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**Non-Performing Financing (NPF) and Cost Efficiency of Islamic
Banks in Indonesia Period 2012Q1 to 2015Q2**

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Abstract

This paper investigates the inter-temporal relationships between non-performing financing (NPF) and cost efficiency of Islamic Banks in Indonesia during the period 2012(Q1) to 2015(Q1). This research uses quarterly published reports data of Central Bank of Indonesia (Bank Indonesia). The Data Envelopment Analysis (DEA) approach is used to measure cost efficiency of Islamic Banks. The inter-temporal relationship between NPF and cost efficiency is estimated using VAR model by testing two of the four hypotheses introduced by Berger and DeYoung (1997). The finding of DEA indicates that Bank Victoria Syariah (BVS) was the most cost efficient. The average cost efficiency of Islamic banks was 0.937 or 94.7%. The finding also indicates that Islamic banks are inefficient in managing the costs. This result supports the "bad management" hypothesis. The 'bad management' hypothesis indicates that the major risks facing financial institutions are caused by the internal problems. In terms of variables that determine NPF by using panel least square, the findings reveal that GDP growth rate, Inflation and Capital Adequacy Ratio (CAR) have a negative and significant effect on NPF, while Exchange rate and Operational Efficiency Ratio (OER) have a positive and significant effect on NPF. Financing Deposit Ratio (FDR) has no significant effect on NPF.

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Key Words: Cost Efficiency, Panel Least Square, Data Envelopment Analysis, Bad Luck and Bad Management.

1. Introduction

As financial intermediaries, banks have an important role in the economy. Bank is one of the economic movers as its function to distribute the funds to the real needs of different sectors of economy. Therefore, by providing capital, the Bank helps to improve business performance and decrease unemployment.

5 There are two types of bank in Indonesia: Conventional and Islamic bank. Islamic banks can be differentiated from conventional banks through three major aspects: foundation, management, and products. There are five major elements which make the Islamic banking distinct compared to the Conventional banking:

- 12 1. *Riba* is prohibited in all transactions.
2. Business and investment are to be undertaken on the basis of *halal* (legally permitted).
3. Transactions have to be free from *gharar*, (speculation or uncertainty) and *maysir* (gambling).
4. *Zakat* is to be paid by the bank to benefit the society.
5. Finally, the banks must ensure that all activities are in line with Islamic principles, which means that the bank must have a *shariah* board which supervises and advises the bank's products.

5 Islamic bank had existed in Indonesia since 1992, but due to lack of regulation, it was only one *syariah* Bank was in operation. The first Islamic bank in Indonesia is Bank Muamalat Indonesia. After Act 21 of 2008 concerning Islamic Banking was issued, number of Islamic banks started to increase until now. Based on Bank Indonesia data, there were 12 Islamic Banks (IB), 24 Islamic Business Units (IBU) and 161 Islamic Rural Banks with 2,881 branches as on June 2015. Total assets of Islamic Banks were IDR 279,240 billion, which was an increase of 179% from the 2010 level.

5 However, this strong growth is followed by the increase in credit risk in the past three years as reflected by Non-Performing Financing (NPF) ratio. Based on Islamic Banking Statistics published by Bank Indonesia from 2012 to June 2015, NPF of Islamic banks has gradually increased and getting closer to 5% which is the maximum permitted from Bank Indonesia (BI) vide regulation of Bank Indonesia No. 6/9/PBI/2004/2004. Unfortunately, on February 2015, NPF of Islamic bank was at the highest so far at 5.10%, as shown in the table 1 below.

Table 1: NPF Ratio of Islamic Banks and Islamic Business Unit (2012-2015)

Month	NPF ratio			
	2012	2013	2014	2015
January	2,68%	2,49%	3,01%	4,87%
February	2,82%	2,72%	3,53%	5,10%
March	2,76%	2,75%	3,22%	4,81%
April	2,85%	2,85%	3,49%	4,62%
May	2,93%	2,92%	4,02%	4,76%
June	2,88%	2,64%	3,90%	4,73%
July	2,92%	2,75%	4,30%	
August	2,78%	3,01%	4,58%	
September	2,74%	2,80%	4,67%	
October	2,58%	2,96%	4,75%	
November	2,50%	3,08%	4,86%	
December	2,22%	2,62%	4,33%	5

Source: Islamic Banking Statistics published by Bank Indonesia

The rising number of NPF urges the bank to increase provision for loan losses which may result in the capital deterioration (Firmansyah, 2014). The increasing number of Syariah banks that operate in the form of Islamic Banks (IB) and Islamic business units (IBU) in Indonesia with variety of products implies that the bank should carefully manage its credit risk, since the bank essentially manages people funds. Therefore, further research is needed to analyze the factors that affect NPF of Islamic Banks in Indonesia. Islamic Banks in Indonesia should be able to manage the cost of fund efficiently and be able to compete locally and regionally in ASEAN countries. Thus, the improvement of cost efficiency can increase the competitiveness of Islamic banks. This study intends to measure the cost efficiency of Islamic banks in Indonesia through Data Envelopment Analysis (DEA) with intermediate approach to find whether Islamic banks in Indonesia have been efficiently managing their cost or not. The question here is how NPF affects the bank efficiency. Karim *et al.* (2010) found that cost efficiency has a negative effect on NPL. The increase in NPL, decreases the cost efficiency.

This research is focused on Islamic banks in Indonesia. By estimating the inter-temporal relationship between NPF and cost efficiency, the researchers can determine whether an increase in financing problem has a negative impact on the cost efficiency and vice versa. The another objective of this research is to determine the significant variables that affect the NPF of Islamic Banks in Indonesia and to examine the cost efficiency of Islamic Banks in Indonesia by using Islamic Banks' inputs-outputs.

This paper is structured as follows. Section 2 reviews the literature. Section 3 describes the data, sources, and methodology, which is employed in the study. The empirical results are available in section 4. Finally, we conclude in section 5.

2. Literature Review

The researchers reviewed ³ the previous research dealing with non-performing loans (NPL) in conventional banks and non-performing financing (NPF) in Islamic banks and efficiency of the banking system in Islamic banking to arrive at the theoretical framework of this study.

2.1 Non-Performing Financing Determinants

Factors that impact NPF can be caused by components ² from internal and external factors. In order to find the causes, external factors used in this research are GDP growth rate, inflation, and exchange rate. Internal factors considered are Capital Adequacy Ratio (CAR), Financing to Deposit Ratio (FDR), and Operational Expenses Ratio (OER). Several studies which investigate the NPF determinants are Firmansyah (2014), Rahmawulan (2008), Wikutama (2010), Nugraini and Setijawan (2015), Padmanty (2011), and Dendawijaya (2005)

Firmansyah (2014) found ² that GDP has a negative and significant impact on NPF. GDP growth rate is the indicator of economic growth in the country, therefore, when GDP growth rate increases, the ability of people to pay back the financing taken increases and, therefore, the NPF ratio also decreases.

Rahmawulan ⁵ (2008) found ¹ that inflation has a positive and significant effect on NPF ratio. ⁵ The increasing price of goods and services indicate the higher cost that people need to spend. ⁵ It means high inflation results in a decrease in purchasing power. The lower purchasing power can decrease the ability of people to payback their obligation to the bank, thus it raises NPF ratio.

⁵ Based on Wikutama (2010), depreciation of rupiah relatively leads to the increasing value of credit that uses foreign currency. Exchange rate highly affects debtor that uses foreign currency in its operation such as to import the raw material. When the market is volatile and the value of one currency changes compared to another currency, it could affect business operation. Moreover, when local currency is undervalued, companies with foreign currency loan will get high exposure. Total loan is increases due to more local currencies needed to be exchanged for the same amount of foreign currencies. It will reduce the value of customer funds and increase the possibility of customers unable ⁵ to pay back their liability.

According to Nugraini and Setijawan (2015), CAR ⁵ has a significant and negative effect on NPF. When CAR of Islamic Bank decreases, ⁵ it reflects the decreasing number of capital. The decrease in capital is caused by the declining profit or the increasing risk-weighted assets. Profits are reduced as the consequence of high problematic credit.

According to Ding Lu ⁴ (2001) as cited by Padmanty (2011), “over” credit demand can increase the NPF ratio. Higher FDR shows ⁴ the high amount of third party funds that are transferred to the financing activity. This condition causes the increasing probability of

financing becoming NPF if the fund is not properly handled. Thus, a high FDR may lead to the increase in NPF.

It is reported by Dendawijaya (2005) that a higher OER indicates a lower efficiency of the bank. This inefficiency may lead to the declining quality of financing and the increasing of NPF.

² **2.2 Bank Efficiency**

Berger and Mester (1997) employed economic efficiency concepts- cost, revenue and standard profit, and alternative profit efficiencies. According to both the authors, the three concepts of efficiency are the most important economic efficiency concepts. These concepts have the best economic foundation for analyzing the efficiency of the financial institution.

Since the 1990s, most of the bank efficiency studies concentrated on estimates of cost efficiency (Berger, Hunter, and Timme, 1993; Resti, 1997). According to Coelli *et al.* (1998) and Thanassoulis (2001) as cited by Bader *et al.* (2008), the cost efficiency gives a measure of how close a bank's cost is to what a best-practice bank's cost would be for producing the same bundle of outputs under the same conditions. There are several recent studies of bank cost efficiency in Islamic banks, such as Bader *et al.* (2008), Tahir and Haron (2010), Zuhroh *et al.* (2015) and Rahmawati (2015). Some of the researchers examine the bank cost efficiency through estimation while the other researchers resorted to comparative studies.

Bader *et al.* (2008) conducted a comparative study of ⁶ 80 banks in 21 countries of Organization of Islamic Conference (OIC): 37 conventional banks and 43 Islamic banks over the period 1990-2005. They found no significant differences between the overall efficiency results of conventional and Islamic banks. Meanwhile, Zuhroh *et al.* (2015) observed 3 full Islamic banking systems and 19 conventional banks listed on the Indonesian Stock Exchange during 2014Q3-2010Q4. The results suggested Indonesian Islamic banks have better technical efficiency, but the average cost efficiency is much lower than conventional banks. Tahir and Haron (2015) conducted a research of Islamic banks in four regions of the world: Africa, the Far East and Central Asia, Europe and the Middle East during the period of 2003-2008. They found that the cost and profit efficiency of Islamic banks in those four regions have improved over the period. The results also showed European Islamic banks were more cost and profit efficient than the other group of banks. The less efficient Islamic banks were in the Far East and Central Asia. Rahmawati (2015) estimates the cost efficiency of Islamic banks in Indonesia through DEA and SFA approach. She ² found that Indonesian Islamic banks are still not efficient in managing the cost.

The other research issue of cost efficiency is about its relationship with the credit risk. Berger and De Young (1997) state that there are several hypotheses that relate bad loan/financing and cost efficiency. Such hypotheses are labeled as “bad management” and

“bad luck” hypotheses. The “bad luck” hypothesis relates to the impact of the increasing bank risk on efficiency levels. According to “bad luck” hypothesis, the increase in non-performing loans is caused by an unexpected exogenous event (bad luck), such as economic slowdown or firms’ breakdown. Banks will consequently incur higher costs in order to monitor these problem loans which caused the decreasing of efficiency. Whereas, in “bad management” hypothesis, poor management in the banking institutions results in bad quality loans which escalates the level of non-performing loans.

The study of Berger and De Young (1997) has made a major contribution to the researches afterwards which observe the causality of bad loan and efficiency. Williams (2004) applied the Granger causality approach used by Berger and De Young (1997) to investigate the intertemporal relationships between loan loss provision, efficiency, and capitalisation for European banks in nineteen centuries. Their econometric results supported “bad management” hypothesis which indicates poor management tends to have a poor quality loan. This finding was similar to the research of Podpiera and Weill (2007) which supported the “bad management” hypothesis in Czech Bank. Karim *et al.* (2010), utilizing Stochastic Cost Frontier approach and applying Tobit Simultaneous Equation Regression also found that the results prove “bad management” hypothesis in Singapore and Malaysia banks. The poor management affected the bad quality loans, thus escalated the level of non-performing loans. A few researchers have investigated the issue in Indonesia, especially in Islamic banking. Setiawan and Putri (2013) conducted a research on Islamic banks in Indonesia by applying DEA and Vector Auto Regression model. They found that the increase in non-performing financing is, mainly, caused by poor management rather than the external factors. This finding was supported by the recent research from Havidz & Setiawan (2015) which found that the “bad management” in Islamic banks was because of the poor financing portfolio management during January 2008-September 2014. However, the existing research is using technical efficiency as the proxy for the efficiency. This research will take another approach by applying cost efficiency instead of technical efficiency in order to find a more accurate result of the causality between non-performing financing and bank efficiency from the cost perspective using the model suggested by Berger and De Young (1997).

3. Methodology

3.1 Research Questions

1. Does each of the variables from the set GDP growth rate, inflation, exchange rate (USD/IDR), CAR, FDR, and OER have a partial and simultaneous effect on the Non-Performing Financing (NPF) of Islamic banks during period 2012Q1 to 2015Q2?
2. What is the average cost efficiency of Islamic banks in Indonesia during 2012Q1-2015Q2?

3. What is the inter-temporal relationship between NPF and Islamic banks' cost efficiency?

3.2 Modeling Non-Performing Finance Determinant and Cost Efficiency

3.2.1 Estimation of Determinants of Non-Performing Financing

The application software used in analyzing the determinant factors of NPF is Eviews version 9. Eviews provides sophisticated data analysis, regression, and forecasting tools. Regression analysis used in this research is panel data regression. Panel data regression method can provide more data that will produce the greater degree of freedom and can overcome the problems occurred when there is omitted-variable (Widarjono, 2007). Panel regression model has three alternative models for the estimation results. Those three models are (1) Common Constant Model (The Pooled OLS Method), (2) Fixed Effect Model (FEM), and Random Effect Model (REM). In order to find the right estimation model, Chow test and Hausman test are conducted. However, since the cross section data (N) in this research is lower than the number of independent variables, Hausman test cannot be used. Therefore, the method that will be tested is Common Constant model and Fixed Effect model.

In this study, external and internal factors will be used to find the significant variables that affect NPF of Islamic banks. The external factors is represented by GDP growth rate, inflation, and exchange rate. Whereas CAR, FDR, and OER depicts the internal factors. Panel regression of Non Performing Financing (NPF) determinants can be formulated as follows: $Y_{it} = \alpha_i + \beta_1 X_{it,1} + \beta_2 X_{it,2} + \beta_3 X_{it,3} + \beta_4 X_{it,4} + \beta_5 X_{it,5} + \beta_6 X_{it,6} + \varepsilon_{it}$ in which: Y = Non Performing Financing (NPF)

α = constant

X1 = GDP growth

X2 = Inflation

X3 = Exchange rate (growth)

X4 = Capital Adequacy Ratio

X5 = Financing to Deposit Ratio

X6 = Operational Efficiency Ratio

β_1 = Determines the contribution of GDP growth (Coefficient regression of GDP growth)

β_2 = Determines the contribution of Inflation (Coefficient regression of Inflation)

β_3 = Determines the contribution of exchange rate (growth) (Coefficient regression of exchange rate (growth))

β_4 = Determines the contribution of CAR (Coefficient regression of CAR)

β_5 = Determines the contribution of FDR (Coefficient regression of FDR)

β_6 = Determines the contribution of OER (Coefficient regression of OER)

i = Total number of banks

t = Total number observations for each bank

ε = Composite error term

The researchers performed t-test to see the effect of each independent variable on the dependent variable by comparing the value of significant t with significant standard $\alpha = 0.05$.

The null hypotheses to be tested are:

H₀₁ : GDP has a negative and significant effect on NPF

H₀₂ : Inflation has a positive and significant effect on NPF

H₀₃ : Exchange Rate has a positive and significant effect on NPF

H₀₄ : CAR has a negative and significant effect on NPF

H₀₅ : FDR has a positive and significant effect on NPF

H₀₆ : OER has a positive and significant effect on NPF

Besides t-test, F-test is applied to test the simultaneous effect of independent variables on the dependent variable. Before the hypothesis test, classical assumption testing is conducted through normality test, heteroscedasticity test, autocorrelation test, and multicollinearity test.

3.2.2 Estimation of Cost Efficiency

According to Berger and Humphrey (1997), the measurement of efficiency can be broadly categorized into parametric and non-parametric methods. The most common approach of non-parametric methods is Data Envelopment Analysis (DEA) model. DEA formulates the frontier of the observed input-output ratios by linear programming technique (Fare, Grosskopf, and Lovell, 1985). On the other hand, the most commonly used parametric method is Stochastic Frontier Approach. The choice of estimation method has been an issue of debate between researchers preferring the parametric approach or non-parametric approach. However, the emerging viewpoint suggests that it is not essential to have a consensus regarding a single best frontier approach for estimating the efficiency. Instead, there should be a set of consistency conditions for the efficiency estimates derived from the varied approaches to meet. The measurement will be considered convincing and valid if efficiency estimations are consistent across various methodologies (Bauer *et al.* 1997)

This research applied DEA to measure the cost efficiency of Islamic banks in Indonesia. The main advantage of DEA approach is the ability to characterize the frontier technology in simple mathematical form and no functional or distributional forms are needed to be specified. Moreover, in the recent years, DEA has been applied in evaluating the performance of numerous different kinds of entities engaged in many different activities, contexts, and countries (Zhu, 2013). The DEA model is extensively used in many recent banking efficiency studies, such as Mufingi and Hotera (2015), and Alber (2015).

To measure the cost efficiency of Islamic banks, the researchers use the software of Maxdea version 6.6 to run DEA-CRS (Data Envelopment Analysis – Constant Return to

Scale).

According to Charnes et al. (1978) as cited in Pasiouras et al. (2007), the input-oriented DEA model under the assumption of constant return to scale is calculated as:

$$\begin{aligned}
 & \text{Min}_{\theta, \lambda} \theta \\
 \text{s.t.} \quad & -y_i + Y\lambda \geq 0 \\
 & \theta x_i - X\lambda \geq 0 \\
 & \lambda \geq 0
 \end{aligned}$$

Where $\theta \leq 1$ is the scalar efficiency score and λ is N x 1 vector of constants where N indicates the number of banks. If $\theta = 1$, the bank is considered to be efficient as it lies on the frontier, whereas if $\theta < 1$ the bank is determined to be inefficient and needs a reduction of $1 - \theta$ in the inputs levels to reach the frontier. The linear programming is being solved for N times, once for each bank sample, and a θ value is acquired for each bank representing its technical efficiency score.

Then, in order to calculate allocative efficiency, w_i is assumed as a N x 1 vector of input prices for the i-th bank and solve the cost minimization model as follows:

$$\begin{aligned}
 & \text{Min}_{\lambda, x_i^*} w_i^r x_i^* \\
 \text{s.t.} \quad & -y_i + Y\lambda \geq 0 \\
 & x_i^* + X\lambda \geq 0 \\
 & \lambda \geq 0
 \end{aligned}$$

Where x_i^* represents the cost-minimizing vector of input quantities for the i-th bank with the input prices w_i and the output levels y_i . Therefore, the total cost efficiency of the i-th bank is calculated as follows:

$$CE = \frac{w_i^r x_i^*}{w_i^r x_i}$$

The value of cost efficiency ranges from zero to one, where a value of one indicates full efficiency.

In this research, the input-output variables to calculate cost efficiency are adapted from Bader, Mohamad, Ariff, and Hassan (2008). The variables are consist of inputs, outputs, and price of inputs:

Table 2: Variables And Operational Definition Of Bank Cost Efficiency

Variable	Variable Names	Operational Definition
Inputs		
X1	Labor	Total expenditures on employees (personal expenses)
X2	Fixed Assets	The sum of physical capital and premises
X3	Total Funds	Total funds that consist of giro wadhi'ah, mudharabah saving, and mudharabah deposit ¹
Outputs		
Y1	Total Financing	Total financing that consist of: murabahah, mudharabah, musyarakah, istishna, and qardhulhasan financing ²
Y2	Other earning assets	Sum of Investment securities and interbank funds
Y3	Off-balance sheet items	The value of the off-balance sheet activities
Input Prices		
PI1	Price of Labor	Total personal expenses divided by the total fund
PI2	Price of Fixed Assets	Depreciation expenses divided by the fixed assets
PI3	Price of Funds	Interest expenses (profit sharing in Islamic bank) on deposits and other operating expenses divided by the total funds

3.2.3 Inter-temporal relationship between NPF and cost efficiency

Panel-VAR model is used to determine the inter-temporal relationship between NPF and banks' cost efficiency. VAR model is the ideal tool to understand the inter temporal relationships among economic variables. Schwert (2010) explained that VAR is generally used to forecast interrelated time series and analyze the dynamic impact of random disturbance on the variables system. VAR approach treats every endogenous (independent) variable in the system as a function of the lagged values. This approach has been used by recent studies such as Setiawan and Putri (2013), and Havidz and Setiawan (2015).

The general mathematical representation of a VAR is:

$$NPF_{i,t} = f_1(NPF_{i,t-1} \dots NPF_{i,t-n}; eff_{i,t-1} \dots eff_{i,t-n}) + e_{it} \dots \dots \dots (1)$$

$$eff_{i,t} = f_2(eff_{i,t-1} \dots eff_{i,t-n}; NPF_{i,t-1} \dots NPF_{i,t-n}) + e_{it} \dots \dots \dots (2)$$

Where:

e_{it} = a vector of innovations that may be contemporaneously correlated but are uncorrelated with their own lagged values and uncorrelated with all of the right-hand side variables.

¹²See Hidayat (2014)

Equation number 1: NPF as dependent variable, cost efficiency as independent variable
(Bad Management Hypothesis)

Equation number 2: Cost efficiency as dependent variable, NPF as independent variable
(Bad Luck Hypothesis)

3.3 Data

¹This study used secondary data that consisted of quarterly financial ratios of Islamic banks and macroeconomic indicators that have been published by Bank Indonesia and Central Agency of Statistics/*Badan Pusat Statistik*.

The ¹population of this study is all Islamic banks that operate during 2012Q1 to 2015Q2, which consist of 12 Islamic commercial banks, 24 Islamic business units, and 161 Islamic rural banks. Sampling technique deployed in this research is purposive sampling. The first selection criterion was the continuous data series e.g. Islamic commercial banks, which publish their quarterly ²financial report continuously with no out layered data during the research period. The other selection criterion was the banks that have credit risk problem or NPF ratio is more than the threshold set by Bank Indonesia (5%) during the period 2012Q1 to 2015Q2. Based on these criteria, ²there are 5 Islamic banks selected as the research sample, which are Bank Syariah Mandiri (establish on 1 November 1999), Bank Muamalat Indonesia (establish on 1 November 1991, considered as the first Islamic Bank in Indonesia), Bank Jawa Barat and Banten Syariah (establish on 20 May 2000), Bank Victoria Syariah (establish on 10 February 2010), and Bank Rakyat Indonesia Syariah (establish on 19 December 2008).

To determine the factors that affect NPF of Islamic banks in Indonesia, panel data regression method is applied. Cost Efficiency is measured by calculating efficiency score through an envelopment model function. The efficiency score was then regressed against NPF ¹to determine the temporal-relationship between NPF and banks cost efficiency through VAR model for time series.

4. Results and Discussion

To find the determinant factors of NPF, Fixed ⁴Effect Model is applied as the estimation model due to the result of the Chow test. The table below is the result of panel data regression using FEM.

Table 3: Regression Model Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP	-2.169944	0.213541	-10.16172	0.0000
INFLATION	-0.421087	0.085860	-4.904367	0.0000
EXCHANGE_RATE	0.111821	0.052780	2.118615	0.0383
CAR	-0.081732	0.030208	-2.705633	0.0089
FDR	-0.001746	0.016822	-0.103772	0.9177
OER	0.029767	0.011196	2.658791	0.0101
C	17.24741	2.386850	7.226013	0.0000

Effects Specification			
Cross-section fixed (dummy variables)			
R-squared	0.757708	Mean dependent var	4.095429
Adjusted R-squared	0.716642	S.D. dependent var	1.738266
S.E. of regression	0.925303	Akaike info criterion	2.825936
Sum squared resid	50.51492	Schwarz criterion	3.179271
Log likelihood	-87.90777	Hannan-Quinn criter.	2.966285
F-statistic	18.45082	Durbin-Watson stat	1.394294
Prob(F-statistic)	0.000000		

Source: Data processed by Author with Eviews9

The result shows the t-statistic of GDP is -10.162 with a significance level of 0.000. It indicates that GDP has a negative and significant effect on NPF. This finding is similar with the previous research conducted by Firmansyah (2014). The t-statistic of inflation is -4.904 with a significance level of 0.000. It indicates that inflation has a negative and significant effect on NPF. This finding is contradictory with the theory, where the increase in inflation raises the ratio of NPF. Based on Firmansyah (2014), the reason behind this contradiction is because the behavior of Indonesia people who tend to still pay back their obligation even though their purchasing power is decreasing. Exchange rate has the t-statistic 2.118 with the significant level of 0.038. It indicates that exchange rate has a positive and significant effect on NPF. This finding has a similar result with Mutamimah and Chasanah (2012). The t-statistic of CAR is -2.706 with the significant result of 0.008. It indicates that CAR has a positive and significant impact on NPF. This finding is similar with Diyanti and Widyarti (2012). FDR has the t-statistic -0.104 with a significance level of 0.918. It indicates that FDR has no significant effect on NPF. The result is not in line with the hypothesis and theory. According to Alissanda (2015), this contradictory result is because FDR ratio affects bank's profitability as the opportunity arises to get profit sharing from the total financing. The t-statistic of OER is 2.659 with the significant level of 0.010. It indicates that OER has a positive and significant effect on NPF. This finding is consistent with the study by Alissanda (2015). The result of the the R² of the model is 0.758 and adjusted R² is 0.717. The result of adjusted R² means 71.7% of dependent variable (NPF) is explained by the combination of

variation of independent variables which are GDP growth rate, inflation, exchange rate, CAR, FDR, and OER. The rest of 28.3% is affected by other factors outside the research model.

4.1 Cost Efficiency Result

Based on Data Envelopment Analysis, Islamic banks can be cost efficient if the efficiency score is equal to one. This research discusses the comparative efficiency score of every bank's sample for every quarter and also the cost efficiency of the specific banks' sample during the period. In order to get a comparative result, every bank is arranged consecutively for each quarter in the software before the program is running. This arrangement helped obtaining the comparative efficiency score with the benchmark of the most cost efficient bank in that quarter. The result of data processing indicates that the Bank Victoria Syariah (BVS) has better cost efficiency compared to another banks. This finding indicates the tightening of costs that BVS ensured especially the operational cost. The average total operational cost to total cost of BVS is the lowest compared to other banks' sample. BVS allocates approximately 86.7% of total cost for the operations. This lowest operational cost practice makes the bank more cost efficient than other banks' sample. The another finding shows that the average Islamic banks' cost efficiency during the period 2012Q1-2015Q2 is equal to 93.7%. It indicates that Islamic bank is inefficient in managing its cost and, on average, used only 93.7% of inputs to achieve the maximum output. Thus, the improvement of cost efficiency is still needed to be emphasized.

4.2 Vector Auto Regression Model Result

To study the inter-temporal relationship between NPF and cost efficiency, the researchers used Vector Auto Regression with two, three, and four lags to prove and estimate whether "bad management" hypothesis or "bad luck hypothesis of Berger and De Young (1997) that can be applied in Islamic banks in Indonesia. The results are presented in table 4 and 5.

Table 4: Bad Management Hypothesis

Defendent : NPF					
	Sum of Coefficient	Sum of Standart Error	Sum of t-ratio	R-Squared of NPF	F-statistic of NPF
EFF Lag 2	-0.2293	-4.3285	0.1324	0.6616	26.8854
EFF Lag 3	-6.4128	-7.1775	-2.6601	0.6830	17.2444
EFF Lag 4	-4.7349	-12.3354	-1.6379	0.7056	12.2886

Source: Data processed by Author with MaxDEA 6.6

Table 5: Bad Luck Hypothesis

Defendent : EFF					
	Sum of Coefficient	Sum of Standart Error	Sum of t-ratio	R-Squared of EFF	F-statistic of EFF
NPF Lag 2	-0.0127	-0.0075	-0.1655	0.2215	3.9141
NPF Lag 3	-0.0018	-0.0256	-2.0571	0.3985	5.3015
NPF Lag 4	-0.0075	-0.0186	0.7310	0.4510	4.2117

Source: Data processed by Author with MaxDEA 6.6

1 According to Berger and De Young (1997), the negative relationship indicates that the increasing of NPF tends to be followed by the decreasing of banks efficiency because high levels of problem loans cause banks to increase spending on monitoring, working out, and/or selling of these loans. The results of this research reject “bad luck” hypothesis proposed by Berger and De Young (1997) since the estimated sum of the coefficient of NPF Lag 4 of Islamic banks is associated positively with efficiency. Whereas as can be seen in table 4, the sum of the coefficient of cost efficiency is associated negatively with NPF. This finding indicates that a decrease in banks’ cost efficiency results in the increasing of NPF. This result supports the “bad management” hypothesis proposed by Berger and De Young (1997) which suggested that decrease in measured bank efficiency is generally followed by increases in NPF. The “bad management” hypothesis indicates that the major risks facing financial institution are caused by the internal problems.

5. Conclusion and Recommendations

14 This study tried to examine the impact of the determinant variables on NPF, such as GDP growth rate, inflation, exchange rate, CAR, FDR, and OER. The result shows that GDP growth rate, inflation, exchange rate, CAR, and OER affect NPF of Islamic banks in Indonesia significantly while FDR does not significantly affect NPF. Among external determinants, GDP growth rate has the highest coefficient. Meanwhile, CAR has the highest coefficient compared to the other internal determinants. This result implies that Islamic banks should be more concerned with the GDP growth rate and manage their CAR in order to reduce the financing problem. Therefore, to reduce NPF problem, Islamic banks should have prudent and professional human resources in managing financing and pay more attention to the internal and external factors that have significantly positive or negative impact on financing problem.

Bank Victoria Syariah is found to be better cost efficient compared to the other Islamic banks in this research period. The result also indicates that Islamic banks in Indonesia are still inefficient in managing their costs. The finding also exhibits Islamic banks in Indonesia during the period 2012Q1-2015Q2 support “bad management” hypothesis proposed by Berger and De Young (1997). “Bad management” occurs when low efficiency is caused by the poor internal management practices that result in the increasing of bad financing problems. Thus, financing problem is generally caused by management controllable factors that apply in day-to-day operations and management portfolios. Low-cost efficiency or cost inefficiency occurs before the increasing of NPF. There are possibilities that management in the banks do not implement adequate financing underwriting, monitoring, and controlling. As “bad” management, they may a) have poor skills in credit scoring and then choose a relatively high proportion of financing with low or negative net present values, b) be less than fully

competent in appraising the collateral value pledged against the financing, and c) have difficulty monitoring and controlling the borrowers after financing is used to assure that covenants are followed. Therefore, Islamic banks should give more concern to the cost management, for example by cutting unnecessary costs.

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