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# Non-Performing Loans, Moral Hazard and Lending Behaviour of Indonesian Banks

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## ABSTRACT

This research aims to analyze the effects of non-performing loans ratio to lending behaviour on listed conventional banks in Indonesia in the period of 2006-2015. By applying the Threshold Regression method from Hansen (1999) and using the most recent non-performing loans ratio as the threshold variable, researcher found that the moral hazard problem is exist when the NPLs ratio exceed 5.29 per cent. We figure out whether there is different behavior in lending between bank which has NPLs ratio above the threshold and below the threshold. And as result, we found the difference since there is threshold effect from our fixed effect panel regression. This difference is not yet shows that the moral hazard is exist in banking system of Indonesia. However, the signs from the independent variables explain that there is moral hazard. Bank with NPLs above the 5.29 per cent has loan growth which increase the NPLs, whereas bank with NPLs below 5.29 per cent has loan growth which decrease the NPLs. The troubled bank behave differently from the rules, with their bad condition, they are adapting riskier lending strategy instead of prudent lending strategies. The determinants of the non-performing loans ratio in Indonesia are loan growth rate (LGR), last period loan growth rate (1.LGR), equity to total asset ratio (ER) and bank size (Size).

**Keywords**: Credit Risk, Lending Behaviour, Moral Hazard, Non-Performing Loans, Threshold Regression

**JEL Classification**: G21, G30

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## INTRODUCTION

Bank has important functions and role in economy. This functions and role will not work properly when bank does not have resistance to economic shocks. It is proved when Monetary Crisis hit Indonesia's banking system in 1998. This crisis caused 16 banks are liquidated and people trust decreased. Many of depositors took their funds from banking system simultaneously so that bank runs happened. As a result, bank had difficulty to return liabilities to other banks so there was domino effect (Siahaan, 2014).

In order to overcome bank runs and to restore most people's trust, Bank Indonesia as a regulator made a policy called the blanket guarantee, which is a guarantee for all banks' liabilities, including customer's deposits and savings if the banks are liquidated. Blanket guarantee has been proven successful to give back to people's trust towards the banking industry. Nevertheless, on the other side, this policy has created moral hazard problems coming from the banks' manager, shareholders, and depositors. Kunt *et al*. (2015) shows that deposit insurance arrangement, or blanket guarantee policy in Indonesia, was highly effective to avoid bank runs, but never able to count the risk accurately. Underpricing guarantee will only jeopardize the risk in the future.

To reform banking sector further and better, understanding about non-performing loans (NPLs) and its implications toward financial stability is required. By understanding factors which influence NPLs and NPLs ratio, also knowing the effect of non-performing loans, regulators either Bank of Indonesia (BI) or Otoritas Jasa Keuangan (OJK) will able to make accurate policy to prevent bank's failure.

Researcher aims to analyze whether lending policy will generate moral hazard or not. One of the main indicators of moral hazard is excessive risk taking in lending. Bank failure, one that is caused by inflated non-performing loans will give incentive to bank manager to take excessive risk. This will happen if the failure causes negative impact to huge financial problem. Manager's incentive cannot be directly observed, but probability of moral hazard can be inferred by examining behaviour of banks (Zhang *et al*., 2016). Moral hazard according to Zhang *et al*. (2016) occurs when bank has NPLs ratio that approaches the threshold, thus inducing bank managers, whom act as agents, to implement riskier strategies, such as conducting aggressive lending activities or finance riskier projects to gain higher returns.

If banks anticipate that the government will intervene in a particular critical threshold of NPLs, banks may further increase their NPLs ratio to that particular critical threshold. If moral hazard problems persist, NPLs ratio may become higher and may cause bankruptcy. The failure of one bank would cause a chain effect to other banks, and eventually it may jeopardize the financial stability of country as a whole (Zhang *et al*., 2016).

To understand the existence of moral hazard in banking sector of Indonesia, we will test whether or not there is a threshold effect when banks with high NPLs ratio raises its risk. In this study, we uses NPLs ratio as bank risk measurement, whereas high NPLs ratio reflect high risk exposure for banks, and last period's NPLs is as threshold variable. All these measurements refer to the study that was conducted by Zhang *et al*., 2016. With threshold panel regression, researcher aims to investigate whether or not lending behaviour of banks is sensitive to a particular threshold, and more importantly; whether or not banks with higher

NPLs ratio have a more aggressive tendency in adopting risky lending strategies. In this study, we also investigates determinant factors of NPLs ratio. This study has proven that risky lending behaviour and moral hazard in Indonesia's banking sector can be identified by observing determinant factors of NPLs ratio.

Moreover, we provide a useful indicator for regulatory authorities by identifying a threshold value. This indicator can monitor the moral hazard problems and design the policy strategies in order to reduce the risk of high NPLs.

## REVIEW OF LITERATURE

The main basic classical theories associated to this research are the agency theory, the signalling theory and the contract theory. Specifically, we will discuss the agency theory. According to Jensen and Meckling (1976), there are two types of moral hazard problems that might cause bank managers to compromise with a riskier lending policy compared to the optimal level. The first one is managerial rent-seeking, it occurs when a bank manager pursue their own benefit by investing in "pet projects" or lending to companies, individuals or organizations, in order to gain the favor or benefit of borrowers. In the other side, it has detrimental effect to the bank. The second type of moral hazard is one that is caused by a conflict of interest between shareholders and the bank's creditors. In this case, the creditor is a customer. The shareholders want to invest in risky loans to get higher return for themselves, but when the banks face risk, shareholder shift this risk to the depositors.

Janda (2006) reports that in signalling models, an informed agent may reveal his private information through the signal which he sends to the principals. During troubled times for banks, their managers often inadvertently increase their NPLs rate by approving risky loans. This is often taken by the shareholders as a sign that the bank is in a depressed state, causing them to look for alternative ways to recovery. With this signal, the shareholders should be able to decide whether to continue to take the risk of holding shares of the bank or otherwise.

In economics, contract theory talks about how economic actors can do and construct the general contractual agreements with asymmetric information. In the model of moral hazard, the principal designs the optimal contract which maximizes his expected utility subject to the participation and incentive compatibility constraints of the agent (Janda, 2006).

Bebchuk and Spamann (2010) and Bebchuk *et al*. (2010) argue that the failure of large financial institutions in the financial crisis of 2008 could be due to CEO incentives to take excessive risks. Chaigneau (2013) reports that the CEO contract design contributes to risk-taking over the optimal level. According to Prospect Theory of Kahneman and Tversky (1979) the agents or managers are risk-averse when facing sure gains, but they become risk-seeking when faced with sure loss. Therefore, it is reasonable to argue that the bank managers have an incentive to increase risk taking in a difficult position. We agree with Zhang *et al*. (2016) that bank managers face the opportunity cost between costs and benefits of excessive risk-taking.

Research by Duran and Lozano-Vivas (2015) also suggest the existence of moral hazard. On the other hand, excessive decision-making is associated with more severe financial difficulties in the long term, which eventually will affect the bank or the manager.

In addition, the contract as a form of monitoring cost can be seen in the form of government regulation contained in BI regulation (PBI) and OJK regulation (POJK). One of them is a regulation that requiring banks to report on a timely basis, as stated in POJK Number 4/POJK.03/2016, POJK Number 18/POJK.03/2016. Regulation which no less important was the regulation about NPLs of total loans on a net basis may not exceed 5 per cent by PBI 15/2/PBI/2013, which was renewed in PBI 17/11/PBI/2015 which stated that the limit on gross NPLs ratio to total loan is 5 per cent. Regulator has given guarantee towards customer's deposits through deposit insurance agreement managed by Deposit Insurance Institution (LPS).

According to Ayotte and Hansmann (2015), because the legal entity is a common signatory for all the firm's contracts, the owners can limit their own ability to act opportunistically. Therefore, those POJK's and PBI's are a type of contract that discourages bank shareholders and bank managers from acting opportunistically. But in this study, we will see whether these rules, especially the maximum NPLs threshold, have been effective in preventing moral hazard problems in the banking sector in Indonesia.

## RESEARCH METHODOLOGY

We use data from Bankscope, Eiken, Indonesia Banking Directory (DPI) and quarter financial reports. The data set is balanced panel data consisting of 38 listed conventional banks in Indonesia as sample, from 2006Q4 until 2015Q4. The sampling method is non-probability sampling with purposive sampling technique.

Table 1 Descriptive Statistic

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| After Winsorize | | | | | |
| Non-performing loans | 1,520 | 0.02374 | 0.0223821 | 0.00069 | 0.13243 |
| Loan growth rate | 1,520 | 0.0562 | 0.0984321 | -0.1514 | 0.58976 |
| Deposit growth rate | 1,520 | 0.05111 | 0.1115514 | -0.2175 | 0.63197 |
| Equity Ratio | 1,520 | 0.12977 | 0.0776856 | 0.05223 | 0.59298 |
| Size | 1,520 | 16.4214 | 1.980109 | 11.4229 | 20.3667 |
| Before Winsorize | | | | | |
| Non-performing loans | 1,520 | 0.02475 | 0.0297819 | 0 | 0.36489 |
| Loan growth rate | 1,520 | 0.06779 | 0.3537342 | -0.4085 | 12.7484 |
| Deposit growth rate | 1,520 | 0.05755 | 0.2021431 | -0.6544 | 5.0486 |
| Equity Ratio | 1,520 | 0.13245 | 0.0970961 | 0.0292 | 0.95146 |
| Size | 1,520 | 16.4158 | 2.003661 | 9.84512 | 20.6334 |

Table 1 presents the descriptive statistics of variables. The data is winsorized at 1 per cent level to avoid inference problems caused by outliers. The average NPLs falls from 0.0247 to 0.0237, the average LGR decreases from 0.0677 to 0.0562, so did the average DGR (deposit growth rate) and the equity ratio falls respectively to 0.0511 and 0.129 after winsorizing. The average value of NPLs after winsorizing is fairly low at 2.37 per cent with a high variation.

The minimum value of NPLs is 0.06 per cent, i.e Bank Maspion Indonesia in the 3rd quarter of 2015 and the maximum value is 13 per cent, i.e. Bank Agris in second quarter of 2009 (after winsorizing). After winsorizing, LGR reach the highest value of 0.58, i.e Bank QNB Indonesia in the 3rd quarter of 2013 and the lowest value of -0.15, i.e Bank Agris in the 4th quarter of 2008, with a standard deviation greater than NPLs that is 9.84 per cent. As for size, the average value increase slightly from 16.41 to 16.42. The standard deviation of the variables becomes smaller and the range becomes narrower than before winsorize.

We use threshold regression model developed by Hansen (1999) which has been proved as effective tool and been recently use to study banking behaviour. Threshold regression model designed to divide individual observations into regimes or classes conditioned on the value of predefined variables. With the threshold, entities in this study, namely individual banks, were divided into two categories according to the threshold value that we used. We use last period of NPLs as threshold variable.

Threshold regression is developed to answer a question whether regression function is identical across all observations in a sample or in other words whether these observations has their own characteristic based on their classes (Hansen, 1999). The threshold model describes the structural break in relationship between variables (Wang, 2015). This means that the threshold value separates the behaviour characteristics of the banks above and below the threshold.

Threshold regressions methods are developed for non-dynamic panel with individual specific fixed-effect (Hansen, 1999). Least squares estimation of the threshold and regression slopes is proposed using fixed-effects transformations.

Structural equation of threshold regression model is as follows

$$y_{i,t} = c_i + \beta_1 x_{i,t} I(q_{it} \leq \gamma) + \beta_2 x_{i,t} I(q_{it} > \gamma) + \varepsilon_{i,t} \quad (1)$$

$$y_{i,t} = c_i + \beta_1 x_{i,t} I(q_{it} \leq \gamma) + \beta_2 x_{i,t} I(q_{it} > \gamma) + \varepsilon_{i,t} \quad (1)$$

where $I$ is the indicator function that takes value one if the statement in brackets is true, and zero otherwise. $q_{i,t}$ is the predefined threshold variable, in this study we use last period of NPLs.

Estimation equation according to Zhang *et al*. (2016) is as follows

$$NPL_{i,t} = c_i + \sum_{j=0}^{m} \beta_1 LGR_{i,t-j} (NPL_{i,t-1} \leq \gamma) + \sum_{j=0}^{m} \beta_2 LGR_{i,t-j)} (NPL_{i,t-1} > \gamma) + 0'X_{i,t} + \varepsilon_{i,t} \quad (2)$$

X is a vector that contains other independent variables. When banks experience significant loan lossess (performing above the threshold value $\gamma$), the decision process is given $\beta_2$ rather than $\beta_1$.

Independent variables in this research are loan growth rate (LGR), first lag of loan growth rate (1.LGR), bank size (size), equity ratio (ER), and deposit growth rate (DGR). Loan growth rate (LGR) is loan growth in bank of one year period against last period (Keeton, 1999; Das and Ghosh, 2007). Abnormal LGR can cause significant subsequent lossess with a lag of two or four years (Foos *et al*., 2010). Clair (1992) argues that the impact of a higher LGR is a deterioration in loans quality but only with some lags, whereas the relationship between LGR and NPLs ratio should be negative. According to Zhang *et al*. (2016), banks with significant previous losses or bank with higher NPLs, making additional loans can reduce NPLs ratio temporarily due to dilution effect. Therefore, we expect significant relationship between LGR

and NPLs ratio, and we also expect positive relationship between lagged LGR and NPLs ratio.

Deposits growth rate is total deposit of current period minus total deposit last period, and the result divided by last period of total deposit. Based on previous findings, we expect DGR significantly affect NPLs ratio as well. Equity ratio or one minus leverage ratio calculated by dividing total equity to total asset. According to previous studies, and specifically based on Zhang *et al*. (2016) we expect negative impact of equity ratio to NPLs ratio. Bank size is calculated using logarithm of Total Asset (Das and Ghosh, 2007). From several related studies and also Zhang *et al*. (2016), we expect positive relationship between bank size and NPLs ratio. Beside the independent variables, we also include time dummies in regressions to capture business cycles in Indonesia.We add 9 dummies into regressions for 10 years.

Our research hypothesis are as follows

H1: There is moral hazard in banks that have NPL ratios above the threshold value.

H2: The determinants of NPL ratios in Indonesia are loan growth rate (LGR), first lag of loan growth rate (1.LGR), deposit growth rate (DGR), equity ratio against total asset (ER), bank size (Size) and time dummies.

## RESULTS

In this study, we use linear regression as benchmark model (Model 1) and 2 threshold models namely Model 2 and Model 3. Before running linear regression, we first winsorize at 1 per cent level to avoid inference problems caused by outliers. After winsorizing, we test the best model for Model 1. We choose the appropriate linear regression model among pooled least square, fixed effect and random effect model, then we found that the appropriate model for Model 1 is random effect model. After that, we test whether or not there is threshold effect in Model 2 and Model 3. If we found that there is threshold effect, we will looking for threshold value.

According to Hansen (1999), to identify threshold value $\gamma$, researcher should find the minimum of concentrated sum of squared error, and to do that, researcher should run regression as many N. However to make it easier, Hansen (1999) suggest to use simplified grid to restrict the search. Therefore, we use 500 grid points in Stata 14 to reduce computation cost. We use bootstrap on the critical values of the F statistic to test the significance of the threshold effect. The bootstrap number is set to 500 for single-threshold model. Balanced panel data for Model 2 and Model 3 has been trimmed at 1 per cent level.

The difference between Model 2 and Model 3 is, in Model 2 we use LGR as one of the independent variable and did not enter the first lag LGR (l.LGR) as the independent variable, whereas in Model 3 we do the opposite. Model 2 and Model 3 in this study refers to the Model 2 and Model 3 study of Zhang *et al*. (2016). The purpose of differentiation in Model 2 and Model 3 is to see whether the lagged LGR has impact on the NPLs.

The hypothesis for threshold effect test are as follows

$H_0$: $\beta 1 = \beta 2$

$H_1$: $\beta 1 \neq \beta 2$

Under the null hypothesis, there is no parameter difference between two classes or in the other words, there is no threshold effect. We reject null hypothesis, if p-value on table is

smaller than alpha or the probability of F value is bigger than F critical at level 1 per cent, 5 per cent or 10 per cent.

Table 2 Estimation of Threshold Effect

| Model | Threshold (ŷ) | Conf. Interval | SSEmin | F stat | p-value | Crit10 | Crit5 | Crit1 |
|---|---|---|---|---|---|---|---|---|
| 2 | 5.29% | [0.0432, 0.054] | 0.2466 | 20.72 | 0.066* | 17.6493 | 22.2904 | 30.0265 |
| 3 | 0.11% | [0.0001, 0.0011] | 0.2476 | 13.43 | 0.22 | 19.1552 | 26.6398 | 34.5169 |

Note: p-value is constructed using 500 bootstraps. *shows significancy at level 10%

The threshold effect is exist in Model 2 but does not exist in Model 3 (see Table 2). In Model 3, the p-value is bigger than alpha and F stat is smaller than F critical at all significant level. Therefore, we accept the conclusion that there is no threshold effect in Model 3 and define that Model 3 is linear model. In Model 3, the parameter value is identical across all observations, whereas in Model 2 there is two parameter value for 2 classes which separated by threshold value.

The NPLs threshold value which is 5.29 per cent in Model 2 (see Table 2), divide the observations into two classes. Banks, which have NPL above 5.29 per cent behave differently from rules where at this condition; a bank may further increases its NPL ratio by giving more lending even though its NPL ratio is quite high. This will eventually lead to moral hazard.

The estimated threshold 5.29 per cent is exceeds the NPLs ratio limit established by OJK and BI which is 5 per cent. It means that banks with bad NPLs, will further adopt riskier lending behaviour to increase the loan growth. By doing this, bank's manager expect to shift the risk and they also expect to get coverage by taking higher risk. Above findings is supported by some other researches in the past. Koudstaal and Wijnbergen (2012) argue that the more trouble the portfolio, the greater the inclination for banks to take the risk. Bruche and Llobet (2010) also report that when banks face the threat of bankruptcy (OJK may give penalty if bank does not fulfil the criteria of healthy banks), they tend to roll over bad loans in order to increase their chances of recovery. The regulatory attitude is also important in this situation.

Our results of threshold panel regression in Table 3, prove that there is difference between the behaviour of troubled bank or a bank which has NPLs above the threshold value and a healthy bank. This difference is shown by LGR; the variable that is directly interacted with the threshold value. The impact of LGR is prominently significant on NPLs in all classes, but LGR in NPLs classes above the threshold has positive effect on NPLs, whereas LGR in classes below the threshold has a negative effect. Bank with NPLs above the threshold deliberately increase their loan growth, those banks attempt to shift the risk to depositors. This shows that there is moral hazard problem in banks which NPLs above the threshold. These behavioral difference is supported by Bernanke and Gertler (1986) which reports that impaired loans of banks may induce different bank behaviour according to banks' risk preferences.

When NPLs ratio is too high, both shareholders and bank managers have clear incentive to shift the risks (Zhang *et al*., 2012). For the bank manager, they may increase lending in risky

projects in order to gain higher return. This will benefit them personally, thus it is in their best interest to improve their performance. If the project succeeds, managers may get bonuses as reward, but if the project fails, the worst case scenario for managers is only that they risk getting fired. For the shareholders, when the project succeeds, they will gain higher returns and will be able to cover the losses suffered from the previous period. Meanwhile, if the project fails and the bank's NPLs increases, or even leads to bankruptcy, shareholders only risk losing their shares in the bank. So, both managers and shareholders do not have to carry full liability over the customers' money. On the other hand, there is the certainty of a gain in shifting the risk.

For managers and shareholders, an added incentive for lending in riskier projects comes from the protection program for bank depositors provided by the Deposit Insurance Institution or LPS in Indonesia. With such incentive, it has been found that a moral hazard problem exists in troubled banks with an NPLs ratio above the threshold value. This moral hazard problem arose because the banks were in difficult circumstances and were looking for an immediate solution to recovery, hence an incentive for both managers and shareholders to take a bigger risk. We can conclude that our first hypothesis that there is a moral hazard problem in banks with an NPLs ratio above the threshold value is valid. This hypothesis is tested with a threshold effect test and a threshold panel regression result.

## DISCUSSIONS

In this section, we explore the regression results of three models. The total sample for all Model is 1140 observations for 38 banks. When no threshold effect is allowed, with R-*square* 17.87%, the significant factors of NPLs in Model 1, save the year dummies are lagged LGR (l.LGR), equity ratio and bank size (see Table 3).

Table 3 Random Effect Regression

| Model 1- Random Effect Regression | |
|---|---|
| LGR | -0.0074141 |
| | (0.0056276) |
| 1.LGR | -0.012823** |
| | (0.0056625) |
| DGR | -0.0063939 |
| | (0.0050378) |
| ER | 0.0268177** |
| | (0.0110639) |
| Size | 0.0016545* |
| | (0.0009575) |
| Dummy Year 2006 | 0.0192344*** |
| | (0.0025735) |
| Dummy Year 2007 | 0.0165125*** |
| | (0.0024502) |

Table 3 (Cont.)

| | |
|---|---|
| Dummy Year 2008 | 0.0126762*** |
| | (0.0023736) |
| Dummy Year 2009 | 0.0151305*** |
| | (0.0023196) |
| Dummy Year 2010 | 0.0136448*** |
| | (0.0022261) |
| Dummy Year 2011 | 0.0083338*** |
| | (0.0021516) |
| Dummy Year 2012 | 0.0015626 |
| | (0.0020951) |
| Dummy Year 2013 | -0.0012207 |
| | (0.0020573) |
| Dummy Year 2014 | -0.0009179 |
| | (0.0020385) |
| Constant | -0.0141389 |
| N | 1140 |
| $R^2$ | 0.1787 |

Note: LGR = Loan Growth Rate, l.LGR = first lag of Loan Growth Rate, DGR = Deposit Growth Rate, ER = Equity Ratio against total asset, Size = log of total asset. Standar error is in bracket

*** shows statistically significant at level 1%

** shows statistically significant at level 5%

* shows statistically significant at level 10%

Table 4 Threshold Panel Regression Results

| | Model 2 | Model 3 |
|---|---|---|
| LGR*I(l.NPL<ŷ) | -0.0177345*** | |
| | | (0.0057289) |
| LGR*I(l.NPL≥ŷ) | 0.0355782*** | |
| | | (0.0115724) |
| l.LGR*I(l.NPL<ŷ) | | -0.1266121*** |
| | | (0.0316238) |
| l.LGR*I(l.NPL≥ŷ) | | -0.0109474*** |
| | | (0.0055721) |
| DGR | -0.007117 | -0.0090125** |
| | (0.0049055) | (0.0044427) |
| ER | 0.0098273 | 0.0052417 |
| | (0.0124345) | (0.0123979) |
| Size | -0.0034539** | -0.0039273** |
| | (0.0016152) | (0.0016074) |

Table 4 (Cont. )

| | | |
|---|---|---|
| Dummy Year 2006 | 0.0099733*** | 0.0093302*** |
| | (0.0033146) | (0.0033189) |
| Dummy Year 2007 | 0.0084718*** | 0.0076889** |
| | (0.0030348) | (0.0030423) |
| Dummy Year 2008 | 0.0057433** | 0.0047625* |
| | (0.0028717) | (0.0028739) |
| Dummy Year 2009 | 0.0095765*** | 0.0081077*** |
| | (0.0027301) | (0.0027387) |
| Dummy Year 2010 | 0.0085428*** | 0.0075852*** |
| | (0.0025176) | (0.0025235) |
| Dummy Year 2011 | 0.0044249* | 0.0035076 |
| | (0.0023053) | (0.0023147) |
| Dummy Year 2012 | -0.0012004 | -0.0018503 |
| | (0.0021744) | (0.0021778) |
| Dummy Year 2013 | -0.0027128 | -0.0036499* |
| | (0.0020687) | (0.002073) |
| Dummy Year 2014 | -0.001372 | -0.0019472 |
| | (0.0020167) | (0.0020195) |
| Constant | 0.0761196 | 0.0853191 |
| N | 1140 | 1140 |
| $R^2$ | 0.0011 | 0.0009 |

Note: I is indicator function which equals one if the statement in bracket is true and zero, otherwise. The variable with l as prefix have been lagged one period backward. LGR = Loan Growth Rate, l.LGR = first lag of Loan Growth Rate, DGR = Deposit Growth Rate, ER = Equity Ratio against total asset, Size = end-of-year total asset (in log term). Standard error are in brackets.

*** shows statistically significant at level 1%

** shows statistically significant at level 5%

* shows statistically significant at level 10%

Table 4 presents the regression results of Threshold Panel with Fixed-Effect for Model 2 and Model 3. Model 2 prove the threshold effect and the threshold value is 5.29 per cent (see Table 2). Troubled banks or banks with a higher NPLs ratio in the previous period have a loan growth rate that raises the NPLs ratio as shown by the positive coefficients in Table 4. Meanwhile, banks in the safe zone in the previous period, or those having an NPLs ratio less or equal to the threshold value, show a decreased NPLs ratio as we can see from their negative coefficients. These findings are consistent with study by Zhang *et al*. (2016) in China at 2006-2015.

Keeton (1999) finds that with simple model of loan market, faster loan growth leads to higher loan lossess. An increase in banks' willingness to lend will raise total lending, reduce the expected rate of return on loans, and lower the minimum level of creditworthiness. The reduction in the credit standard increases the chances that some borrowers will eventually default on their loans (Keeton, 1999). Zhang *et al*. (2016) also find that bank managers behave

badly when they face pressure due to previous losses, and thus potentially leading to even worse scenario. Banks with previous significant losses increase loans in an attempt to dilute the effect of NPLs (Zhang *et al*., 2016). Banks may take excessive risk or become less prudent when lending, and the situation would be even worse in the future.

LGR have become variables that interact directly with threshold variable and indicate a threshold effect. The negative relationship between LGR and NPLs in Model 1 is consistent with the results of Zhang *et al*. (2016). LGR, in Model 2, are significantly affect the NPLs ratio. The different signs of LGR in Model 2 shows the different behaviour of 2 classes of banks. Although in Model 1, the results are not significant, but in Model 2 as significant, we concluded that the LGR as factors that affect the NPLs ratio in Indonesia.

In Model 1, lagged LGR has a significant and negative impact on NPLs (see Table 3). Meanwhile, Model 3 shows that the previous loan growth rate (l.LGR) has a very significant but negative effect on NPLs ratio (see Table 4). This significant and negative effect is consistent with the random effect regression in Model 1. Thus, we conclude that the lagged LGR becomes a factor that affects the ratio of NPLs in Indonesia. l.LGR is proved that has more significant effect compared to LGR since l.LGR significant in Model 1 and Model 3 while LGR is not significantly affect the NPLs in Model 1 and only significant in Model 2.

Deposit growth rate (DGR) has a negative correlation in all models and significant only in Model 3. Since only significant in Model 3, we do not include DGR as determinants of NPLs in Indonesia. DGR has not significant impact on the NPLs since the source of credit given to customers is not only come from deposit or Third Parties Funds but also come from the first and second parties funds.

Equity ratio (ER) has positive relationship with NPLs in all models and only significant in Model 1. This results is different from Zhang *et al*. (2016) which shows negative relationship between equity ratio and NPLs. Therefore, we took into account equity ratio as a factor affecting the NPLs.

The size of the bank is one factor that significantly influence NPLs at level 5 per cent in Model 2, 3 and 10 per cent in Model 1. The size of the bank in Model 1 has positive influence on NPLs whereas the size in Threshold Panel Regression models has negative influence. Thus, we conclude that the size of the bank is a factor that affects the NPLs ratio in Indonesia.

The time trend is measured from the year dummies. In general, the time trend from 2006 to 2011 is significantly affects NPLs ratio in all models. This means that business cycle has an impact toward NPLs in Indonesia banking system. Therefore, we include time trend as determinant factor of NPLs in Indonesia.

From the discussion above, we conclude that determinant factors that significantly affect NPLs ratio in Indonesia are loan growth rate (LGR), lagged loan growth rate (l.LGR), equity ratio against total asset (ER), bank size (Size) and time trend (year dummies). Factor that do not significantly affects the NPLs ratio in Indonesia is the deposit growth rate. Thus we reject the second hypothesis since there is a factor that does not significantly affect the ratio of NPLs in Indonesia.

## CONCLUSSIONS

This research aims to analyze the impact of non-performing loans towards lending behaviour of listed conventional banks in Indonesia in quarterly period from 2006 to 2015. We also aim to analyze how lending decision related to moral hazard. We use threshold panel regression methods developed by Hansen (1999) to analyze whether there is threshold NPLs which cause moral hazard. Threshold panel regression itself is a transformation from fixed-effect regression which divide individual observations into classes. In this research, we use last period of NPLs ratio as threshold variable and find threshold value 5.29 per cent. We figure out whether there is different behavior in lending between bank which has NPLs ratio above the threshold and below the threshold. And as result, we found the difference since there is threshold effect from our fixed effect panel regression. This difference is not yet shows that the moral hazard is exist in banking system of Indonesia.

We also analyze whether this lending behaviour cause moral hazard. Our hyphothesis' results explain the answer of that question. Our research has two main hypothesis and the results are as follows. First, our result shows that there is moral hazard problem in banks which has NPLs ratio above 5.29 per cent. Bank with NPLs above the 5.29 per cent has loan growth which increase the NPLs, whereas bank with NPLs below 5.29 per cent has loan growth which decrease the NPLs. The troubled bank behave differently from the rules, with their bad condition, they are adapting riskier lending strategy instead of prudent lending strategies. Bank managers deliberately lend to risky project or lending without prudent standard loan. The manager's incentives to trigger moral hazard are the low of manager's liability toward NPLs and the great manager's benefit if they perform well in the eyes of shareholder, the guarantee for customer's money from banking regulator. An increase in banks' willingness to lend will raise total lending, reduce the expected rate of return on loans, and lower the minimum level of creditworthiness. The reduction in the credit standard increases the chances that some borrowers will eventually default on their loans (Keeton, 1999). Our second hyphothesis results shows the determinant factors which significantly affect NPLs, they are loan growth rate (LGR), last period of loan growth rate (1.LGR), equity ratio against total asset (ER), bank size (size), and time trend (dummy year).

Overall, this results suggest that Indonesia banking regulators should consider NPLs ratio as a useful indicator for detecting potential moral hazard of banks and design transparant policy goals and monitor banks closely. We suggest that Indonesia Banking regulator both LPS, BI and OJK should be more prudent in monitor bank behaviour, so that in long term there will be no more moral hazard and financial stability will be established in Indonesia. Since the lagged LGR has negative influence toward NPLs, while the LGR for troubled banks has positive influence, the authorities should take more attention about current loan growth especially for troubled banks. The authorities should have more tight monitoring toward banks which has NPLs above 5 per cent and especially for banks which has NPLs above 5.29 per cent, so that they can not adopt riskier lending strategies. The regulators should take regulations review towards banking issue in the local and international, so they will will understand clearly about credit policy especially when bank is facing high NPLs ratio. Therefore, when BI take expansion policy bank still know its customer better so that banks will not give lending to customers

which has bad collectabilities. The last but not least, the authorities should give more attention to determinant factors of NPLs to control the NPLs level.

Due to limitations in this study, we give some suggestions for some parties. Suggestion for other researcher are to add more sample quantity, classify the research based on types of bank, add the other independent and dependent variables for robustness check. We also suggest banks' manager to keep the prudential principle by considering long term effect in lending and establish the "know your customer" principle. We also suggest the managers not to increase the loans volume as new customer may has low collectability.

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