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Master thesis

Earnings management behaviour among the systemically important banks and non-systemically important banks in the USA banking industry

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Abstract

Income smoothing behaviour through loan loss provision is a financial reporting mechanism which could influence financial system stability. This paper compares the income smoothing behaviour among systemically influential banks (SIB) and non-systemically important banks in the USA before, during, and after the economic crisis. The empirical results suggest that non-SIBs exhibit greater income smoothing behaviour through loan loss provisions (LLPs) than SIBs when dealing with high earnings. Also, the earning management behaviour is more pronounced in the SIBs in the post-crisis period, but less pronounced during and before the crisis period. Furthermore, the empirical results of the last hypothesis indicate that after 2011 the SIBs are less likely to recognise loan loss in a timely manner compared to non-SIBs. This study provides additional evidence that the reinforced regulations might bring about negative effects on the stability of systemic shocks through an increase in income smoothing behaviour. The results of my finding are useful for the regulator, investor, auditor, and all other stakeholders to have a more accurate interpretation on the earning management behaviour of the banking industry and enhance financial system stability through evaluating financial statements properly and improving the financial regulatory environment.

Keywords: loan loss provision, income smoothing, systemically important banks, timeliness loan loss recognition, the Dodd-Frank Act, the United States

1. Introduction

After the global financial crisis, regulators and policymakers promoted the "too big to fail" issue of large and powerful financial institutions and made substantial efforts to increase financial stability. The Financial Stability Board and Basel Committee have labelled banks with larger scales and influence on the global financial markets as global systemically important banks (G-SIBs) in 2011. Later the United States extended the G-SIB framework expeditiously to domestic systemically important banks (D-SIBs) through signing the Dodd-Frank Wall Street Reform. The D-SIB list in America not only include financial institutions in G-SIBs, but also those banks that have a substantial domestic influence. According to the Dodd-Frank Act, the USA explored its own methods to identify the systemic importance of individual banks. Bank holding companies with total consolidated assets of $50 billion or more are to be classified as domestic systemically important banks.

Earning management refers to using accounting practices to alter financial statements that, in turn, might influence the stakeholders' decision-making process. Additionally, income smoothing is a type of earning management behaviour that can produce both positive and negative effects on financial stability, while loan loss provision (LLP) is a special amount that has been designated as an allowance for bad loans and plays a significant role in the financial statements, which directly influence the numbers of earning reports. Also, bank managers have incentives to report smoothed earnings based on the timing of recognition and managerial discretion relating to loan loss provisions. Many existing works of literature debate the various incentives that are used for loan loss provisions (LLPs) to smooth earnings. The positive effect suggests that bank managers might manipulate LLPs to pursue the goal of making the report earnings more stable and persistent. (Greenawalt & Sinkey, 1988; Lobo & Yang, 2001; Kanagaretnam et al., 2005). The negative effect suggests that bank managers might use the loan loss provision to manipulate earnings and, therefore, ensure that the earnings are never too high or too low. Greenawalt et al. (1988) posited that banks might set aside more LLPs when earnings are high in anticipation of losses in the future. Skala (2015) proffered that banks reserve less LLPs and draw from the LLPs in the previous period to cover the current losses.

Prior literature also provides evidence that income smoothing behaviour might differ among SIBs and non-SIBs based on their attributes of being systemically important or too-big-to-fail. Ozili (2017) in his paper determined that income smoothing behaviour is more pronounced among the not-too-big-to-fail European banks. He examined empirical data in different economic periods and ascertained that larger banks with a higher income were more

likely to engage in income smoothing behaviour during the post-crisis period. Later, Peterson and Arun (2018) also determined that income smoothing is more pronounced among global systemically important banks only in the post-crisis time, whereas non-G-SIBs in the pre-crisis period were more prone to manipulating earning through LLPs. Furthermore, large financial institutions are more likely to experience pressure from stakeholders and are not allowed to fail when it comes to benefits. In this aspect, big banks have more motivation to utilise the loan loss provision to smooth earnings when the earnings cannot meet the stakeholders' expectations. On the other hand, SIBs might pay more costs than non-systemically banks while engaging in earnings management. Hope, Thomas, and Vyas (2013) discovered that public sectors of the United States have less motivation to manage their accounts. Nichols, Wahlen, and Wieland (2009) also found that public banks are more conditionally conservative than private banks, while recognising earnings and loan loss provisions through recognising loan loss is timelier than with private banks.

Based on the contradictory effects which are produced by the reinforced regulations and income soothing behaviour between SIBs and non-SIBs, it is necessary to test whether income smoothing behaviour via LLPs among SIBs and non-SIBs differ before, during and after the economic crisis. This study provides additional evidence that the reinforced regulation might generate negative effects on the stability of systemic shocks through increasing the income smoothing behaviour from SIBs. As Tobias and Brunnermeier et al. (2016) concluded, the financial crisis revealed that global systemic important banks became systemically important long before they were classified as G-SIBs by banking regulators in 2011. Thus, this paper covers the period from 2002 to 2018 which includes the pre-crisis, crisis and post-crisis economic periods and attempts to garner a systematic understanding of the income smoothing behaviour via LLPs among SIBs and non-SIBs. My research results answer the question of what specific accounting item motivate SIBs and non-SIBs to use loan loss provision to smooth income and to what extent can the earning management behaviour assisting these two groups of banks to hide risk before, during and after the crisis. The conclusion of the thesis also provides regulators, auditors, and other stakeholders a superior interpretation of financial reporting behaviour, risk hiding behaviour and the procyclical mechanism through LLPs among SIBs and non-SIBs.

In Section 2, I discuss the literature review, while Section 3 develops the hypothesis, and Section 4 discusses the research design and methodology. Section 5 presents the data selection,

while Section 6 depicts the results testing the income smoothing hypothesis, which was developed from Section 5. Finally, Section 6 offers a conclusion.

2. Literature review

2.1 Regulations for SIB and non-SIB

After the financial crisis, it was established that large financial institutions in the US actually thought they were too big to fail. The Basel Committee created a methodology to determine the systemic importance of financial institutions based on five categories: size; interconnectedness; complexity; substitutability; and cross-jurisdictional activity. Different from the Basel Committee, the United States in 2011 signed the Dodd-Frank Act, which classifies systemically important banks as having consolidated assets that equal or exceed $50 billion. A set of specific prudential requirements put forward by the Dodd-Frank Act applies only to large banks that intend to mitigate systemic risks. This means that SIBs need to implement additional stress tests and capital planning to ensure they have sufficient capital to survive during a crisis period. The SIBs also have to meet a higher level of liquidity and risk management requirements to ensure sufficient liquidity and risk control. Moreover, regulatory intervention might be taken when SIBs pose a threat to financial stability. It should be noted that most of those requirements overlap with the international agreement of Basel III, of which the United States is a signatory. Additionally, the Dodd-Frank regime is referred to as enhanced or heightened because it involves higher standards for those banks having more than $50 billion in assets than it applies to smaller banks. Although systemic importance is not the only rationale provided for enhanced prudential regulation, it is the primary one. In this thesis, I will simply classify those banks having total consolidated assets higher than $50 billion as SIBs and all others not falling in this category as non-SIBs.

2.2 Earnings management strategies of systemically important banks

In the United States, systemically important banks have the highest systemic contribution to the financial system as compared to non-systemically important banks. However, some prior research determined the reinforced regulation might generate negative effects on systemic stability shocks as well as positive effects. Davis (2009) stated that due to the treatment of too-big-to-fail banks, these institutions more easily bring about negative effects regarding moral hazards and competition. Slovik (2012) started from the perspective of capital regulation and suggested that tighter capital requirements based on risk-weighted assets might shift banks'

attention regarding economic functions and lead to a decrease in GDP growth. Moenninghoff, Ongena, and Wieandt (2015) in their research ascertained that new international regulations result in some negative offsetting on the positive impact of the identification of global systemically important banks through increasing the funding costs for globally systemically important banks. Recently, Mohanty, Akhigbe, Basheikh, and Khan (2018) examined the impact of the Dodd-Frank Act and found the risk of global systemically important banks increased significantly during the post-crisis period in Europe.

When it comes to earnings management behaviour, bank managers might manipulate LLPs to pursue their goal of producing a more stable and persistent earnings report (Greenawalt & Sinkey, 1988; Lobo & Yang, 2001; Kanagaretnam et al., 2005). Additionally, Peterson and Arun (2018) discovered that income smoothing is more pronounced among global systemically important banks in the post-crisis period, whereas the non-G-SIBs are more pronounced in the pre-crisis period to manipulate earnings through LLPs. Therefore, the more prudential regulation for systemic banks might lead to systemic banks altering their financial behaviour to align with the banks' shareholders, supervisor and other stakeholder's expectations to pretend that they indeed behaved prudently in achieving opportunistic objectives. Moreover, systemic important banks might manipulate accounting numbers opportunistically to smooth earnings to achieve both their goals of contributing to financial system stability as well as increasing the opacity of financial reporting numbers.

Besides, the profitability of banks is also an incentive which drives bank managers to smooth earnings. Greenawalt et al. (1988) postulated that banks might set aside more LLPs when their earnings are high to anticipation losses in the future, while Skala (2015) suggested that banks will set aside less LLPs and draw from the LLP in the previous period to cover the current losses. Shrieves and Dahl (2003) focused on Japanese banks and realised that banks are likely to exploit gains on securities sales and loan loss provisions to smooth earnings. El Sood (2012) determined that the more profit the US banks had, the more likely they utilised LLPs to smooth income. Balboa et al. (2013), in his paper, provided new evidence that US banks employ LLP to smooth non-negative income, while Aristei and Gallo (2014) discovered that in high-risk economic environment banks not only display a higher level of LLP, but also exhibit a higher probability to smooth earnings through earnings management. Kilic et al.'s (2012) study ascertained that the US banks smooth earnings through manipulating LLPs when accounting reporting regulations complicates/interferes with the use of derivatives to realise earnings management.

2.3 Earnings management during diverse economic cycles

A lot of research provide evidence on how income smoothing behaviours were affected by the economic cycle through loan loss provisions. In their early research, Beatty and Liao (2009) determined that banks delay the time to recognise loan loss provision until the recession period sets in, which reinforced the current state of the economy. Recently Morris, Kang, and Jie's (2016) research explained that when the economic conditions deteriorated, the banks have incentives to smooth and signal income through discretionary loan loss provision. They found that banks with low pre-managed earnings skilfully utilise discretionary loan loss provision to further decrease those earnings and loan loss provisions to a large extent, which negatively impacts reported earnings in the post-crisis period. Anandarajan et al. (2007) collected data from Australian banks to examine the income smoothing behaviour and discovered that earnings management behaviour is more profound in the post-Basel I period than in the pre-Basel I period. Sood (2012) compared the pre-crisis boom of 2002 to 2006 and the crisis period of 2007 to 2009 and demonstrated that banks use LLPs more extensively during crisis periods to manipulate figures to present a higher income.

When it comes to the question of whether large banks' income smoothing behaviour via LLPs differs from non-SIBs, Olszak, Pipie_n, Kowalska, and Roszkowska (2016) discovered that LLPs in large banks, as well as banks reporting consolidated statements, are more procyclical. Recently, Archaya and Ryan (2016) proffered that income smoothing behaviour over the economic cycle is consistent with the regulatory objectives of bank stability. It appears that capital regulation and economic fluctuations are both reasons that prompt systemic banks to use LLP to smooth income. Peterson and Arun (2018) found that income smoothing is more pronounced among global systemically important banks in the post-crisis time, while the non-G-SIBs in the pre-crisis period are more prone to manipulating earnings through LLPs. Collectively, previous researchers did not provide empirical evidence on the income smoothing behaviour via LLPs among the domestic SIBs and non-SIBs in the US.

2.4 Timeliness of loan loss recognition

In addition to the income smoothing behaviour, the delayed loan loss recognition, also considered as earning management behaviour, will directly influence the current earnings. When banks predict that the loan quality might decrease in future periods, they do not want to reflect their expectation on the current period of loan loss provision. This enables them to prevent the current level of earnings not to decrease and the loan loss provisions not to increase through delaying the recognition of loan loss. Prior research also provides evidence on the

correlation between delayed loan loss recognition and financial stability risk. Bushman and Williams's (2015) study demonstrated that delayed loan loss recognition is highly associated with financing frictions and opportunities for risk-shifting during the crisis period. Furthermore, Nichols, Wahlen, and Wieland (2008) discussed timely loan loss recognition and conservatism. The empirical evidence from their research determined that public banks are more conservative on financial reporting. Therefore, compared with private banks, public banks recognise more timely earning declines as well as larger and more timely loan losses.

3. Hypothesis development

I will follow the method of Peterson and Arun (2018) to investigate the extended period from 2002 to 2018 and shed light on whether the income smoothing behaviour through loan loss provision has changed from the pre-crisis period (2002 to 2006), crisis period (2007 to 2009) and the post-crisis period (2010 to 2018). As the above literature suggests, this represents a good case test for the diverse earnings management behaviours among the SIBs and non-SIBs in the USA banking industry.

First, I will follow the arguments that banks will manipulate LLPs when they need to smooth earnings (Shrieves & Dahl, 2003). Hence, I followed the idea from Peterson and Arun (2018) that systemic important banks might manipulate accounting numbers opportunistically to smooth earnings so as to achieve both goals of contributing to the financial system stability as well as increasing the opacity of financial reporting numbers. Thus, I am expecting that the SIBs have greater incentives to hide risk when they are facing unfavourable operating results and use loan loss provision to smooth unfavourable earnings to a greater extent than non-SIBs in the USA.

The thesis refines the income smoothing hypothesis and predicts that the incentive to opportunistically manage earnings may depend on the profitability. Prior research presents a mixed effect on how the income before tax will influence their earnings management behaviour. Balboa et al. (2013) proffered that US banks utilise LLPs to smoothing non-negative income, while El Sood (2012) discovered that the more profit the US banks had, the more likely they used LLPs to smooth income.

H 1 : Systemically important banks (SIB) are more (or less) likely to use LLP to smooth earnings than non-systemic important banks (non-SIB) in the USA.

To investigate how profit levels will influence the income smoothing behaviour via LLPs, I designed the following sub-hypotheses:

H 1a : Systemically important banks (SIB) are more (or less) likely to use LLP to smooth earnings than non-systemic important banks (non-SIB) in the USA when the earnings are higher than the average.

H 1b : Systemically important banks (SIB) are more (or less) likely to use LLP to smooth earnings than non-systemic important banks (non-SIB) in the USA when the earnings are positive.

H 1c : Systemically important banks (SIB) are more (or less) likely to use LLP to smooth earnings than non-systemic important banks (non-SIB) in the USA when the earnings are negative.

Second, according to research from Peterson and Arun (2018), the G-SIBs in the post-crisis period are more likely to utilise LLP to smooth earnings, whereas the non-G-SIBs in the pre-crisis period are more inclined to manipulate earnings through LLP. In this thesis, I will follow the method of Peterson and Arun to investigate the association between the economic cycle and LLPs by using the subsamples of the pre-crisis period, crisis period, and post-crisis period, respectively. The thesis expects that there is a difference in the earnings management behaviour between SIB and non-SIB through LLPs depending on the economic cycle.

H 2 : SIBs are more (or less) likely to smooth earnings during a pre-crisis, crisis and post-crisis period.

Third, I will examine whether the timeliness of loan loss recognition has been affected by the classification of SIBs and non-SIBs. Nichols, Wahlen, and Wieland (2008) found public banks recognise larger and more timely loan losses, while Bushman and Williams (2015) ascertained that delayed loan loss recognition is highly associated with financing frictions and opportunities for risk-shifting during the crisis period. Since the SIBs need to implement extra stress tests and capital sufficiency requirements to ensure sufficient liquid and risk control, I am expecting that SIBs under the enhanced regulatory environment would motivate SIBs to recognise loan loss more timely after the implementation of the Dodd-Frank Act which came into being in 2011.

H 3 : SIBs are more (or less) timely to recognise loan loss after the implementation of the Dodd-Frank Act (since 2011).

4. Research design

In order to use a methodology to test these hypotheses, this paper will first follow the non-discretionary loan loss provision model from prior researchers Beatty and Liao (2014) who utilised the residuals of loan loss provision to proxy the earnings management behaviour of banks. Banks estimate and set aside a certain allowance for bad loans based on the judgments of managers. Morover, Beatty and Liao (2014) captured the characteristics of LLP in their preferred LLP model through making some adjustments to reflect the fundamentals of performance. Therefore, non-discretionary loan loss provision represents the incurred loss which is required by accounting standards and fundamental operations, as well as the discretionary loan loss provision that represents the managers' adjustment behaviour based on their professional judgments or motivation.

In this research, I will follow the method of Kilic et al. (2012) to facilitate an extension of the original model (Beatty and Liao, 2014) by adding the variable ΔGDP and ΔUNEMP to demonstrate a procyclical pattern. Moreover, EBTP will be used to test whether SIBs and non-SIBs use LLP to smooth income differently. Loan loss provision, therefore, is modeled as the following equation:

$$LLP_{i,t} = \beta_0 + \beta_1 EBTP_{i,t} + \beta_2 SIB + \beta_3 SIB * EBTP_{i,t} + \beta_4 NCO_{i,t} + \beta_5 LOAN_{i,t-1} + \beta_6 \Delta LOAN_{i,t} + \beta_7 NPL_{i,t-1} + \beta_8 \Delta NPL_{i,t} + \beta_9 ALL_{i,t-1} + \beta_{10} \Delta GDP_t + \beta_{11} \Delta UNEMP_t + \epsilon_{i,t} \quad (1)$$

Where:

$EBTP_{i,t}$	represents the ratio of earnings before tax and loan loss provision deflated by the total assets of bank i at time t
$LLP_{i,t}$	indicates the ratio of loan loss provision to the total assets of bank i at time t
SIB	indicates the dummy variable that a bank is systemically important
$NCO_{i,t}$	represents the net charge-offs scaled by the total assets of bank i and at quarter t
$LOAN_{i,t-1}$	represents loans outstanding scaled by the total assets of bank i and at quarter t
$\Delta LOAN_{i,t}$	indicates change in loans outstanding during quarter t scaled by the total assets
$NPL_{i,t-1}$	represents non-performing loans scaled by the total assets of bank i at quarter t -1
$\Delta NPL_{i,t}$	indicates the change in non-performing loan scaled by the total assets of bank i and at quarter t
ALL_{t-1}	represents allowance for loan losses scaled by the total assets of bank i at quarter t -1
ΔGDP_t	indicates the change of real gross domestic product growth at the country level of quarter t
$\Delta UNEMP_t$	indicates the change of the unemployment rate at the country level of quarter t
$\epsilon_{i,t}$	indicates the residual from the model indicates an estimate of DLLP for bank i at quarter t

For the first variable, EBTP is derived by adding back the loan loss provision to the earnings before tax. Similar to Kanagaretnam et al. (2004) and Bouvatier et al. (2011), EBTP

captures the income smoothing behaviour. A significant and positive coefficient indicates that discretionary loan loss provision (DLLP) is higher when the current earnings before tax and loan loss provision are higher. Additionally, a significant and negative coefficient indicates that DLLP is lower when the current earnings before tax and loan loss provision are higher.

NCO represents the net charge-off of banks that can be used to estimate the future net charge-offs and influence the current loans (Beaver & Engel, 1996). Besides, loan charge-offs could also be used to measure some degree of the macroeconomic effects (Kanagaretnam, Lobo, & Yang, 2004). Additionally, the variables LOAN and the change of LOAN included here aim to capture the influence when it comes to the changes in size of loan portfolios and non-discretionary changes in earnings (Beatty, Bin Ke, & Petroni, 2002). The variable NPL and the change of NPL represent the non-performing loans in the lagged year and the changes taking place in the current year, respectively, to estimate previously observed changes in portfolio performance and ultimate collectability (Bushman &Williams, 2012; Beatty & Liao, 2014). The paper also includes the yearly lag where ALL refers to the value of the loans which the banks anticipate cannot be collected. This variable aims to control the loan loss provision which would be adjusted in the current period (Beck & Narayanamoorthy, 2013). The change of GDP and the change of UNEMP are used to control the macroeconomic changes throughout the research analysis period.

In Model (1), a significant and positive coefficient of EBTP presents the income smoothing behaviour, while the interaction of SIB and EBTP captures the difference in the income smoothing behaviour between SIBs and non-SIBs. Later, I will follow the method from Peterson and Arun (2018) and use three sub-models to measure how the profitability level will affect the different methods of earnings management among SIBs and non-SIBs in the United States. In the sub-equation below, HIGH assumes the value of one when the earnings before taxes are higher than the average earning and zero otherwise. POSI is a dummy variable and takes value one when the earnings before tax are positive and zero otherwise, while NEG is a dummy variable that takes the value of one when the earnings before tax are negative and zero otherwise. Thus, a positive and significant sign for $HIGH * EBTP$, $POSI * EBTP$ and $NEG * EBTP$ implies evidence of income smoothing when banks receive more (or less) profit. Furthermore, I used SIB to interact with the above three terms, respectively, to capture the diverse income smoothing behaviours between SIBs and non-SIBs on three profitability levels.

$$LLP_{i,t} = \beta_0 + \beta_1 EBTP_{i,t} + \beta_2 HIGH_{i,t} + \beta_3 HIGH * EBTP_{i,t} + \beta_4 SIB + \beta_5 SIB * EBTP_{i,t} + \beta_6 SIB * HIGH + \beta_7 SIB * HIGH * EBTP_{i,t} + \beta_8 NCO_{i,t} + \beta_9 LOAN_{i,t-1} + \beta_{10} \Delta LOAN_{i,t} + \beta_{11} NPL_{i,t-1} + \beta_{12} \Delta NPL_{i,t} + \beta_{13} ALL_{i,t-1} + \beta_{14} \Delta GDP_t + \beta_{15} \Delta UNEMP_t + \epsilon_{i,t} \quad (2)$$

$$LLP_{i,t} = \beta_0 + \beta_1 EBTP_{i,t} + \beta_2 POSI_{i,t} + \beta_3 POSI * EBTP_{i,t} + \beta_4 SIB + \beta_5 SIB * EBTP_{i,t} + \beta_6 SIB * POSI + \beta_7 SIB * POSI * EBTP_{i,t} + \beta_8 NCO_{i,t} + \beta_9 LOAN_{i,t-1} + \beta_{10} \Delta LOAN_{i,t} + \beta_{11} NPL_{i,t-1} + \beta_{12} \Delta NPL_{i,t} + \beta_{13} ALL_{i,t-1} + \beta_{14} \Delta GDP_t + \beta_{15} \Delta UNEMP_t + \epsilon_{i,t} \quad (3)$$

$$LLP_{i,t} = \beta_0 + \beta_1 EBTP_{i,t} + \beta_2 NEG_{i,t} + \beta_3 NEG * EBTP_{i,t} + \beta_4 SIB + \beta_5 SIB * EBTP_{i,t} + \beta_6 SIB * NEG + \beta_7 SIB * NEG * EBTP_{i,t} + \beta_8 NCO_{i,t} + \beta_9 LOAN_{i,t-1} + \beta_{10} \Delta LOAN_{i,t} + \beta_{11} NPL_{i,t-1} + \beta_{12} \Delta NPL_{i,t} + \beta_{13} ALL_{i,t-1} + \beta_{14} \Delta GDP_t + \beta_{15} \Delta UNEMP_t + \epsilon_{i,t} \quad (4)$$

Where:

$LLP_{i,t}$	indicates the ratio of loan loss provision to the total assets of bank i at time t
$EBTP_{i,t}$	represents the ratio of earnings before tax and loan loss provision deflated by the total assets of bank i at time t
$HIGH_{i,t}$	dummy variable equals 1 when bank i 's earning higher than median at time t
$POSI_{i,t}$	dummy variable equals 1 when bank i 's earning is positive at time t
$NEG_{i,t}$	dummy variable equals 1 when bank i 's earning is negative at time t
SIB	indicates the dummy variable that a bank is systemically important
$NCO_{i,t}$	represents the net charge-offs scaled by the total assets of bank i and at quarter t
$LOAN_{i,t-1}$	represents loans outstanding scaled by the total assets of bank i and at quarter t
$\Delta LOAN_{i,t}$	indicates change in loans outstanding during quarter t scaled by the total assets
$NPL_{i,t-1}$	represents non-performing loans scaled by the total assets of bank i at quarter t -1
$\Delta NPL_{i,t}$	indicates the change in non-performing loan scaled by the total assets of bank i and at quarter t
ALL_{t-1}	represents allowance for loan losses scaled by the total assets of bank i at quarter t -1
ΔGDP_t	indicates the change of real gross domestic product growth at the country level of quarter t
$\Delta UNEMP_t$	indicates the change of the unemployment rate at the country level of quarter t
$\epsilon_{i,t}$	indicates the residual from the model indicates an estimate of DLLP for bank i at quarter t

Second, according to prior research, loan loss provision has a pro-cyclical bias. Bouvatier and Lepetit (2012) discovered that the economic cycle has a significant correlation with loan loss provision. During the boom period, banks set aside a low LLP to encourage credit expansion. However, the sudden identification of problem loans during a recession period

constrains banks to make loan loss provisions, which reduces their incentive to supply new credit. Moreover, more researchers have examined the timeliness of LLPs over the business cycle and financial stability (e.g., Laeven & Majnoni (2003); Bikker & Metzemakers (2005); Beatty & Liao (2011). By following the method of Peterson and Arum (2018), I will classify the time-period from 2002 to 2018 into three periods: pre-crisis, crisis, and post-crisis and run the regression below:

$$LLP_{i,t} = \beta_0 + \beta_1 \mathrm{EBTP}_{i,t} + \beta_2 PRECRISIS + \beta_3 PRECRISIS * EBTP_{i,t} + \beta_4 SIB + \beta_5 SIB * PRECRISIS + \beta_6 SIB * EBTP_{i,t} + \beta_7 SIB * PRECRISIS * EBTP_{i,t} + \beta_8 NCO_{i,t} + \beta_9 LOAN_{i,t-1} + \beta_{10} \Delta LOAN_{i,t} + \beta_{11} NPL_{i,t-1} + \beta_{12} \Delta NPL_{i,t} + \beta_{13} ALL_{i,t-1} + \beta_{14} \Delta GDP_t + \beta_{15} \Delta UNEMP_t + \epsilon_{i,t} \quad (5)$$

$$LLP_{i,t} = \beta_0 + \beta_1 \mathrm{EBTP}_{i,t} + \beta_2 CRISIS + \beta_3 CRISIS * EBTP_{i,t} + \beta_4 SIB + \beta_5 SIB * CRISIS + \beta_6 SIB * EBTP_{i,t} + \beta_7 SIB * CRISIS * EBTP_{i,t} + \beta_8 NCO_{i,t} + \beta_9 LOA\square_{i,t-1} + \beta_{10} \Delta LOAN_{i,t} + \beta_{11} NPL_{i,t-1} + \beta_{12} \Delta NPL_{i,t} + \beta_{13} ALL_{i,t-1} + \beta_{14} \Delta GDP_t + \beta_{15} \Delta UNEMP_t + \epsilon_{i,t} \quad (6)$$

$$LLP_{i,t} = \beta_0 + \beta_1 \mathrm{EBTP}_{i,t} + \beta_2 POSCRISIS + \beta_3 POSCRISIS * EBTP_{i,t} + \beta_4 SIB + \beta_5 SIB * POSCRISIS + \beta_6 SIB * EBTP_{i,t} + \beta_7 SIB * POSCRISIS * EBTP_{i,t} + \beta_8 NCO_{i,t} + \beta_9 LOAN_{i,t-1} + \beta_{10} \Delta LOA\square_{i,t} + \beta_{11} NPL_{i,t-1} + \beta_{12} \Delta NPL_{i,t} + \beta_{13} ALL_{i,t-1} + \beta_{14} \Delta GDP_t + \beta_{15} \Delta UNEMP_t + \epsilon_{i,t} \quad (7)$$

Where:

$\mathrm{LLP}_{i,t}$	indicates the ratio of loan loss provision to the total assets of bank i at time t
$\mathrm{EBTP}_{i,t}$	represents the ratio of earnings before tax and loan loss provision deflated by the total assets of bank i at time t
PRECRISIS	dummy variable captures the pre-crisis period from 2002 to 2006
CRISIS	dummy variable captures the crisis period from 2007 to 2009
POSRISIS	dummy variable captures the pre-crisis period from 2010 to 2018
SIB	indicates the dummy variable that a bank is systemically important
$\mathrm{NCO}_{i,t}$	represents the net charge-offs scaled by the total assets of bank i and at quarter t
$\mathrm{LOAN}_{i,t-1}$	represents loans outstanding scaled by the total assets of bank i and at quarter t
$\Delta LOAN_{i,t}$	indicates change in loans outstanding during quarter t scaled by the total assets
$NPL_{i,t-1}$	represents non-performing loans scaled by the total assets of bank i at quarter t -1

$\Delta NPL_{i,t}$ indicates the change in non-performing loan scaled by the total assets of bank i and at quarter t

ALL_{t-1} represents allowance for loan losses scaled by the total assets of bank i at quarter t -1

ΔGDP_t indicates the change of real gross domestic product growth at the country level of quarter t

$\Delta UNEMP_t$ indicates the change of the unemployment rate at the country level of quarter t

$\epsilon_{i,t}$ indicates the residual from the model indicates an estimate of DLLP for bank i at quarter t

In the equation above, *PRECRISIS* takes value one during the period from 2002 to 2006 and zero otherwise, while *CRISIS* is a dummy variable and takes value one during the period from 2007 to 2009 and zero otherwise. Additionally, POSCRISIS is a dummy variable and takes the value 1 during the period from 2010 to 2018 and zero otherwise.

Third, this paper will follow the method from Bushman and Williams (2015) by using the incremental R square to empirically measure the timely recognition of loan loss. The equations are as follows:

$$LLP_{i,t} = \beta_0 + \beta_1 \Delta NPL_{i,t-1} + \beta_2 \Delta NPL_{i,t-2} + \beta_3 Capital_{t-1} + \beta_4 EBTP_{i,t} + \beta_5 SIZE_{i,t-1} + \epsilon_{i,t} \quad (8)$$

$$LLP_{i,t} = \beta_0 + \beta_1 \Delta NPL_{i,t+1} + \beta_2 \Delta NPL_{i,t} + \beta_3 \Delta NPL_{i,t-1} + \beta_4 \Delta NPL_{i,t-2} + \beta_5 Capital_{t-1} + \beta_6 EBTP_{i,t} + \beta_7 SIZE_{i,t-1} + \epsilon_{i,t} \quad (9)$$

where,

$LLP_{i,t}$ indicates the ratio of loan loss provision to the total loan of bank i at time t

$\Delta NPL_{i,t}$ indicates the change in non-performing loan scaled by the total loan of bank i and at quarter t

$\Delta NPL_{i,t-1}$ indicates the change in non-performing loan scaled by the total loan of bank i and at quarter t-1

$\Delta NPL_{i,t-2}$ indicates the change in non-performing loan scaled by the total loan of bank i and at quarter t-2

$\Delta NPL_{i,t+1}$ indicates the change in non-performing loan scaled by the total loan of bank i and at quarter t+1

$Capital_{t-1}$ indicates the tier 1 capital ratio of bank i and at quarter t-1

$SIZE_{i,t-1}$ indicates the natural log total assets of bank i and at quarter t-1

$EBTP_{i,t}$ represents the ratio of earnings before tax and loan loss provision deflated by the total loan of bank i and at quarter t

$$Incremental\ R^2 = adj.R^2\ from\ equation\ (9) - adj.R^2\ from\ equation\ (8) \quad (10)$$

I generated bank-quarters with a 12-quarter rolling window and estimated the dummy variable DELR through the following steps. First, I calculated the delayed loan loss recognition

through subtracting the adjusted R^2 from Equation (8) from Equation (9). A higher value of incremental R^2 represents a higher level regarding the timely recognition of loan loss. Observations with lower incremental R^2 then indicate banks demonstrated a higher delay on loan loss recognition. Second, for each quarter I computed the average incremental R^2. Third, I generated DELR that equalled one when a bank's incremental R^2 was lower than the quarterly average incremental R^2 and equaled zero when a bank's incremental R^2 was higher than the quarterly average incremental R^2.

I test Hypothesis H3 by estimating the following regression:

$$DELR_{i,t} = \beta_0 + \beta_1 POST + \beta_2 SIB + \beta_3 POST * SIB + \beta_4 Capital_{i,t-1} + \beta_5 SIB * Capital_{i,t-1} + \beta_6 POST * Capital_{i,t-1} + \beta_7 POST * SIB * Capital_{i,t-1} + \beta_8 LEVERAGE_{i,t} + \beta_9 \Delta NPL_{i,t-1} + \beta_{10} \Delta LLP_{i,t} + \beta_{11} \Delta\, NCO_{i,t} + \beta_{12}\, \Delta EBTP_{i,t} + \epsilon_{i,t} \quad (10)$$

where,

$DELR_{i,t}$	indicates the dummy variable equals one if bank i delayed recognising loan loss at time t
$POST$	indicates the dummy variable equals one if observation is for post 2010 and 0 otherwise
SIB	indicates the dummy variable equals one if bank i is a systemically important bank at time t
$POST * SIB$	measures the difference-in-difference change in DELR between SIBs and non-SIBs
$Capital_{t-1}$	indicates the tier 1 capital ratio of bank i and at quarter t-1
$LEVERAGE_{i,t-1}$	indicates the leverage ratio of bank i and at quarter t
$\Delta\, NPL_{i,t-1}$	indicates the change in non-performing loan scaled by the total loan of bank i and at quarter t-1
$\Delta\, LLP_{i,t}$	indicates the change in loan loss provision scaled by the total loan of bank i and at quarter t
$\Delta\, NCO_{i,t}$	indicates the change in net charge-offs scaled by the total loan of bank i and at quarter t
$\Delta\, EBTP_{i,t}$	indicates the change in earnings before tax and loan loss provision scaled by the total loan of bank i and at quarter t

In the regression, I introduce quarter fixed effects along with controls for leverage, the growth of non-performing loans, the growth of loan loss provision, and the growth of net charge-offs in order to adequately capture the fundamentals of banks that might be related to the timeliness recognition of loan loss provision. NCO, which represents the net charge-off of banks, can be used to estimate the future net charge-off and the influence it would have on current loans. (Beaver and Engel, 1996). Moreover, loan charge-offs could also be used to measure the macroeconomic effects to some extent (Kanagaretnam, Lobo, & Yang, 2004). The change of LOAN included here, aims to capture the influence of the changes in the size of loan portfolios and non-discretionary changes in earnings (Beatty, Bin Ke, & Petroni, 2002).

The lagged change of NPL represents the non-performing loans in the lagged year and the changes of the current year, respectively, in order to approximate previously observed changes in portfolio performance and ultimate collectability (Bushman & Williams, 2012; Beatty & Liao, 2014).

5. Sample selection and data

This thesis focuses on the banking industry in the specific country of the USA. The data are derived from the years 2002-2018, which include pre-crisis, crisis, and post-crisis periods. Similar to the Dodd-Frank Act, this thesis classifies those banks that have more than $50 billion in total assets as systemically important banks (SIB). All other banks not falling in this category will be classified as non-systemically important banks.

The data were downloaded from the Wharton Research Data Services (WRDS) database which is offered by Erasmus University. To avoid missing lagged variable observations, this paper first downloaded the data period from 2001Q1 to 2018Q4 and calculated all the independent variables in the regression model. Initially, there were 55,108 quarter observations, after which the paper merged the original data with the macroeconomic variables of UNEMPLOY and GDP. Both of these variables were downloaded from the Federal Reserve of St. Louis for the data period from 2002Q1 to 2018Q4. During this process, I used gvkey and quarter as key variables and in the merge process; I excluded 3,641 observations which were not a match. Further, for each bank, I first calculated the total number of quarterly observations and dropped 2,126 of the observations which represented banks whose total quarter observations were less than 40. This was decided since a small number of quarter-observations do not facilitate a long enough period for the regression to compare the income smoothing behaviour during different economic periods. Prior to running the regression, I further eliminated the outliers of all the independent variables from the top 99% and bottom 1%, respectively. This led to a final sample of 594 banks consisting of 70 systemically important banks (SIBs) and 524 non-systemically important banks (non-SIBs).

6. Results

In this section, I first provide tables of the descriptive statistics and the Pearson correlations among independent variables. Next, I will discuss the empirical results of the different income smoothing behaviours between SIBs and non-SIBs. Finally, I will introduce the empirical

evidence of how the economic cycle influences income smoothing behaviour between SIBs and non-SIBs.

6.1 Descriptive statistics and correlation

Table 1：Descriptive statistics

	Variable	Mean	Std Dev	Min	Median	Max
Non-SIB	LLP	0.0023	0.0043	-0.0016	0.0009	0.0264
	EBTP	0.0046	0.0036	-0.0048	0.0041	0.0219
	NCO	-0.0009	0.0017	-0.0104	-0.0003	0.0006
	lag_LOAN	1.3211	0.2424	0.4725	1.3518	1.7616
	△LOAN	0.0249	0.0571	-0.1045	0.0177	0.2859
	NPL	0.0146	0.0182	0	0.0079	0.0979
	△NPL	0.0002	0.0039	-0.0133	0	0.0167
	ALL	0.0096	0.0054	0.0012	0.0085	0.0338
	△GDP	0.0096	0.0069	-0.0189	0.0105	0.022
	△UNEMP	-0.0057	0.0557	-0.15	-0.009	0.139
SIB	LLP	0.0026	0.0046	-0.0016	0.0009	0.0264
	EBTP	0.0052	0.0045	-0.0048	0.0042	0.0219
	NCO	-0.0012	0.0017	-0.0104	-0.0006	0.0006
	lag_LOAN	1.0904	0.3044	0.4725	1.1375	1.7616
	△LOAN	0.017	0.0506	-0.1045	0.0134	0.2859
	NPL	0.0091	0.0101	0	0.0054	0.0771
	△NPL	0.0001	0.0024	-0.0133	0	0.0167
	ALL	0.0096	0.0069	0.0012	0.0082	0.0338
	△GDP	0.0097	0.0068	-0.0189	0.0105	0.022
	△UNEMP	-0.0074	0.0546	-0.15	-0.009	0.139
Full sample	LLP	0.0024	0.0044	-0.0016	0.0009	0.0264
	EBTP	0.0046	0.0037	-0.0048	0.0041	0.0219
	NCO	-0.0009	0.0017	-0.0104	-0.0003	0.0006
	lag_LOAN	1.3002	0.2573	0.4725	1.3354	1.7616
	△LOAN	0.0242	0.0566	-0.1045	0.0172	0.2859
	NPL	0.0141	0.0177	0	0.0077	0.0979
	△NPL	0.0002	0.0038	-0.0133	0	0.0167
	ALL	0.0096	0.0055	0.0012	0.0085	0.0338
	△GDP	0.0096	0.0069	-0.0189	0.0105	0.022
	△UNEMP	-0.0059	0.0556	-0.15	-0.009	0.139

Table 1 depicts the results of the descriptive statistics for the SIBs and non-SIBs' independent variables as well as the entire sample from 2002 to 2018. All the variables were winsorized at the 1% and 99% levels. On average, the ratio of LLP was 0.23%, 0.26% and 0.24% for the non-SIBs' full sample, respectively. The relatively higher LLP ratio implies that the SIBs in the US keep a higher level of provision companies as compared with the provision level of non-SIBs. The mean ratio of EBTP for the full sample is 0.46%, 0.52% for the SIB, and 0.46% for the non-SIB. The EBTP ratio suggests that SIBs are more profitable than non-SIBs in the US. NCO was on average lower for SIB at -0.12%, higher for non-SIB at -0.09%, and -0.09% for the full sample, indicating that SIBs have relatively lower net charge-offs than non-SIBs. Concerning lag_LOAN, ΔLOAN, and NLP, the results, as expected, illustrated that

SIBs have a higher loan volume, loan volume growth, and a non-performing loan volume than non-SIBs. The mean of ΔNLP was 0.02% for the non-SIB, 0.01% for SIB, and 0.02% for the full sample, implying that the changes of non-performing loans are increasing more slowly for SIBs than for non-SIBs on average. The mean ratio of ALL for the full sample, SIBs and non-SIBs, totals 0.96%, which suggests that the level of allowance is the same for both SIBs and non-SIBs in the US.

Table 2: Correlations for full sample

	LLP	EBTP	NCO	lag_LOAN	△LOAN	NPL	△NPL	ALL	△GDP	△UNEMP
LLP	1	0.530***	-0.638***	0.186***	-0.172***	0.392***	0.119***	0.358***	-0.120***	0.324***
		[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
EBTP	0.662***	1	-0.300***	0.131***	-0.012**	0.051***	0.031***	0.266***	0.073***	0.166***
	[0.000]		[0.000]	[0.000]	[0.048]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
NCO	-0.727***	-0.378***	1	-0.085***	0.311***	-0.497***	0.015**	-0.451***	0.112***	-0.198***
	[0.000]	[0.000]		[0.000]	[0.000]	[0.000]	[0.013]	[0.000]	[0.000]	[0.000]
lag_LOAN	0.136***	0.090***	-0.118***	1	-0.023***	0.162***	0.055***	0.271***	-0.048***	0.097***
	[0.000]	[0.000]	[0.000]		[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
△LOAN	-0.239***	-0.077***	0.288***	-0.090***	1	-0.386***	0.067***	-0.222***	0.112***	-0.117***
	[0.000]	[0.000]	[0.000]	[0.000]		[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
NPL	0.505***	0.177***	-0.576***	0.140***	-0.360***	1	-0.185***	0.547***	-0.175***	0.069***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]		[0.000]	[0.000]	[0.000]	[0.000]
△NPL	0.119***	0.050***	0.015***	0.069***	0.071***	-0.156***	1	-0.110***	-0.109***	0.203***
	[0.000]	[0.000]	[0.010]	[0.000]	[0.000]	[0.000]		[0.000]	[0.000]	[0.000]
ALL	0.513***	0.354***	-0.584***	0.224***	-0.268***	0.660***	-0.092***	1	-0.051***	0.027***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]		[0.000]	[0.000]
△GDP	-0.127***	0.036***	0.116***	-0.061***	0.092***	-0.104***	-0.170***	-0.042***	1	-0.111***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]		[0.000]
△UNEMP	0.321***	0.175***	-0.237***	0.092***	-0.091***	0.081***	0.246***	0.050***	-0.319***	1
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	

p-values in brackets

* $p < 0.1$,** $p < 0.05$,*** $p < 0.01$

Table 2 depicts the Pearson and Spearman correlations for the full sample. Among the independent variables in the regression equations, the correlation between LLP and EBTP is significant and positive at the level of 0.662 for the Pearson correlation, and 0.530 for the Spearman correlation test, which indicates there is no potential multicollinearity problem. As expected, LLP was negative and significantly correlated with NCO, ΔLOAN and ΔGDP, indicating that loan loss provisions are negatively correlated with the net charge-off, the

increase of the loan, and the fluctuation of the economic cycle. Other variables are not highly inter-correlated, and the coefficients were low and not high enough to concern about multicollinearity.

6.2 Income smoothing

6.2.1 Income smoothing behaviour among SIBs and non-SIBs

Table 3 illustrates the results of Equation (1) to Equation (4), which all include an interaction term to examine the different income smoothing behaviours via LLPs among SIBs and non-SIBs by using a dummy variable SIB multiples EBTP. The LLP was regressed on incurred loss variables with quarterly fixed effects. The four equations can explain 80%, 80.2%, 81.7, and 81.70% of the variance in the dependent variable LLP, respectively. Model (1) includes the full sample and the coefficient of the independent variable, while EBTP is positive and significant, which imply that on average when the EBTP increases 1 value it will lead to LLP increasing 47.37%. In Model (2) and Model (4) the coefficients of EBTP were 0.4652 and 0.5821, respectively, with a positive and significant sign. This indicates that when banks get high-earnings and negative-earnings they are more likely to smooth earnings through setting a higher level of LLPs. This finding supports the income smoothing behaviour and is consistent with the empirical results of Morris al et. (2016) who found that a lower level of earnings before loan loss provision is associated with a higher level of LLP. In contrast, in Model (3), the coefficient of EBTP is significant and negative at -0.3364, which indicate that while banks have positive earnings they set aside less loan loss provisions.

Further, I tested for differential income levels between high-earnings, positive-earnings and negative-earnings through an interaction term. The coefficient of the variable HIGH* EBTP from Model (1) is 0.2481, POSI* EBTP from Model (2) is 0.9185, and NEGA* EBTP from Model (3) is -0.9185, which indicate that high-earnings and positive-earnings will prompt banks to set aside more LLPs, while negative-earnings will result in banks setting aside less

Table 3 : Linear regression to test the income smoothing behavior in different profitability

Variables	Model(1)	Model(2)	Model(3)	Model(4)
	full sample	high earning	positive earning	negative earning
	LLP	LLP	LLP	LLP
EBTP	0.4737***	0.4652***	-0.3364***	0.5821***
	(109.3863)	(105.7144)	(-9.2577)	(122.3957)
NCO	-1.1295***	-1.1183***	-1.0747***	-1.0747***
	(-109.5747)	(-108.8815)	(-108.2075)	(-108.2075)
$LOAN_{t-1}$	0.0001**	0.0002***	0.0002***	0.0002***
	(2.4506)	(3.0089)	(3.7207)	(3.7207)
△LOAN	-0.0003	-0.0004	-0.0004*	-0.0004*
	(-1.4128)	(-1.5276)	(-1.8268)	(-1.8268)
NPL	0.0407***	0.0413***	0.0393***	0.0393***
	(38.2866)	(39.0573)	(38.5488)	(38.5488)
△NPL	0.1005***	0.1004***	0.0974***	0.0974***
	(29.615)	(29.7531)	(29.9755)	(29.9755)
ALL	-0.0098***	-0.0155***	-0.0307***	-0.0307***
	(-2.8525)	(-4.5025)	(-9.2324)	(-9.2324)
△GDP	0.014	0.0151	-0.0129	-0.0129
	(0.2872)	(0.3125)	(-0.2764)	(-0.2764)
△UNEMP	0.008	0.0081	-0.0017	-0.0017
	(0.8874)	(0.9065)	(-0.1925)	(-0.1925)
SIB	-0.0001	0.0011***	-0.0004	0
	(-0.9159)	(7.6399)	(-0.6750)	(-0.2910)
SIB*EBTP	-0.0048	-0.3549***	-0.0165	-0.0222*
	(-0.3612)	(-9.7114)	(-0.0927)	(-1.6541)
HIGH		-0.0020***		
		(-5.8569)		
HIGH*EBTP		0.2481***		
		(10.3202)		
SIB*HIGH		0.0003		
		(0.7381)		
SIB*HIGH*EBTP		0.1858***		
		(4.0642)		
POSI			-0.0010***	
			(-8.7944)	
POSI*EBTP			0.9185***	
			(24.9149)	
SIB*POSI			0.0004	
			(0.6267)	
SIB*POSI*EBTP			-0.0057	
			(-0.0321)	
NEG				0.0010***
				(8.7944)
NEG*EBTP				-0.9185***
				(-24.9149)
SIB*NEG				-0.0004
				(-0.6267)
SIB*NEG*EBTP				0.0057
				(0.0321)
_cons	-0.0028	-0.0025	-0.0018	-0.0027
	(-1.4523)	(-1.3237)	(-0.9622)	(-1.4977)
Quarter	Yes	Yes	Yes	Yes
N	24497	24497	24497	24497
adj. R^2	0.8	0.802	0.817	0.817
F	1323.2788	1274.2703	1401.6022	1401.6022

t statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

LLPs to smooth earnings. Further, the coefficient of the interaction term of SIB with HIGH*

EBTP, POSI* EBTP and NEG* EBTP, from Model (2) to Model (4), respectively, captures the difference among SIBs and non-SIBs. The coefficient of SIB*EBTP for the full sample is not significant, which means the SIBs and non-SIBs are not using LLPs to smooth the statistic of earnings differently. However, based on the results of Table 3, it is evident that only Model (2) displays a positive and significant coefficient with a value of 0.1858 at a 99% confidence level, indicating that SIBs set aside 18.58% fewer LLPs than non-SIBs when they achieved high earnings. The result is consistent with the empirical results of Peterson et al. (2018), which found that compared to non-SIBs, global SIBs were less likely to use LLPs to smooth income when they are more profitable.

6.2.2 Income smoothing through LLP in different economic periods

Opinions may differ regarding the period of the economic crisis in the US. Therefore, this paper followed the method of Peterson and Arun (2018) to investigate the income smoothing behaviour via LLPs in the pro-crisis period (2002 to 2006), crisis period (2007 to 2009) and the post-crisis period (2010 to 2018), respectively. Table 4 depicts the results of Equation (5), Equation (6) and Equation (7).

The EBTP coefficient was positive and significant for all sub-periods and the coefficient was 0.5032 for the pre-crisis period, 0.3107 for the crisis period, and 0.4920 post-crisis period. In Model (5) to Model (7) I first interacted 'Precri', 'Cri' and 'Postcri' with 'EBTP'; the interaction coefficients were -0.2870, 0.2197, and --0.0004, respectively, with a statistic significant level of 99%, 99% and 90% for the pre-crisis period, crisis period, and post-crisis period, respectively. The results provide evidence that prior to an economic crisis, banks designate much less LLP. However, during the crisis banks set aside more LLPs to smooth earnings. Additionally, after the economic crisis banks are less likely to use LLPs to smooth earings as the coefficient is negative with a smaller number and significant level.

Further, I divided the SIB and non-SIB sample through using SIBs to interact with Precri*EBTP, Cri*EBTP, and Postcri*EBTP, respectively, to analyse whether SIBs and non-SIBs utilise LLPs to manage earnings differently when they were experiencing a different economic cycle. The coefficient of SIB*Precri*EBTP is negative and significant with the number of -0.1426 at the confidence level of 99%, implying that systemically important banks set aside 14.26% less loan loss provisions than non-SIBs before an economic crisis. The coefficient of SIB*Cri*EBTP is still negative and significant with the number of -0.897at the confidence level of 99%, implying that systemically important banks reserve 8.97% less for loan loss provisions than non-SIBs during an economic crisis. To sum up, the income

Table 4 : Main regression : income smoohting in different econimic cycle

Variables	Model(5)	Model(6)	Model(7)
	LLP	LLP	LLP
EBTP	0.5032***	0.3107***	0.4920***
	(112.2566)	(38.6699)	(104.9756)
NCO	-1.1177***	-1.1185***	-1.1265***
	(-109.6076)	(-109.6794)	(-109.5339)
$LOAN_{t-1}$	0.0002***	0.0002***	0.0001***
	(3.6209)	(4.0031)	(2.6606)
△LOAN	-0.0003	-0.0004*	-0.0004*
	(-1.3557)	(-1.8193)	(-1.6929)
NPL	0.0406***	0.0396***	0.0402***
	(38.6251)	(37.5845)	(37.8689)
△NPL	0.0995***	0.0998***	0.1002***
	(29.6442)	(29.7232)	(29.5832)
ALL	-0.0097***	-0.0128***	-0.0113***
	(-2.8414)	(-3.7662)	(-3.2923)
△GDP	0.0101	0.0102	0.0149
	(0.2099)	(0.2114)	(0.307)
△UNEMP	0.0085	0.0063	0.0071
	(0.953)	(0.7064)	(0.7883)
SIB	0	-0.0003**	-0.0001
	(-0.4293)	(-2.2847)	(-1.1051)
SIB*EBIT	0.0045	0.0754***	-0.0258*
	(0.3319)	(3.0327)	(-1.7578)
Precrisis	0.0012***		
	(15.0501)		
Precrisis*EBIT	-0.2870***		
	(-22.1503)		
SIB*Precri	0.0003		
	(1.2362)		
SIB*Precrisis*EBIT	-0.1426***		
	(-3.1007)		
Crisis		-0.0008***	
		(-14.8476)	
Crisis*EBIT		0.2197***	
		(23.9685)	
SIB*Crisis		0.0002	
		(1.202)	
SIB*Crisis*EBIT		-0.0897***	
		(-3.0668)	
Postcrisis			0.0003***
			(4.8464)
Postcrisis*EBIT			-0.1197***
			(-10.4485)
SIB*Postcrisis			-0.0004*
			(-1.9126)
SIB*Postcrisis*EBIT			0.1868***
			(5.5119)
_cons	-0.0028	-0.0022	-0.0027
	(-1.4716)	(-1.1841)	(-1.4339)
Quarter	Yes	Yes	Yes
N	24497	24497	24497
adj. R^2	0.805	0.805	0.801
F	1293.5219	1293.4661	1263.8461

t statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

smoothing behaviour is more pronounced for the non-SIBs before and during an economic

crisis. Importantly, the coefficient of SIB*Postcri*EBTP is positive and significant registering 0.1868 at a 99% confidence level, indicating that systemically important banks set aside 18.68% more loan loss provisions than non-SIBs after an economic crisis. This finding supports the results of Peterson and Arun (2018), which found that income smoothing is more pronounced among global SIBs in the post-crisis period. Furthermore, this result also provides the necessary evidence that SIBs are more likely to smooth income after an economic crisis.

6.2.3 Timely recognition of LLPs

Table 5 : Regression of timeliness loan loss recognition and SIB

Variable	Model(10)	Model(11)
	DELR	DELR
POST	-0.1004 ***	-0.1282 ***
	(-6.6604)	(-3.6799)
SIB	-0.019	-0.2999 **
	(-0.7272)	(-2.4275)
POST*SIB	-0.0043	0.7068 ***
	(-0.1353)	(3.554)
CAPITAL	0.0042 ***	0.0026
	(3.253)	(1.1849)
SIB*CAPITAL		0.0279 **
		(2.3147)
POST*CAPITAL		0.0023
		(0.9548)
POST*SIB*CAPITAL		-0.0629 ***
		(-3.6094)
LEVARAGE	-0.0912	-0.0775
	(-0.6801)	(-0.5736)
△NPL $_{t-1}$	-2.7130 ***	-2.7417 ***
	(-3.0872)	(-3.1198)
△LLP	0.9689	0.9111
	(0.5853)	(0.55)
△NCO	1.0617	1.0323
	(0.4426)	(0.4304)
△EBTP	-1.005	-1.0125
	(-0.9166)	(-0.9237)
_cons	0.9762 *	0.9755 *
	(1.9531)	(1.9504)
Quarter	Yes	Yes
N	18011	18011
adj. R^2	0.004	0.005
F	2.1792	2.2817

t statistics in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

The previous section provided empirical evidence that the income smoothing behaviour is more pronounced in SIBs in the post-crisis period. The higher the earnings before tax and provision, the more loan loss provision would be set aside for SIBs. In this section, I will

examine how the delayed recognition of loan loss provision influences income smoothing behaviour. Table 5 depicts the results of the regression where I used the dummy variable DELR, which was taken from Bushman and Williams (2015) to capture the delayed recognition of loan loss. DELR equals one when a bank's incremental R^2 is lower than the quarterly average incremental R^2 and equals zero when a bank's incremental R^2 is higher than the quarterly average incremental R^2. The coefficients of POST in both Models (10) and (11) are negative and statistically significant, suggesting that the entire sample of banks in the US recognised loan loss more timely after 2011. In Model (10) the coefficient of the tier 1 capital ratio is positive and significant, which implies that the higher the tier 1 capital ratio, the less timely the recognition of loan loss.

To provide a more in-depth understanding of how the tier 1 capital ratio will influence the timeliness of LLP recognition, I further tested Model (11). The coefficient of POST*SIB was significant and positive, indicating that SIBs do recognise LLPs less timely after 2011 with the implementation of the Dodd-Frank Act. Furthrmore, the coefficient of SIB*CAPITAL was also positive and significant at 0.0279, which indicates that a tier 1 capital ratio increase of 1% will result in DELR increasing 0.0279. In other words, reaching tier 1 capital will lead to less timely loan loss provision for SIBs. Moreover, the interaction term of POSI*SIB *CAPITAL was statistically significant and negative, indicating that after 2011, the systemically important banks recognised loan loss in a more timely manner. Since the coefficient is -0.0629, it implies that SIBs with a 1% higher tier 1 capital ratio result in DELR decreasing 0.0629.

7. Conclusion

This paper examined the association of income smoothing and loan loss provision among SIB and non-SIB US banks from 2002 through 2018. The study aimed to test whether the income smoothing behaviour via LLPs between systemically important banks and non-systemically important banks in the US are different. Therefore, I posited three hypotheses expecting that SIBs are more (or less) likely to use LLPs to smooth earnings than non-SIBs, while SIBs are more (or less) likely to smooth earnings and delay the recognition of loan loss during pre-crisis, crisis, and post-crisis period.

The full sample of the research consists of 594 banks, which included 70 systemically important banks (SIBs) and 524 non-systemically important banks (non-SIBs). For the first hypothesis, the results reveal that income smoothing behaviour is more profound for the high-earning banks and negative-earning banks. The non-SIBs exhibited a greater income smoothing

behaviour via LLPs than SIBs only in the high-earning group. Based on the results, which tested the second hypothesis, I can report that the full sample period was divided into three sub-periods: pre-crisis, crisis and post-crisis. The interaction coefficient of SIB*Postcri*EBTP was positive and significant at 18.68%. This means SIBs set aside 18.68% more loan loss provisions than non-SIBs after an economic crisis, but reserved fewer LLPs than non-SIBs before and during an economic crisis. The empirical results of the last hypothesis indicate that after 2011, SIBs are less timely to recognise loan loss as compared to non-SIBs. My study also provides extra evidence on the reinforced regulations, which might bring about negative effects on systemic stability shocks through increasing the income smoothing behaviour.

The results of my findings are useful for the regulator, investor, auditor, and all other stakeholders to form a better comprehension on earnings management behaviour of the banking industry and improve financial system stability through adequately evaluating financial statements and enhancing the financial regulatory environment.

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