relationship between earnings management and earnings persistence would be biased. We use competition to orthogonalize discretionary loan loss provisions to estimate a new earnings management measure that is independent to competition. We then use the newly estimated variable into main specification, we found consistent results showing earnings management have strong effect in smoothing earnings persistence. 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).

Thus, our evidence suggests that competition does not reduce earnings persistence indirectly through the channel of earnings management. we also tested relationship between earnings management and earnings persistence would vary depending on different investment sentiment. The main idea is that banks might change their earnings management strategy solely based on investment sentiment. Therefore, we regress earnings management on investment sentiment to check the relationship between sentiment and earnings management. Our results suggest that earnings management are subjective outside market sentiment. When the market is under high sentiment, banks are less likely to manipulate earnings. This help us identify that banks use earnings management differently, then competition effect on earnings persistence is more pronounced, comparing to earnings management on earnings persistence.

Appendix

Table A1
The Impact of Competition on Bank Realized gains/losses of AFS: GAP>0 vs GAP<0

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 Branching Restrictions index measure is a state level competition measure. The Adjusted Lerner index is a bank-level competition measure. The detailed methodology of Lerner measure is described in the appendix. Earnings Management is calculated by applying the discretionary loan loss provision model (Liu and Ryan, 2006). The absolute value of the error term is regarded as the discretionary loan loss provision (DLLP) and the degree of Earnings Management. All other variables are defined in the appendix. *, **, *** represents the significance level of 10%, 5% and 1% respectively.

Dependent Variable	Realized gains/losses of AFS			
	Below target GAP>0	Above target GAP<0	Below target GAP>0	Above target GAP<0
	(1)	(2)	(3)	(4)
NI	-0.012***	-0.008***	-0.012***	-0.010***
	(-24.04)	(-18.07)	(-16.56)	(-14.28)
Branching Restrictions Index	0.000001*	0.000		
	(1.69)	(1.04)		
NI*Branching Restrictions Index	0.000	0.000		
	(0.53)	(1.46)		
Adjusted Lerner Index			-0.001	-0.001
			(-1.16)	(-0.93)
NI*Adjusted Lerner Index			-0.003	-0.007***
			(-1.34)	(-3.58)
Discretionary Loan Loss Provisions	0.001	0.059***	0.001	0.051***
	(1.19)	(6.36)	(1.30)	(6.87)
Z-score	-0.000*	0.000	-0.000*	0.000
	(-1.87)	(1.39)	(-1.78)	(1.26)
Capital Ratio	-0.000	0.000***	-0.000	0.000***
	(-0.47)	(3.20)	(-0.59)	(3.20)
Loan to Total Asset	-0.001***	-0.003***	-0.001***	-0.002***
	(-7.51)	(-8.48)	(-6.92)	(-8.29)
Size	0.002***	0.003***	0.002***	0.005***
	(9.52)	(6.42)	(8.10)	(5.13)
Total Assets Growth Rate	0.000***	0.000	0.000***	0.000
	(4.59)	(1.43)	(3.76)	(0.60)
Managerial Efficiency	-0.007***	-0.000***	-0.000	-0.005***
	(-22.31)	(-14.51)	(-1.34)	(-2.83)
Income Diversification	-0.000***	-0.000***	-0.000***	-0.000**
	(-5.38)	(-3.89)	(-3.89)	(-2.54)
GDP Growth Rate	0.000	0.000***	0.000	0.000***
	(1.19)	(3.91)	(1.47)	(4.26)
Inflation	-0.009***	-0.003***	-0.009***	-0.003***
	(-6.73)	(-3.55)	(-6.82)	(-3.56)
GDP Per Capita	-0.008***	-0.000**	-0.003***	0.000
	(-5.48)	(-1.98)	(-4.40)	(1.06)
Constant	-0.001***	-0.001***	-0.000	0.000
	(-9.50)	(-5.42)	(-0.35)	(0.95)
Time Fixed Effects	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes
Max VIF	5.12	4.91	3.89	5.41
N	78491	47324	78491	47324
adj. R-sq	0.079	0.081	0.079	0.081

Chapter 6

Conclusion

This thesis studies two primary determinants of bank profit persistence. Persistent profit is a natural outcome of earnings management, as largely suggested by accounting literature. However, mean reverting theory suggests that profit persistence is a not a usual phenomenon under intensive competition. Economic scholars define that any abnormal return that above equilibrium will fade away quickly if competition is high. Chapter 2 studies literature on these two main stream topics and provides a background of bank opacity. This thesis tries to reconcile these two strand literature particularly on banking sector.

Chapter 3 studies the economic theory on competition and bank profit persistence. It evaluates the impact of competition on profit persistence in US banking, using bank-level data spanning 11 years. We document that competition has significant negative impact on bank profit persistence both at market level and individual level in a dynamic fashion. Our design has successfully addressed the causal relationship between bank profit persistence and competition, and our measure of persistence innovatively allow for varying in terms of bank and time. We contribute to bank and profit persistence literature streams in two ways: first, we investigate how profit persistence varies whether the profitability positively or negatively deviates from the expected return. Bank managers concern less on profit persistence when the banks' returns are under the expected to return, while stronger profit persistence has been found if the returns are above the expected return.

Secondly, the partial adjustment statistical results show that both market power and IBBEA index have significant positive impact on profit persistence. Our findings assist the regulator in distinguishing, to what extend, the market power or the internal accounting techniques determine the profit persistence. From an academic point of view, this article introduces the artificial impact of traditional profit persistence researches.

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.

Chapter 4 studies the accounting theory on earnings management and bank profit persistence. This article evaluates the impact of earnings management on earnings persistence in US banking, using bank-level data spanning 11 years. We document that earnings management has significant negative impact on bank profit persistence in a dynamic fashion. By employing the SOX act as an exogenous shock, our design has successfully addressed the causal relationship between bank profit persistence and earnings management, and our measure of persistence innovatively allow for varying in terms of bank and time. We found banks are less likely to manipulate earnings after SOX act. During financial crisis, banks are more likely to use earnings management as a big bath tool rather than for profit persistence goals.

We contribute to bank and profit persistence literature streams in two ways: first, we investigate how profit persistence varies whether the profitability positively or negatively deviates from the expected return. Bank managers concern less on profit persistence when the banks' returns are under the expected return, while stronger profit persistence has been found if the returns are above the expected return. Secondly, the partial adjustment statistical results show that earnings management have significant positive impact on profit persistence. Our findings assist the regulator in distinguishing, to what extend, the market power or the internal accounting techniques determine the profit persistence. From an academic point of view, this article introduces the artificial impact of traditional profit persistence researches. 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.

Chapter 5 studies the relationship between earnings management, competition and profit persistence in banking. In this supplement chapter, we further discussed whether competition itself would impact on earnings management. We use a battery of tests to check the economic impact of both competition and earnings management on bank profit persistence. We also introduce investment sentiment as an exogenous variation of market vitality to see how bank profit persistence changes. We find both competition and earnings management have significant impact on profit persistence. We also discovered that competition would increase earnings management. Then, if higher competition reduces earning persistence and increase earnings management. while, we also observe that higher earnings management would increase earnings persistence. Therefore, we conclude that the effect of competition on earnings persistence is from earnings management. Furthermore, we find that competition impacts on earnings persistence is strong enough to overcome the marginal effect that boosted

from earnings management due to high competition. We additionally found that earnings management is sensitive to investment sentiment.

We reveal a positive relation between earnings management and earnings persistence. Our further analysis in this sub-section does not find a negative relation between bank competition and earnings management. We found earnings management still has a strong impact on bank earnings adjustment. This indicates that banks earnings management increase earnings persistence disregard to the impact of competition. We see the pure earnings management itself still have strong impact on bank earnings persistence. 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). we test how pure earnings management would influence on earnings persistence.

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Our work has put efforts in contributing earnings management in banking by studying how banks smooth earnings under different levels of competition. Earnings management could produce opacity in banks, which creates barriers for outsider investors to value banks. However, unlike ordinary firms, it could be beneficial for banks to maintain certain level of opacity. For example, the privacy of loans information could help banks increase financial stability as each loan on the balance sheet will be maintained as face value. A further disclosure requirement on banks may induce instability of banks. Then a further question arises, as to what extend banks need to disclose financial information. Is there an optimal point for disclosure? In addition, our study main focuses on information asymmetry that induced by loan loss provisions. Is that a regulatory capital effect from loan loss provisions?

Several limitations of our study are also worth noting. First, research models in earnings management of banking could be strengthened. Loan loss provisions have been widely examined as a predominant tool of earnings management. However, managers have several other feasible vehicles to manipulate earnings, it includes available for sale securities,

securitizations, off balance sheet grants and so on. This study only incorporates loan loss provisions and available for sale securities. Second, a further research into competition and earnings management could be helping. Thirdly, this study use time fixed effects to rule out the effect of regulators on banks earnings management. Does financial reporting discretion would improve during the BASEL evolutions? Finally, this study calls for attention on earnings persistence, which could be an important factor that banking scholars have been neglected.

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