SENIOR RESEARCH

The Use of Loan Loss Provision as Income and Capital Management and Signaling: The case study of Thailand

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Abstract

This paper studies the implementation of loan loss provision of Thai banks by exploiting the quarterly data from the first quarter of 2010 to the last quarter of 2016 of 11 banks which are listed in the Stock Exchange of Thailand. The research first focuses on misconduct of provisioning policy and performs an empirical analysis through the Difference Generalized Method of Moment estimator over three assumptions; Income Smoothing, Capital Management, and Signaling. The research also tries to investigate whether the variation in stocks' price relative to book value can be considered as one of factors, apart from regulations regarding the determination of loan loss provision from the regulatory institution, banks take into their consideration in implementing provisioning policy. Scrutinizing through the effect of bank size, the study finds that small and medium Thai listed banks are subject to profit manipulation through the use of loan loss provision. However, there is no evidence of Thai listed banks on managing capital and the result of signaling hypothesis is inconclusive. In addition, it is found that provisioning policy implemented from small and large banks are inversely influenced from a positive change in their current stock price relative to the book value.

Keywords: Loan loss provision, Income Manipulation, Capital Management, Signaling, Price to book value

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1. Introduction

In traditional banking business, banks' revenue is generated mainly due to the interest charged from the amount of loan provided to customers. However, it is considered as banks' credit risk as the loan granted may turn into non-performing loan. If it is so, the particular amount is then considered as losses for banks which need to be charged off. In order to do so, loan loss provision is needed. It is referred as the expenses set aside by banks as an allowance for future deterioration in loan portfolio. In other words, it acts as a buffer against losses which occurred from non-performing loan and debt securities. On the other hand, the amount is also considered as one of the crucial expenses banks have to encounter and it negatively impacts their income. According to Bank of Thailand, loan loss provision is composed of two main components, General and Specific provision. The former is an amount of capital set aside to cover particular loan. Here, banks are constrained to the regulation required by Bank of Thailand to hold the amount equivalent to one percent of performing loan and one hundred percent of non-performing loan. The later is the amount of provision set aside in excess of specific provision. Thus, it is rather determined by internal credit risk models and expert judgment within each particular banks.

However, as there are no restrictions and discrete value from the regulator on how and at what rate General provision should be determined, this hence implies that the regulator has no full control over loan loss provision since it leaves some rooms for banks to also play a role in adjusting the mentioned rate. As literature that contributes to the study of loan loss provision in Thailand is in paucity. The objective of this research is to investigate if the implementation of loan loss provision is misleading. In other words, provisioning policy can be manipulated and implemented, through the unrestricted component, in such a way that it does not represent a true value of expected evolution of bank's loan losses.

By focusing on the misuse of loan loss provision, "Do Thai banks smooth their income?" is the main and crucial question the research tries to seek for answer as banks' expenditure would be mitigated from the lower amount in loan loss provision, and such rate could be used to bring down their over-target income. The action results in misguided objective of

loan loss provision, as a tool to offset losses. Moreover, the research proposes different perspective in interpreting the signaling behavior of banks. Prior study suggested that banks try to signal their financial strength through provision. Yet, this study, on the other hand, investigates whether banks try to signal outsiders about an expansion in their portfolios, which reflect through one-year ahead change in earnings, by loan loss provision. Lastly, to stand on the shoulder of giant, the research also applies the hypothesis suggested from prior researchers and see if Thai banks with low level of total regulatory capital ratio, compared among others, tend to increase such rate from provisioning policy.

Moreover, as mentioned earlier that decisions regarding General provision are not rigid, this research tries to scrutinize though the factor influencing the General component and find out if variation in bank's stock price can be considered as one of many unrevealed and concerning factors banks managers take into account in determining the loan loss provision rate.

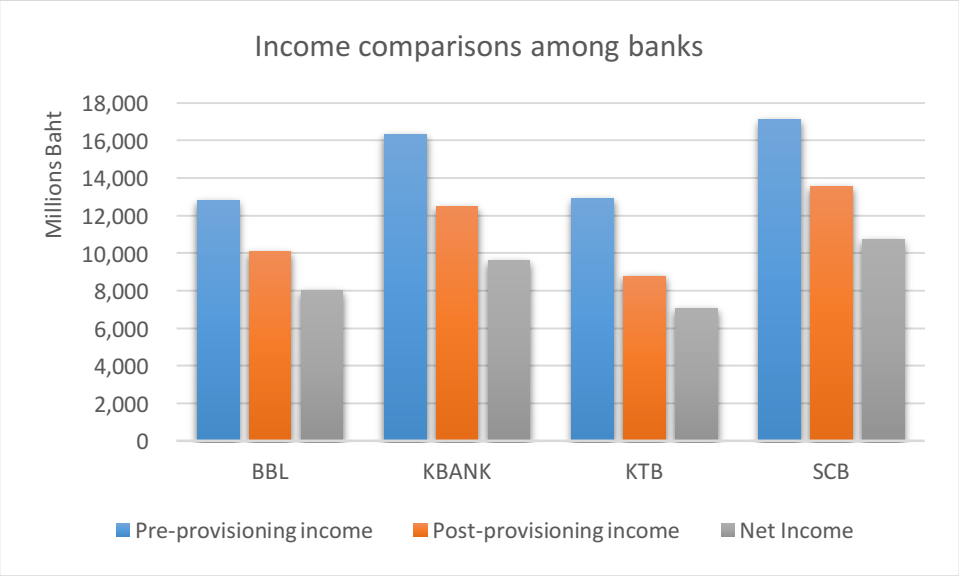
The rest of the paper proceeds as follow. Section 2 explains about the conceptual framework behind this study. Related literature review is discussed in section 3. Descriptive statistics, data selection, and model specification are in section 4. Empirical result and robustness test are discussed in section 5. Lastly, conclusion is in section 6.

2. Conceptual Framework

Earnings management

As mentioned previously, Thai banks are constrained to specific components of loan loss provision. However, they are not subject to restrictions on decisions regarding general components of provisioning policy. As suggested in the introduction section, on one hand, the purpose of loan loss provision is to mitigate credit risk as it is served as a buffer against losses. On the other hand, the amount is also considered as banks' crucial expenses, which negatively impact their income.

Figure 1: Income comparisons among banks



Source: Publicly announced data from Securities and Exchange Commission (SEC) and official websites of the four suggested banks.

To confirm the statement, exploiting the data in quarterly basis starting from 2010 to 2016, figure 1 represents an average value of pre-provisioning, post-provisioning, and net income among four largest banks in terms of their total asset size in Thailand. Obviously, by comparing the average amount of pre and post provisioning income, loan loss provision has a significant impact on banks' income.

This finding, together with the fact that general provision is not constrained to regulations and is solely under banks' decision in determining such amount, raise important question whether Thai banks are subject to the misuse of loan loss provision. To clarify the point,

banks may have incentives to reduce the general component of provision, which results in a decrease in provision as a whole, during the time when their earnings are considerably low to reduce the inevitable cost. This also leads to an opposite perspective as banks may also decide to raise such amount during a good time as well. The point that has just been raised can be referred as income smoothing behavior. According to Bhat (1996), this is done since it helps reducing banks earnings volatility over time which, in turn, stabilize the growth of earnings. This is crucial assumption since it tends to improve risk perception to both investors and regulators. Moreover, according to Kanagaretnam, Lobo, and Mathieu (2004) as higher premium should be compensated to investors from variability in earnings, hence, in order to mitigate the cost of raising capital, managers have an incentive to smooth bankd' income. From the point that has been raised, the research then hypothesizes that Thai banks are subject to income smoothing behavior.

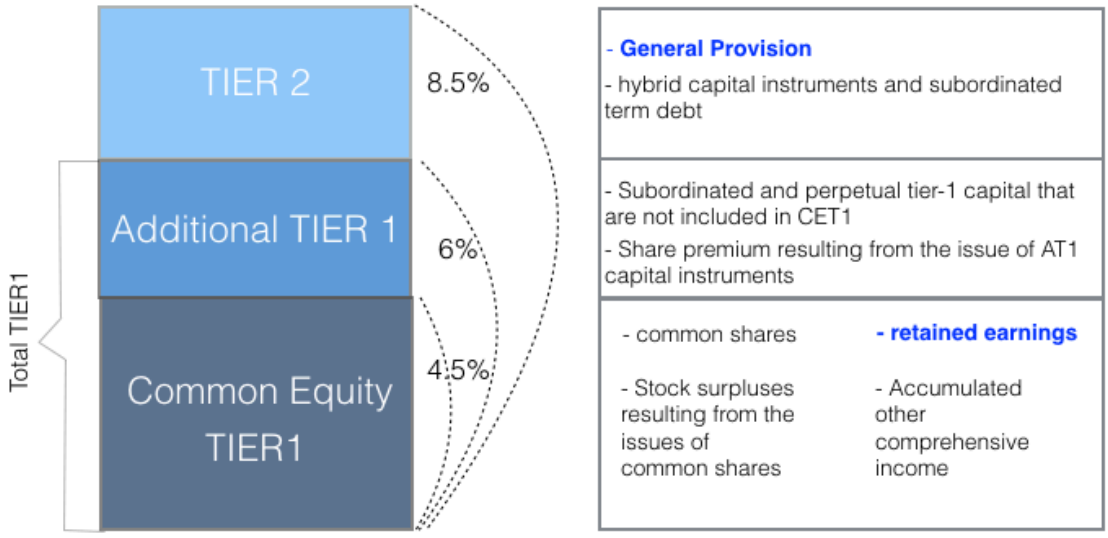
Signaling hypothesis

According Beaver, Eger, Ryan, and Wolfson (1989) banks try to signal outsiders their ability in withstanding from a hit to earnings that come in form of expenses occurred from higher loan loss provision. The author suggested that such expense is offset from the banks' potentiality in obtaining higher income in the future. This then leads to the assumption that loan loss provision is positively related to one-year ahead changes in earnings before loan loss provision and tax relative to the average of total assets from the two period. However, the research applies the suggested hypothesis, yet proposes a different interpretation of the result such that one could think of an increase in future earnings as the expansion of bank's portfolio. With the expected positive relationship between future earnings and loan loss provision, this leads to the conclusion that banks may use loan loss provision as a tool to signal outsiders about their expansion in business through larger banks' portfolio. Because there is no theory supporting this suggested argument, this research proposes hypothesis that signaling hypothesis is not able to apply with Thai banking industry.

Capital management

Moreover, for a purpose of robustness, the use of loan loss provision in managing capital has also been tested as suggested from Curcio and Hasan (2015). However, the hypothesis is applied to fit to the context under Thailand banking industry.

Figure 2: Components of bank capital



Source: Bank of Thailand

According to Bank of Thailand, Thai banks are subject to hold total capital, which composed of Common equity TIER 1, Additional TIER 1, and TIER 2 capital relative to their weighted assets equivalent to 8.5 percent. This is shown by figure 2. One important point to note is that general provision is considered as TIER 2 capital, thus banks with the total capital ratio less than the mentioned threshold is expected to have an incentive in manipulating the loan loss provision to bring the total capital ratio up. The flow works as follow: higher general provision leads to the higher TIER 2 capital which, in turn, increases bank's total capital. This thus results in a rise in total capital ratio. Yet, it is important to note that banks are subject to constrain here since the ratio of general provision relative to weighted assets should not exceed 1.25 percent. In other words, there is a ceiling in manipulating the loan loss provision. On the other hand, as general provision is also considered as banks' expense, a rise in general provision hence negatively affects banks' retained earnings. Banks thus have lower common equity which, in turn, affects total capital ratio negatively. Obviously, this is

paradoxical. the net effect then depends on the amount of general loan-loss reserves. Under Thai banking industry context, it is expected that the suggested assumption should be insignificant since all Thai banks have the total regulatory capital ratio, from the period of 2010 to 2016, higher than the mentioned threshold of 8.5 percent.

Not to limit oneself to the misuse of loan loss provision, the factor determining the general component of provision is also examined. Since banks do not disclose information publicly, besides what has been required from the Bank of Thailand, on the criteria general provision is set. The research serves the variation in bank's stock price relative to their book as the target variable. This is done to investigate if market participants' demand and supply in banks' stock influences the banks' decision in the setup of loan loss provision. According to the fact that the observations used in this research are all based on Thai listed banks the research hypothesizes that Price to Book Value has a significant impact on loan loss provision.

3. Literature Review

Earnings Management

To support the hypothesis that Thai banks may subject to profit manipulation, prior researchers have also performed an empirical analysis over the mentioned issue. Anandarajan, Hasan and McCarthy (2007) examined the use of loan loss provision for earnings management and found that Australian listed commercial banks used LLPs in smoothing their income more aggressively, compared to the unlisted ones after the implementation banking regulations consistent with the Basel Accord of 1988. Likewise, Perez, Salas-Fumas and Saurina (2008) found an evidence that Spanish banks smooth income through loan loss povision. By examining jointly between the risk and profitability aspects, Norden and Stoian (2014) found out that Dutch banks' provisioning policy was misleading since they were subject to the income smoothing behavior. Moreover, by using a sample from Turkish commercial banks, Acar and Ipci (2015) suggested that there was an adequate evidence in supporting the income smoothing hypothesis for Turkish banks yet the effect is faded during the time of crisis. They also noted that foreign banks were subject to a stronger degree of income smoothing compared to the domestic banks. Kanagaretnam, Lobo, and Mathieu (2004) added on the literature that during 1992 to 2001, banks with relatively high (low) pre-managed earnings, had positive (negative) loan loss provision. On the other hand, Ahmed, Takeda and Thomas (1999) found no evidence on the use of loan loss provision under earnings management hypothesis. In addition, based on the data during the Asian currency crisis, the Sub-prime crisis, and the Euro debt crisis, Isa, Choong, Fie, Mohamed, and Agil (2013) made a conclusion that Malaysian banks did not use loan loss provision to smooth their income due to the good governance and stringent conditions imposed by regulators. More importantly, the important point to note is according to Gonzalez and Fonseca (2008) as the authors suggested that, by using the data from 1995-2002, Thai banks were not subject to income smoothing hypothesis.

Signaling hypothesis

Even though the research tries to propose a different interpretation regarding the signaling hypothesis, we still base our adjustment on the theory suggested from prior researches. Therefore, researches that focus on the signaling hypothesis should be referred. Collins, Shackelford, and Wahlen (1995) found that general provision was positively related to future changes in cash flow and banks stock return. The result seemed to be consistent with Bouvatier and Lepetit (2008) as the author used difference GMM estimator since they argued that banks were subject to backward-looking behavior and found out that banks use loan loss provision as a tool to signal their financial soundness to the outsiders. Based on the observations among Nigerian Banks, Ozili (2014) suggested that there was an incentive for them to signal the outsiders after IFRS had been in effect through the use of loan loss provision. On the other hand, by controlling for the global financial crisis, Anandarajan, Hasan, and McCarthy (2007), examined the use of loan loss provision among Australian banks and found no evidence on signaling behavior. Ahmed Takeda and Thomas (1999) also suggested that there was no evidence for banks to signal private information to outsiders through the use of loan loss provision. Adzis, Anuar, and Hishamuddin (2015) also tested for the signaling hypothesis among Malaysian banks. By controlling for the effect of global financial crisis, the authors found that there was no significant evidence to support the signaling hypothesis as well.

Capital management

Various papers have dealt with the capital management assumption. Moyer (1990) found an evidence that according to the cost occurring from capital regulations encountered by banks, accounting measures, provisioning policy in this case, had been implemented by some managers as a tool to reduce the cost effect from a regulatory constraint. The result turned out to be consistent with Ahmed, Takeda and Thomas (1999) since the authors tried to examine the use of loan loss provision under capital management hypothesis and found that manipulation over capital influenced banks to adjust their provisioning policy. Moreover, Anandarajan, Hasan and McCarthy (2007) also insisted that loan loss provision

had been used in managing capital among listed Australian banks. However, according to the data prior to Basel I Beatty, Chamberlain and Magliolo (1995) came up with different results since they conclude that, by using the data from 1985-1989, provision was not the factor determining managers' decision to manage banks capital. The result was aligned with the result from the later period suggested by Anandarajan, Dimitropoulos, and Leventis (2011) as the authors focused on the capital management hypothesis prior to and after the implementation of IFRS on listed banks in European Union. They found that banks were not subject to capital manipulation both before and after the implementation of IFRS. In addition, Anandarajan, Hasan, and Lozano-Vivas (2003) also suggested that there was no evidence of the misuse of loan loss provision as a tool for capital management among Spanish banks.

However, to the best of our knowledge, there was no study taking a closer look at the effect of Price to book Value ratio on loan loss provision.

4. Empirical analysis: data selection, descriptive statistics, and model specification

4.1 The sample selection

As scope of this research is in boundary of Thailand, the dataset in this study was extracted from eleven Thai listed banks websites, Office of the National Economic and Social Development Board (NESDB), and Securities and Exchange Commission websites. The list of the banks and their acronyms used as our observations are as follow: 1) Bank of Ayudhya public company limited: BAY 2) Bangkok bank public company limited: BBL 3) CIMB Thai public company limited: CIMBT 4) Kasikornbank public company limited: KBANK 5) Kiatnakin bank public company limited: KKP 6) Krung Thai bank public company limited: KTB 7) LH financial group public company limited: LHBANK 8) The Siam Commercial bank public company limited: SCB 9) Thanachart Capital public company limited: TCAP 10) TISCO Financial group public company limited: TISCO 11) TMB bank public company limited: TMB. One point to mention is that due to the unavailability of the data from LH financial group public company limited, the the data has to be shortened for a purpose of balanced panel data. Hence, the data used in the baseline model is in quarterly basis starting from 2010 to 2016

For a purpose of robustness, banks are differentiated into three main categories depending on their total assets. This is done to investigate if banks with different asset sizes behave differently. This is shown in table 1. A point to note here is that the observations are the same with those used in our baseline model from 2010 to 2016.

Table 1: Banks categorized by their total assets

Size	Banks
Large	Bangkok bank public company limited
Large	Kasikorn bank public company limited
Large	Krung Thai bank public company limited
Large	The Siam Commercial bank public company limited
Medium	Bank of Ayudhya public company limited
Medium	TISCO Financial group public company limited
Medium	TMB bank public company limited
Small	CIMB Thai public company limited
Small	Kiatnakin bank public company limited
Small	LH financial group public company limited
Small	TISCO Financial group public company limited

Moreover, to scrutinize through the use of loan loss provision during the financial crisis, the quarterly data from 2006 to 2010 is also exploited. However, as some banks do not provide adequate information during the financial crisis, the data is constrained to only 8 banks which are 1) Bank of Ayudhya public company limited 2) Bangkok bank public company limited 3) Kasikornbank public company limited 4) Kiatnakin bank public company limited 5) Krung Thai bank public company limited 6) The Siam Commercial bank public company limited 7) Thanachart Capital public company limited 8) TMB bank public company limited.

4.2 Descriptive Statistics

Table 2: Descriptive Statistics

Descriptive Statistics										
	Baseline Sample		Small		Medium		Large		Crisis	
Year	2010-2016		2010-2016		2010-2016		2010-2016		2006-2010	
Variables	Mean (SD)	Max (Min)	Mean (SD)	Max (Min)	Mean (SD)	Max (Min)	Mean (SD)	Max (Min)	Mean (SD)	Max (Min)
LLP	0.026 (0.009)	0.056 (0.007)	0.022 (0.01)	0.05 (0.007)	0.029 (0.007)	0.056 (0.016)	0.029 (0.006)	0.041 (0.02)	0.035 (0.012)	0.082 (0.022)
NPL	0.02 (0.012)	0.094 (0.007)	0.02 (0.011)	0.062 (0.008)	0.024 (0.017)	0.094 (0.01)	0.016 (0.008)	0.047 (0.007)	0.075 (0.038)	0.199 (0.021)
LOAN	0.69 (0.067)	0.904 (0.522)	0.727 (0.082)	0.904 (0.588)	0.671 (0.056)	0.771 (0.522)	0.667 (0.031)	0.724 (0.582)	0.705 (0.08)	0.861 (0.001)
EBTP	0.006 (0.003)	0.029 (0.001)	0.006 (0.003)	0.012 (0.001)	0.006 (0.003)	0.016 (0.0004)	0.007 (0.003)	0.029 (0.002)	0.006 (0.005)	0.029 (-0.02)
TRCL	0.098 (0.192)	0.766 (-0.34)	0.135 (0.236)	0.62 (0)	0.136 (0.239)	0.654 (0)	0.146 (0.263)	0.742 (0)	0.133 (0.243)	0.692 (0)
SIGN	0.0002 (0.003)	0.02 (-0.018)	0.0001 (0.002)	0.01 (-0.01)	0.0002 (0.003)	0.011 (-0.011)	0.0002 (0.003)	0.02 (-0.18)	0.0002 (0.006)	0.024 (-0.022)
GDPGR	0.01 (0.032)	0.11 (-0.11)	0.01 (0.032)	0.11 (-0.107)	0.01 (0.032)	0.11 (-0.011)	0.01 (0.032)	0.11 (-0.107)	0.026 (0.056)	0.12 (-0.071)
PBV	1.618 (0.769)	6.28 (0.45)	1.71 (1.09)	6.28 (0.45)	1.417 (0.462)	3.35 (0.7)	1.685 (0.526)	2.87 (0.82)	1.292 (0.573)	2.74 (0.33)

Table 2 presents the descriptive statistics for sample from the baseline model, banks with different total assets size, and during the financial crisis (2006 – 2010). Obviously, the mean value of loan loss provision during the crisis (0.035) is relatively higher compared to one resulting from the baseline model (0.026). By scrutinizing through this, one shall find that medium and large banks contributes to the loan loss provision equivalent to an average of 0.029, which is relatively higher than small banks whose rate turns out to be at 0.022 even though small banks have the highest proportion of total loan relative to their assets. By looking in another perspective, this might suggest that Thai banks do concern more during the financial difficulty and set up higher loan loss provision for a purpose of safety. However, one should be aware that the result might be inaccurate due to the difference in the number of banks during the two time periods.

One interesting point to note here is that the mean value of non-performing loan relative to the total assets of medium banks is the highest at 0.024 among the whole banking industry in Thailand. Compared among others, Large banks come up with the highest average value of pre-provisioning and tax profit. Lastly, the average value of the change in GDP growth rate and price to book value is somewhat consistent as during the crisis, the two variables dropped, which reflects the consequences from the crisis, compared to the post-crisis.

4.3 Model specification

To capture all assumption we have mentioned previously, the following model is used as the baseline model

$$\mathrm{LLP}_{i,t} = \alpha_1 \mathrm{LLP}_{i,t-1} + \alpha_2 \mathrm{NPL}_{i,t} + \alpha_3 \mathrm{LOAN}_{i,t} + \alpha_4 \mathrm{EBTP}_{i,t} + \alpha_5 \mathrm{TRCL}_{i,t} + \alpha_6 \mathrm{SIGN}_{i,t} + \alpha_7 \mathrm{GDPGR}_{i,t} + \alpha_8 \mathrm{PBV}_{i,t} + \epsilon_{i,t}$$

Table 3: Variables construction and their expected sign

Variable		Construction	Expected Sign
Dependent	$\mathrm{LLP}_{i,t}$	Loan loss provision over total assets	
Independent	$\mathrm{LLP}_{i,t-1}$	Loan loss provision at t-1 over total assets at time t	+
	$\mathrm{NPL}_{i,t}$	Non-performing loan over total assets	+
	$\mathrm{LOAN}_{i,t}$	Total loan over total assets	+
	$\mathrm{EBTP}_{i,t}$	Earnings before tax and provision over total assets	+
	$\mathrm{TRCL}_{i,t}$	(Total regulatory capital ratio – 8.5)/ 8.5 when observations for banks I are in the first quartile of total capital ratio, 0 otherwise	+/-
	$\mathrm{SIGN}_{i,t}$	$(\mathrm{EBTP}_{t+1} - \mathrm{EBTP}_t)/0.5 * (\mathrm{Toal\ Assets}_t + \mathrm{Toal\ Assets}_{t+1})$	+
	$\mathrm{GDPGR}_{i,t}$	GDP growth rate	-
	$\mathrm{PBV}_{i,t}$	Price to book value	+/-

Variable description

According to table 3, the dependent variable of the regression model here is loan loss provision relative to their total assets for bank i at time t.

$\mathrm{LLP}_{i,t-1}$ represents the lagged dependent variable and it is constructed as loan loss provision at period t-1 over total assets at period t. This is done since Bouvatier and Lepetit (2008) suggested that banks are subject to the backward-looking behavior in implementing provisioning policy. In other words, decision regarding the rate of loan loss provision in current period is influenced by the rate in a prior period. The variable is expected to yield a positive relationship with the dependent variable.

$\mathrm{NPL}_{i,t}$ is the ratio of non-performing loan over total assets of bank i at time t. The variable is included to proxy the specific component of loan loss provision since banks are constrained to set aside the provision equivalent to full amount of non-performing loan. One could thus expect that the variable should be positively related to the loan loss provision.

$\mathrm{LOAN}_{i,t}$ is constructed as total loan to total assets for banks i at time t. The variable is included in the model to complement with the NPL to proxy the specific provision since loan loss provision is mainly determined by the size of bank's total loan portfolio. As required by Bank of Thailand, banks are subject to set aside 1 percent of their loan as a provision. Hence, one should also expect that the variable is positively related to the dependent variable.

$\mathrm{EBTP}_{i,t}$ is the target variable, which is included to capture the income smoothing behavior. The variable is constructed as earnings before tax and provision over total assets of bank i at time t. As it is assumed that banks managers tend to increase the amount of loan loss provision when the earnings are considered as too high or over the target, vice versa. This is done to mainly to underscore the risk perception to regulators and investors, and reduce earnings volatility. One then could expect the positive relationship between EBTP and the dependent variable.

$\mathrm{TRCL}_{i,t}$ is included for a purpose of capturing the capital management hypothesis. This is constructed as (total regulatory capital ratio – 8.5)/ 8.5 when observations for banks i are in the first quartile of total capital ratio and it is equal to 0 otherwise. The positive relationship is expected if banks with low level of capital use the loan loss provision as a tool to bring up their total regulatory capital ratio. However, the expectation could be the other way around since an increase in loan loss provision affects retained earnings negatively. Hence, the expected sign may turn out in either positive or negative sign.

$\mathrm{SIGN}_{i,t}$ is constructed as $(\mathrm{EBTP}_{t+1} - \mathrm{EBTP}_{t})/0.5 * (\mathrm{Toal\ Assets}_{t} + \mathrm{Toal\ Assets}_{t+1})$. Under our signaling assumption, banks might signal the market participants about expansion in their business resulting from an increase in their portfolio, which comes in form of higher

earnings, through the use of loan loss provision. Therefore, one should expect a positive relationship between variable SIGN and dependent variable.

$\mathrm{GDPGR}_{i,t}$ represents Thailand's seasonally-adjusted GDP growth rate in quarterly basis. The variable is included as a control variable of pro-cyclicality effect since during the economic downturn, banks tend to have higher non-performing loan. This then leads to an increase in the rate of loan loss provision. One should then expect a negative coefficient of GDPGR.

$\mathrm{PBV}_{i,t}$ is one of the target variables. The variable is included to investigate whether variation in banks' stock price relative to their book value has an impact on the loan loss provision. As suggested previously that the data used in the research is based on Thai listed banks, there is a high probability that market participants' demand and supply in stock price have an impact on provisioning policy. However, to our best knowledge, there is no theory supporting this issue, both positive and negative sign of the coefficient are expected.

5 Result and Robustness Test

5.1 Result

Table 4: Baseline result

Dependent variable: Loan Loss Provision	Coefficient	Robust standard error	P-value
LLP_{t-1}	0.79037***	0.04405	0.000
NPL	0.02718	0.04207	0.532
LOAN	0.01879**	0.00615	0.011
EBTP	0.49380***	0.09657	0.000
TRCL	-0.00028	0.00077	0.725
SIGN	0.05889**	0.04849	0.047
PBV	-0.00111***	0.00021	0.000
GDPGR	-0.00531*	0.00284	0.089

*** represents 1 percent significant level ** represents 5 percent significant level * represents 1 percent significant level

As suggested by Bouvatier and Lepetit (2008), backward-looking behavior is a crucial assumption regarding provisioning policy. In other words, the rate of loan loss provision in a prior period is used as a reference in determining such rate in current period. This suggests that lagged dependent variable, loan loss provision, should be included in the model as the independent variable. Hence, in this case, a lag of one period of loan loss provision represents the dynamic part of the model. One point to mention here is that as suggested by Arrelano and Bond (1991), implementing OLS estimator, fixed, or random effect model on dynamic panel data would lead to a Nickell bias, which causes inconsistency in the estimated parameter. Hence, the difference Generalized Method of Moment estimator, which mitigates such problem, is applied to the model.

According to table 4, exploiting the quarterly data from 2010 to 2016, it is obvious that the coefficient of LLP_{t-1} is positively significant at 1 percent level. This confirms that the statement mentioned earlier is able to apply under Thai banks context as past realization of loan loss provision is a crucial factor for banks manager's concern against provisioning policy Surprisingly, NPL turns out to be insignificant. This contradicts to the theory suggested earlier since under Bank of Thailand's regulation, Thai banks are constrained to set aside the

amount of loan loss provision equivalent to full amount of Non-performing loan. This may be implied that a period of 7 years, starting from 2010 to 2016, non-performing loan plays no important role on the rate of loan loss provision. LOAN, as expected, is positively significant at 5 percent level. The result is consistent with the regulation as an increase in loan portfolio results in higher amount of loan loss provision banks have to hold.

Moving on to the target variable, by looking at variable EBTP, as it turns out to be positively significant at 1 percent level, banks increase the amount of loan loss provision when there is a rise in earnings before tax and provisions, and the provisioning policy is negatively impacted from a decline in the pre-provisioning and tax profit. This confirms that Thai banks are subject to profit manipulation as they smooth income, which results in misguided real economic result, through provisioning policy. In addition, as there is no sign of significance in variable TRCL, Capital Management hypothesis is not able to apply under Thai banking industry context. In other words, Thai banks with low level of capital ratio do not use loan loss provision to bring up the total regulatory capital ratio. However, the result is as expected since all Thai banks hold the total regulatory capital ratio higher than the threshold of 8.5 percent. Under signaling assumption, surprisingly, as SIGN turns out to be positively significant at 5 percent level, this then confirms that there is an evidence of signaling hypothesis in Thai banking industry. It could be implied that Thai banks try to signal outsiders through loan loss provision about the increase in their portfolio. This reflects through an increase in their portfolio, which comes in form of higher future earnings.

As PBV variable is negatively significant at 1 percent level, it might be interpreted such that when banks are well-performed, which reflects through higher demand in banks' stock, which, in turn, increases their price relative to book value, the loan loss provision rate is affected negatively. GDPGR represents Thailand seasonally-adjusted GDP growth rate in quarterly basis. As the variable is negatively significant at 5 percent level, it could be implied that Thai banks set aside higher loan loss provision during the economic slowdown and decrease the rate when economy is in good condition.

5.2 Robustness test

For a purpose of robustness, this section applies the difference GMM estimator to Thai banks with different total asset size. As suggested earlier, banks are classified into three categories, small, medium, and large.

Table 5: Results from different sizes of bank

Dependent variable:
Loan Loss Provision

Variables	Small Banks			Medium Banks			Large Banks		
	Coefficient	Robust Standard error	P-Value	Coefficient	Robust Standard error	P-Value	Coefficient	Robust Standard error	P-Value
LLP_{t-1}	0.71375***	0.15016	0.009	0.71948***	0.10173	0.006	0.79465***	0.05357	0.000
NPL	0.14809	0.10157	0.219	-0.05761	0.02475	0.102	0.01664	0.03237	0.634
LOAN	0.02121***	0.00332	0.003	-0.01082	0.00656	0.198	0.02298***	0.00473	0.008
EBTP	0.50667***	0.09691	0.006	0.4199***	0.03897	0.002	0.45627	0.28998	0.191
TRCL	-0.00071	0.001	0.513	0.00135	0.00166	0.476	-0.00147	0.00085	0.160
SIGN	0.01134	0.07816	0.892	0.0432	0.08377	0.642	0.06332	0.03553	0.149
PBV	-0.0011***	0.00022	0.007	-0.00031	0.00774	0.773	-0.0019***	0.00014	0.000
GDPGR	-0.0009	0.00304	0.782	-0.00008	0.00099	0.992	-0.0117**	0.00491	0.075

*** represents 1 percent significant level ** represents 5 percent significant level * represents 1 percent significant level

Obviously, the coefficient of LLP_{t-1} is positively significant at 1 percent level for all sizes of banks. Under Thai banking industry context, this highlights a strong argument that the provisioning policy in a prior period heavily influences the decision in coming up with such rate in current period regardless of banks' total asset size.

For small banks, similar to the result from baseline result, the coefficient of NPL is insignificant while the coefficient of LOAN is positively significant at 5 percent. For the target variable, EBTP turns out to be positively significant at one percent, representing income smoothing behavior among small banks, while there is no evidence of significance on the other hypotheses. Moreover, it is obvious that there is no evidence that loan loss provision is affected from different states of economy. Lastly, negatively significance of the coefficient

on PBV indicates that a positive change in the price relative to book value leads to the deterioration in bank's loan loss provision.

Surprisingly, apart from the significance coefficient of the lagged dependent variable and the target variable, EBTP, others show no sign of significance as suggested by the p-value from medium-size bank. Nevertheless, this is still an evidence that medium banks are subject to profit manipulation through the use of loan loss provision.

For large banks, obviously, even though the coefficient of variable LOAN is positively significant at 10 percent, NPL turns out to be insignificant. This may be implied that, among large banks, specific provision is determined solely on the change in size of their loan portfolio regardless of the the change in non-performing loan. Moreover, there is no sign of significance shown in either variable EBTP, TRCL, or SIGN. Hence, one might imply that large banks in Thailand are not subject to the misleading implementation in provisioning policy. However, as suggested by a negative significant parameter of PBV, this indicates that large-size banks' provisioning policy is negatively influenced from a change in price relative to book value.

In conclusion, under Thai banking industry context, regardless of the total asset size, banks provisioning policy is considered as dynamic. It is influenced from the decision in the past. By concentrating on the income smoothing hypothesis, only small and medium banks are subject to profit manipulation. Moreover, besides the sign of significance in variable GDPGR for large banks, economic condition has no effect on loan loss provision for both medium and small banks. More importantly, all banks share the same characteristic that non-performing loan has no effect on their provisioning policy. Lastly, as the coefficient of SIGN shows no sign of significance either in small, medium, or large banks, which contrasts to the result provided from the baseline result, we might argue that signaling assumption is inconclusive.

5.3 Result during the financial crisis

Table6: Results during the financial crisis

Dependent Variable: Loan Loss Provision	Coefficient	Robust standard error	P-value
LLP_{t-1}	0.79209***	0.18963	0.003
NPL	0.00024*	0.00012	0.076
LOAN	0.02038	0.01284	0.151
EBTP	-0.44417	0.27519	0.145
TRCL	-0.00210	0.00176	0.270
SIGN	0.11119	0.06785	0.140
PBV	0.00266**	0.00083	0.012
GDPGR	-0.00406	0.00719	0.588

*** represents 1 percent significant level ** represents 5 percent significant level * represents 1 percent significant level

The research also applies the same model to scrutinize through the use of loan loss provision during the global financial crisis. The observation includes the quarterly data from 2006 to 2010. However, one should be noted that due to the unavailability of data, observations are shortened and constrained to only 8 listed Thai banks.

According to table 6, as suggested by P-value, LLP_{t-1} is positively significant at 1 percent level. This hence, again, highlights a strong statement of backward looking behavior of Thai banks in determining the rate of loan loss provision even during the financial difficulties. Together with the result from the baseline model, this may imply that such behavior is not related to changes in economic conditions. For the variable controlled for Bank of Thailand's regulation, one should observe that while a change in non-performing loan positively affects the change in loan loss provision, the coefficient on LOAN shows no sign of significance. However, even though NPL[1] turns out to be significant at ten percent level, the economic interpretation might be ambiguous due to its small magnitude. In addition, there is no evidence of income smoothing behavior as well as capital management and signaling hypothesis as suggested by P-value. Moreover, as Price to Book value is positively significant at 5 percent level, this may be implied that during financial difficulties, less demand in Bank's stock, which reflects from a decrease in PBV negatively impacts the decision

[1] Please note that NPL, here, represents Gross non-performing loan while the one in the baseline result represents Net non-performing loan. The difference is mainly due to the unavailability of the data during financial crisis.

regarding loan loss provision policy, vice versa. As the variable GDPGR turns out to be insignificant, one can say that economic conditions do not have an impact on loan loss provision in Thai Banking industry during the time of global financial crisis.

6. Conclusion

Loan loss provision is considered as crucial variable for both banks themselves and regulatory institution. However, as not much attention has paid to the implementation of loan loss provision in Thailand, the research thus scrutinizes through such issue to see if there is misconduct in provisioning policy among Thai banks by testing empirically over three hypotheses. Firstly, Thai banks may have an incentive in smoothing their income to stabilize the variability in their stocks price. Secondly, loan loss provision may be thought of a device in signaling outsiders about an increase in banks' portfolio. Lastly, Thai banks with considerably low total regulatory capital ratio, compared among others, are assumed to increase the rate through a rise in loan loss provision. Moreover, the research also performs the empirical analysis to investigate if the variation in banks' stock price has influence on banks' decisions in determining the loan loss provision rate.

The crucial point this research would like to mention is that small and medium size Thai listed banks are subject to profit manipulation. The suggested action therefore deviates the objective of loan loss provision. Moreover, surprisingly, contrasting to the regulation monitored by the regulatory institution, non-performing loan has no significant impact on the magnitude of loan loss provision. Even though, according to the result from our robustness test, it has an impact during financial crisis, the magnitude is considerably small. Loan loss provision set in a prior period is considered as one of significant factors Thai listed banks use as a reference in determining the rate in current period as suggested by the result during and post crisis. Size of total loan relative to the assets seems to be matter for only small and large banks, yet we find no significant impact from the change in loan portfolio on loan loss provision during the financial difficulties. As expected, there is no sign of capital management from Thai listed banks as suggested by results from baseline model and robustness test. This is probably due to the fact that Thai listed banks are not subject to the violation in holding total regulatory capital ratio. However, there seems to be a conflict in

the result of Signaling hypothesis from the baseline model and the result when banks are categorized into three groups as the former states that there is an evidence that Thai listed banks are subject to the signaling assumption. This is consistent to the result during the financial crisis. The later, on the other hand, shows no sign of significance in the mentioned assumption. The result is hence inconclusive. According to our assumption regarding the effect of variation in banks' stock price, it turns out that only provisioning policy from small and large banks are inversely influenced from the positive change in price relative to book value. Lastly, the result suggests that only large banks are ones who take the change in GDP into account in determining the provisioning policy.

The purpose of the research is to shed some light on the provisioning policy so that the regulatory institution could realize about a hidden agenda behind the use of loan loss provision and come up with stricter policy or tool to prevent banks' misconduct in implementing provisioning policy.

Appendix

Nickell Bias

According to Nickell (1981), a serious difficulty arises with one way fixed-effect model which includes a lagged dependent variable as independent variable. This is referred as the Dynamic Panel Data model. The problem causes a stronger degree especially with large observations and short time series (small T, large N context). The problem occurs as the demeaning process, which subtracts out the mean value of dependent and independent variable from each respective variable, causes a correlation between regressor and the disturbance term. Nickell (1981) suggested that such correlation leads to a bias in estimating coefficient which explain the lagged dependent variable since the regressor cannot be distributed independently from the disturbance term.

A point Nickell (1981) has also mentioned is that the inconsistency of estimated coefficient of the lagged dependent variable is in order of 1/T, where T represents time period, as the size of observations approaches infinity. In other words, the persistence of the dependent variable will be underestimated. This can be implied that the resulting bias has a stronger degree for short time-series observations.

Likewise, in the case of large value of T, the inconsistency turns out to be approximately equivalent to $-(1 + p)/(T - 1)$ where p represents the coefficient of lagged dependent variable and T is the time period. The author also argued that such bias cannot be mitigated by including additional regressors to the model since the bias is not caused through the autocorrelation in disturbance process. Moreover, another significant point to mention is that the bias can be arisen even if the disturbance process is independent and identically distributed. This then can be implied that the bias would be more severe if the disturbance term appeared to be serially correlated among themselves in coming up with consistent Auto Regressive (AR) coefficient. The problem also occurs with one-way random effect model since each value of $Y_{i,t}$ contains the value of error component U_i. This hence indicates that the lagged dependent variable cannot be uncorrelated to the disturbance process.

Solution

First difference approach can be considered as one of the solutions for the bias
For instance;

$$Y_{i,t} = \alpha_1 + \rho Y_{i,t-1} + \alpha_2 X_{i,t} + u_i + \varepsilon_{i,t} \quad (1)$$

By taking the first difference of (1), it turns out as follow

$$\Delta Y_{i,t} = \rho \Delta Y_{i,t-1} + \alpha_2 \Delta X_{i,t} + \Delta \varepsilon_{i,t}$$

Obviously, constant term and the individual effect have been removed by the first difference approach. However, the correlation between the first order Moving Average process (MA1) and the differenced lagged dependent variable still exist as the former contains $Y_{i,t-1}$ while the latter contains $\varepsilon_{i,t-1}$.

According to Anderson and Hsiao (1981), with the removal of individual fixed effect, instrumental variable approach can be applied. In this case, the strategy might be that the lagged dependent variable starting from second lag in both forms of differences and lagged level can be used as the instrumental variable. Through this, the Nickell bias will be removed if the disturbance process is independent and identically distributed as the instrumenting variable will be highly correlated to the lagged dependent variable but uncorrelated with the disturbance term. Even though the disturbance terms are serially correlated among themselves, one can still instead use further lags of dependent variable as instrumental variable.

Generalized Method of Moment

However, according to Arellano and Bond (1991), the approach suggested by Anderson and Hsiao (1981) does not exploit all the information available in the sample. Moreover, the mentioned approach has to deal with a tradeoff between the sample and lag length. In other words, the further lags used as the instrumental variable results in a shortage in a sample size.

According to Roodman (2009), to deal with the mentioned tradeoff, GMM approach is suggested instead.

This can be represented through an example from Roodman (2009). the instrument $Y_{i,t-2}$, for example, can be written in terms of vector Z as follow

$$Z_i = \begin{pmatrix} . \\ Y_{i1} \\ \vdots \\ Y_{i,T-2} \end{pmatrix}$$

The missing value is represented by ".". Therefore, the first row of observation will be removed as the transformed variables being instrumented should start at period t = 2.
The author then constructed a set of instruments from the second lag of Y, one for each time period, and substitute zero to represent missing observations. Such construction is referred as "GMM-style" instruments

$$\begin{pmatrix} 0 & 0 & \cdots & 0 \\ Y_{i1} & 0 & \cdots & 0 \\ 0 & Y_{i2} & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & Y_{i,T-2} \end{pmatrix}$$

Through this setup, each column of Z is considered as orthogonal to the transformed errors. This thus provides a meaningful moments condition that one should expect as
$\sum_i Y_{i,t-2} e^*_{it} = 0$,hence $E\left(Y_{i,t-2} \varepsilon^*_{it}\right) = 0$ for each t is greater or equal to 3

It is also available to collapse the columns of the matrix Z in to a single column

$$\begin{pmatrix} 0 \\ Y_{i1} \\ \vdots \\ Y_{i,T-2} \end{pmatrix}$$

By doing so, the problem of a loss in observations should be eliminated. Hence, all valid lags of untransformed variables can be used as instruments. Lags two and further should be appropriate in instrumenting endogeneous variable whereas lag 1 is also valid for a predetermined variable. This can be shown as follow

$$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & \dots \\ Y_{i1} & 0 & 0 & 0 & 0 & 0 & \cdots \\ 0 & Y_{i2} & Y_{i1} & 0 & 0 & 0 & \cdots \\ 0 & 0 & 0 & Y_{i3} & Y_{i2} & Y_{i1} & \cdots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \ddots \end{pmatrix}$$

or the collapsed one

$$\begin{pmatrix} 0 & 0 & 0 & \cdots \\ Y_{i1} & 0 & 0 & \cdots \\ Y_{i2} & Y_{i1} & 0 & \cdots \\ Y_{i3} & Y_{i2} & Y_{i1} & \cdots \\ \vdots & \vdots & \vdots & \ddots \end{pmatrix}$$

Applying GMM to the model

To specify the backward-looking behavior of the bank, a lag of one period of loan loss provision is included in the model. This hence refers to the dynamic panel data model. According to the Nickell bias, fixed and random effect estimator might not be appropriate in this case. Therefore, the difference GMM approach suggested by Arellano and Bond (1991) is used for this context.

According to the baseline model:

$$\begin{aligned} \mathrm{LLP_{i,t}} = {} & \alpha_1 \mathrm{LLP_{i,t-1}} + \alpha_2 \mathrm{NPL_{i,t}} + \alpha_3 \mathrm{LOAN_{i,t}} + \alpha_4 \mathrm{EBTP_{i,t}} + \alpha_5 \mathrm{TRCL_{i,t}} + \alpha_6 \mathrm{SIGN_{i,t}} \\ & + \alpha_7 \mathrm{GDPGR_{i,t}} + \alpha_8 \mathrm{PBV_{i,t}} + \epsilon_{\mathrm{i,t}} \end{aligned}$$

As suggested by the GMM estimator, “GMM” and “IV” style of instrumental variables should be specified. In this research, lag order of two and three of dependent variable and variable EBTP are instructed as GMM style instrumental variables while others are instrumenting themselves. Hence, besides EBTP and LLP, the rest is specified as IV style instrumental variable.

Sargan and Hansen Test

The Sargan and Hansen test is a test of the validity of instrumental variables. It is a test of the overidentifying restrictions. The hypothesis being tested with the Sargan and Hansen test is that the instrumental variables are uncorrelated to some set of residuals, and therefore they are acceptable, healthy, instruments.

AR test

According to Arellano and Bond (1991), the test for serial correlation in the idiosyncratic disturbance term should be performed to assure that such correlation is eliminated. Normally, first order serial correlation is expected in differences as $\Delta\nu_{i,t}$ is correlated to $\Delta\nu_{i,t-1}$ through the $\nu_{i,t-1}$ term where ν represents the idiosyncratic disturbance term. Therefore, as suggested by Roodman (2009), second order correlation in differences should be observed to detect for first-order correlation in level. To clarify the point, this will detect correlation between the $\nu_{i,t-1}$ in $\Delta\nu_{i,t}$ and $\nu_{i,t-2}$ in $\Delta\nu_{i,t-2}$.

Table 7: Autocorrelation test

Autocorrelation test	Baseline Model	Small	Medium	Large	Crisis
	Pr > z	Pr > z	Pr > z	Pr > z	Pr > z
Arellano-Bond test for AR(1) in first differences	0.030	0.11	0.174	0.161	0.109
Arellano-Bond test for AR(2) in first differences	0.182	0.651	0.174	0.178	0.333

Table 7 represents the Arellano-bond test for autocorrelation in both first and second order in first differences of the model used in the research. Obviously, according to the p-value stated above, none of them appear to follow the first order correlation in level.

Table 8: Hansen Test

Test for over-identification restrictions	Baseline Model	Small	Medium	Large	Crisis
	P-value	P-value	P-value	P-value	P-value
Hansen Test	1.000	1.000	1.000	1.000	1.000

Table 8 above presents the Hansen J statistic with the P-value of all models used in this research. Obviously, with the null hypothesis that the instruments as a group are exogeneous, the resulting P-value confirms that the null hypothesis cannot be rejected. This hence implies that the group of instrumental variables are not correlated to the disturbance term.

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