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**Submission date:** 21-Mar-2022 04:17PM (UTC+0700)
**Submission ID:** 1789105916
**File name:** BANK_EFFICIENCY_AND_NON-PERFORMING_FINANCING.pdf (699.34K)
**Word count:** 9152
**Character count:** 49040

Asian Journal of Economic Modelling, 2015, 3(3): 61-79

Asian Journal of Economic Modelling
ISSN(e): 2312-3656/ISSN(p): 2313-2884

journal homepage: http://www.aessweb.com/journals/5009

# BANK EFFICIENCY AND NON-PERFORMING FINANCING (NPF) IN THE INDONESIAN ISLAMIC BANKS

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## ABSTRACT

*This paper investigates the efficiency of Indonesian Islamic Banks by employing Data Envelopment Analysis (DEA) approach, the determinants of banks efficiency and non-performing financing (NPF). The authors further examine the inter-temporal relationships between bank efficiency and non-performing financing (NPF) of Indonesian Islamic Banks to test two hypotheses: 'Bad Luck' and 'Bad Management'. The data covers the periods of January 2008 – September 2014 using quarterly-published report data from Central Bank (Bank Indonesia) with 4 Islamic banks as the sample of research. The bank efficiency is measured by data envelopment analysis (DEA) estimating overall technical efficiency (OTE), pure technical efficiency (PTE), and scale efficiency (SE). Panel Least Square for fixed effect model is used to find the determinants of efficiency and NPF. Panel-VAR model is used to test the two hypotheses 'Bad Luck' and 'Bad Management'. The finding reveals that none of the Islamic banks consistently efficient for all periods of research by OTE, PTE, and SE. The overall results show that efficiency of Islamic Banks is affected significantly by return on assets (ROA), operational efficiency ratio (OER), and inflation rates (INF), while financing to deposit ratio (FDR), capital adequacy ratio (CAR), size, and GDP growth rate have insignificant effect on bank efficiency. Regarding the determinants of NPF, there are significant effects of size, operational efficiency ratio (OER), and GDP growth rate toward NPF, while return on assets (ROA), financing to deposit ratio (FDR), capital adequacy ratio (CAR), and inflation rate (INF) have insignificant effect on NPF. The research supports "Bad Management" hypothesis since it reveals that possibly because of poor financing portfolio management of Indonesian Islamic Banks in the period and sample of the research.*



**Keywords:** Indonesian islamic banks, Data envelopment analysis, Panel least square, Fixed effect method, Panel-VAR, Bad luck, Bad management.

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DOI: 10.18488/journal.8/2015.3.3/8.3.61.79
*ISSN(e): 2312-3656/ISSN(p): 2313-2884*

**Contribution/ Originality**

This research aims to find the inter-temporal relationships between bank efficiency and non-performing financing (NPF) in the Indonesian islamic banks by examining the determinants of both research objectives beforehand and it is counted as few studies in the Indonesian banking industry.

## 1. INTRODUCTION

The history of economic crisis turned to financial crisis as failures of financial intermediaries. Bank as categorized into financial intermediary between society and institution with the role of deposit-taking entities involved primarily in business lending (Cetorelli *et al*., 2012). Trust, confidence and soundness of banking system may lead to efficient performance of banks in order to survive and compete among industry (Zeitun and Benjelloun, 2013). Thus, efficient banking system may guarantee the smooth functioning of nation's payment system and effective implementation of the monetary policy (Gulati, 2011). Hence, bank efficiency as measured through overall technical efficiency (OTE), pure technical efficiency (PTE) and scale efficiency (SE) are necessary to be controlled and examined as well as the risks in a certain condition of economy.

Bank of Indonesia changes the strategy in order to boost up the Islamic banking performance by measuring performance growth of Islamic banking with the average score more than 34% rather than market share optimization of Islamic banking to 5%. The view of its growth is more interested for the investor by having high growth since it is the only industry that shows significant growth for its business per year compare to other peers group. Market share found as the problem since conventional bank develops as well as the total assets when the Islamic bank grows at the same time, but the total assets of conventional bank is bigger since the beginning. Islamic banks should create product innovation with the financing feature in order to achieve the target (Kurniasih, 2010).

According to the website news of Ministry of Finance of the Republic of Indonesia on 16 December 2013, stated that the development of Islamic banking in Indonesia indicates rapid growth in the latest year, especially on Islamic Commercial Banks (*BUS*) and the Islamic Business Unit (*UUS*) dominated for the assets of Islamic banking. It reveals from the data of the central bank of Indonesia (*Bank Indonesia*) per October 2013 increase to IDR 229.5 trillion (YOY),if it is totaled with the assets of Islamic Rural Banks (*BPRS*)then the assets of Islamic banking reach to IDR 235.1 trillion. Nevertheless, the continuation impact of macroeconomics of global financial crisis disposed to retard the economic growth in many countries all over the world as well as decrease the economic growth in Indonesia and it is undeniable affected the Islamic banking industry during 2013 (Indonesia, 2013).

Indonesia Financial Services Authority noted the level of non-performing financing (NPF) in the Islamic banking industry is quite high around 3% or even higher than peer industry which is only 2%. The head, Edy Setiadi, explained that high ratio of NPF is adjustment condition of economic growth retardation. However, small market share for 4.8% is still minim by having target to increase the Islamic financing to 25% in 2014. In the end of 2013, the total financing of Islamic banks is up to IDR 180 trillion (Admin, 2014). As the total assets is around 5% from banks total assets nationally, the customer of Islamic banking is under IDR 10 million people and there is high

possibility to increase the customer of Islamic banks since the Indonesian productive population increase steadily. In the end of November 2014, there are 12 Islamic Commercial Banks (*BUS*), 22 banks of Islamic Business Unit (*UUS*), 163 Islamic Rural Banks (*BPRS*) and 2,939 branch offices. The total asset (*BUS* and *UUS*) is IDR 261,927 trillion, IDR 198,376 trillion for financing and IDR 209,622 trillion for third-party fund (Fauzi, 2015).

Financing offered by Islamic Commercial Banks (BUS) and Islamic Business Unit (*UUS*) are Mudharabah, Musyarakah, Murabahah, Istishna, Ijarah, and Qardh contracts. All of the financing offered increase to IDR 14,307 billion (Mudharaba), IDR 50,005 billion (Musyarakah), IDR 115,602 billion (Murabaha), IDR 618 billion (Istishna), IDR11,464 billion (Ijarah) and IDR 6,380 billion (Qardh) where IDR 198,376 billion in total. As provided data from Islamic banking statistics, it reveals that the financing offered to the customer is dominant by murabahah contract that apply cost-plus profit (mark up price) where the profit is earned from the margin of the selling price as dealed among the users. Further, the unstable economic nowadays has lead to retardation growth of Islamic banks and increment of financing problems. Thus, the efficiency performance of Islamic banks may be affected from internal and external factors. The Financial ratios of Islamic Commercial Bank and Islamic Business Unit are 15.66% (CAR), 0.87% (ROA), 4.86% (NPF), 94.62% (FDR) and 93.5% (OER) per November 2014 (Authority, 2015). In fact, non-performing financing is high with low profitability while the remaining ratios are quite better.

This research will determine the determinants of bank efficiency and NPF from internal and external factors. Prior to its regression, the researchers measure bank efficiency through data envelopment analysis that calculate the utilization of inputs to produce multiple outputs. Bank efficiency and NPF are important aspects in measuring banking performance. Berger and De Young (1997) stated that an increase in non-performing loans is caused by unexpected exogenous or external events; such as economic slowdowns or firms' breakdown that leads to bad luck hypothesis. Due to past loans or nonaccruing, the banks should deal with additional managerial effort and expense. Furthermore, poor senior management practices lead to non-performing loans since the internal bank is not working proportionally, namely bad management. It is focusing on the fourth full-fledged Indonesian Islamic Banks and estimating the inter-temporal relationship between bank efficiency and NPF.

Setiawan and Putri (2013) had an empirical research in the Indonesian Islamic Banks during January 2007 to August 2012 by using monthly data in the Syariah Commercial Banks (*BUS*) and Syariah Business Unit (*UUS*) of conventional banks averagely. However, this research applies different samples and conduct more comprehensive study. The authors measure bank efficiency with three different assumptions (OTE, PTE and SE), determines the factors of bank efficiency (OTE) and non-performing financing (NPF). Further, the inter-temporal relation determined by regressing bank efficiency (OTE) against non-performing financing (NPF) in the Indonesian Islamic Banks.The remaining structure of this research as follows: section 2 literature reviews, section 3 research methodology by describing the data, sample and sources that employed in this research. The findings and discussion are explained in the section 4 and will be concluded in the section 5.

## 2. LITERATURE REVIEW

In order to examine the healthiness and performance of banking industry, such a particular measurement must be examined through bank efficiency measurement. As researched by some previous researchers, they apply non-parametric and parametric approach to measure bank efficiency. Non-parametric approach is firmly measured using data envelopment analysis (DEA) and the authors utilize the same measurement as well. Besides, the authors determine the factors that might affect its bank efficiency as well as determinant factors of non-performing financing since providing financing is the main activity of banking industry to the customers. Thus, bank efficiency and financing provider is necessary to be researched further. Therefore, the authors find the inter-temporal relationship between bank efficiency and non-performing financing (NPF). The previous empirical studies will be the basis of this research.

There are international research of bank efficiency, they are; Gulati (2011); Garza-Garcia (2012); Zeitun and Benjelloun (2013) and Sravani (2014). Some of the researchers examine the bank efficiency through its estimation and some other researchers held a further study to find the determinants of bank efficiency. Gulati (2011) reveals that there are only 9 banks found to be efficient with the TE score between 0.505 and 1 and average score of 0.792. Managerial inefficiency stands as the dominant source of overall technical inefficieny. As further study, he utilizes the multivariate tobit analysis and reveals that ROA and off-balance sheet activities are the most influential factors explaining the overall technical efficiency of Indian domestic banks. Zeitun and Benjelloun (2013) found only few efficient Jordanian banks in managing their financial resources (inputs) and generates profit. VRS model as the highest model compare to CRS. Further, only few banks were found to be efficient on the scale of pure technical efficiency and it has significant effect of financial crisis on banks' efficiency. The findings of Sravani (2014) explain that the overall average technical efficiency are 91.64% under CRS assumption, 95.45% under VRS assumption, and 95.99% under scale efficiency. There are 3 banks indicate the technical efficiency under CRS assumption averagely, 8 banks under VRS assumption averagely, and 3 banks as well under both assumptions. The main source of inefficiency is due to scale inefficiency rather than pure technical inefficiency. Garza-Garcia (2012) reveals the average inefficiencies during the period of 15%, 29%, and 14% for technical efficiency (TE), pure technical efficiency (PTE) and scale efficiency (SE) respectively.The second stage of tobit is applied to determine the factors of bank efficiency in the Mexico bank. It proves that there is positive effect and statistically significant of capitalization and GDP, while positive effect and statistically insignificant of size on bank efficiency. CPI as proxy of inflation gives negative effect and statistically significant, while ROA gives negative effect and statistically insignificant on bank efficiency.

Besides, there are some researches conducting bank efficiency in Indonesia. Afiatun and Wiryono (2010) rate the Islamic banks based on best efficiency score as follows: Bank Syariah Mandiri, Bank Muamalat Indonesia, and Bank Mega Syariah with an average score of 0.9872, 0.897 and 0.7377 respectively. Viverita and Ariff (2011) summarize the mean score of technical efficiency (TE), allocative efficiency (AE), and overall efficiency (OE) for 0.918, 0.979 and 0.939 respectively. It figures the mean value of allocative efficiency is lower than technical efficiency (TE). Soetanto and Ricky (2011) measure the technical efficiency of Indonesian Commercial Bank

and it shows that overall mean is equal to 0.895 which indicates saving 10.5% of inputs to produce the same level of outputs. The average of PTE during the period is higher than the average of TE. Reveals by tobit regression that efficiency of bank will increase with higher asset scale, while contrary with profitability.

Further, a comprehensive research held by Firdaus and Hosen (2013) found trend of fluctuation during second quarter of 2010 until the fourth quarter of 2012 in the ten (10) Islamic Commercial Banks. Individually, Bank Muamalat Indonesia had the highest average efficiency score of 93.82, while Bank Victoria Syariah had the lowest of the average efficiency score of 72.12. As the second model application, branch bank, non-performing financing (NPF), and capital adequacy ratio (CAR) had negative effect and significant on efficiency level of bank. On the other hand, assets, return on assets (ROA) and return on equity (ROE) had positive effect and significant.

Setiawan and Putri (2013) investigates the inter-temporal relationships between bank efficiency and non-performing financing (NPF) and determinants of NPF in the Islamic banks in Indonesia. The result support "bad management" hypothesis and indirectly support the determinants of NPF that ROA, Inflation and GDP have negative effect and significant on NPF, while FDR and interest rate have positive effect and significant on NPF.

The Islamic banks experience mean value of efficiency for 97.57% during 2007-2012 with monthly data. Ahmad and Bashir (2013) clarify the determinants of NPLs prove significant effect of LDR and ROA with positive association, while insignificant effect of inefficiency (OE/OI) and solvency ratio with negative association. Podpiera and Weill (2008) provided new evidence on the causality between non-performing loan and cost efficiency that support "bad management" hypothesis which reduced cost efficiency fosters and increase in non-performing loans. Hence, they suggest to favor education of bank managers so as to enhance their managerial performance.

## 3. THE METHODOLOGY AND MODEL

This research is focusing in the Indonesian Islamic Banks offering foreign exchange transaction. As of 2015, there are 12 full-fledged Islamic banks in Indonesia where they stand as own Islamic banks (not operating as business unit of conventional banks).

However, there are only 3 Indonesian Islamic banks operates between 10 to 20 years and the other one Islamic bank just recently being converted into full-fledged Islamic banks from business unit of conventional banks by offering the foreign transactions.

Thus, there are four Islamic banks employed as the sample of research, those are: Bank Muamalat Indonesia (BMI), Bank Syariah Mandiri (BSM), Bank Mega Syariah (BMS) and Bank Negara Indonesia Syariah (BNIS). These samples may represent all the Islamic banks in Indonesia since they have more experience and provide more transactions compare to other Islamic banks and Islamic business unit.

It will cover quarterly published data by the central bank of Indonesia (Bank Indonesia) during January 2008 to September 2014. Since banking industry is well known as the mediator between Islamic banks and customers, hence this research employs intermediation approach by using non-parametric approach and the common tools to measure is data envelopment analysis (DEA). There are three measurement of bank efficiency utilized in this research, such as: Overall Technical

Efficiency (OTE), Pure Technical Efficiency (PTE) and Scale Efficiency (SE). Descriptive statistic will define the score of each measurement individually as well as a whole Indonesian Islamic Banks. Further, Overall Technical Efficiency (OTE) employed as the first dependent variable of bank efficiency, while non-performing financing (NPF) as the second dependent variable. Bank specific and macroeconomic factors utilized as the explanatory variables by estimating panel regression employing fixed effect method.

Causality test determine the relationship of OTE and NPF, thus panel VAR is utilized in this research to answer the theory that proposed by Berger and De Young (1997). There are four hypotheses proposed by Berger and De Young (1997) but only two hypotheses will be tested in this research, such as "Bad Management" and "Bad Luck".

### 3.1. Estimation of Non-Parametric Approach DEA

Banking operations or its processes is represented by decision making units (DMUs) that have a set of inputs and outputs. It utilizes the frontier as estimation of best practice performance. Charnes *et al*. (1978) proved an effective tool in identifying such empirical frontiers and in evaluating relative efficiency known as Data Envelopment Analysis (DEA).

CCR model estimates that Indonesia Islamic banks could operate in optimum scale where one input could produce one output, namely constant return to scale (CRS) assumption. In the 1984, this tool is being developed by Banker, Charnes and Cooper (BCC) that estimates the disturbance of external factors might effect and managerial inefficient during the operational process, namely variable return to scale (VRS) assumption.

DEA uses mathematical programming to implicitly estimate the tradeoffs inherent in the empirical efficient frontier (Zhu, 2009). Further, CCR model is popularly known as overall technical efficiency (OTE) scores, while BCC model is popularly known as pure technical efficiency (PTE) scores.

In order to understand the right scale efficient of the Indonesian Islamic banks can be obtained by a ratio of OTE score to PTE score (i.e., SE=OTE/PTE) (Gulati, 2011).The research uses three inputs; deposits[1], fixed assets and operational expenses and two outputs; financing[2] and operational income. In order to determine the efficient frontier can be defined by two alternative approaches, such as input oriented and output oriented (Zhu, 2009).

Input orientation reduces the amount of inputs as much as possible while keeping at least the present outputs levels, while output orientation aims at maximizing output levels without increasing use of inputs (Sufian, 2006 & 2007). Thus, this research employed input oriented as the frontier of bank efficiency.

[1] Deposits equal to third-party funds (*dana pihak ketiga*) as the sum of wadiah current account and Mudharabah Mutlaqah.

[2] Financing equals to the sum of receivables (murabahah , istishna, qardh, ijarah) and financing (mudharabah and musyarakah).

**Table-1.** Envelopment Models

| Frontier Type | Input-Oriented |
|---|---|
| CRS (OTE) | $\min\theta-\varepsilon(\sum_{i=1}^{m} s_i^- + \sum_{r=1}^{s} s_r^+)$ subject to $\sum_{j=1}^{n} \lambda_j x_{ij} + s_i^- = \theta x_{io}\ \ i = 1,2,\ldots,m;$ $\sum_{j=1}^{n} \lambda_j y_{rj} - s_r^+ = y_{ro}\ \ r = 1,2,\ldots s;$ $\lambda_j \geq 0 j = 1,2,\ldots,n.$ |
| VRS (PTE) | Add $\sum_{j=1}^{n} \lambda_j = 1$ |
| NIRS (SE) | Add $\sum_{j=1}^{n} \lambda_j \leq 1$ |
| NDRS (SE) | Add $\sum_{j=1}^{n} \lambda_j \geq 1$ |
| Efficient target | $\begin{Bmatrix} \theta * x_{io} - s_i^{-*}\ i = 1,2,\ldots,m \\ \hat{y}_{ro} = y_{ro} + s_r^{+*}\ r = 1,2,\ldots s \end{Bmatrix}$ |

**Source:** Zhu (2009)

Each DMU has a set of inputs and outputs, representing multiple performance measures. Consider a set of n observations on the DMUs. Each observation, DMU j (j=1,2, … , n), uses m inputs $x_{ij}$ (i = 1,2, … , m) to produce s outputs $y_{rj}$ (r = 1,2, … , s).

*Where*

$DMU_0$ = one of the n DMUs under evaluation

$x_{io}$ and $y_{ro}$ = the $i_{th}$ input and $r_{th}$ output for $DMU_0$, respectively.

$\theta$ = input-oriented efficiency score of $DMU_0$

$s_i^-$ and $s_r^+$ = input and output slacks

$\lambda_j$ = benchmark for a specific DMU under evaluation

### 3.2. Estimation of Determinants of Bank Efficiency and Non-Performing Financing (NPF)

Panel regression is employed in this research to determine the bank efficiency as the first dependent variable and non-performing financing (NPF) as the second dependent variable, while bank specific as internal factors and macroeconomics as external factors utilize as independent variables. In panel data the same cross-sectional unit (Indonesian Islamic Banks) is surveyed over time. Thus, it has space as well as time dimensions (Gujarati, 2004). Method to be used is panel least square by employing fixed effect method (FEM). The conditions of each object differ to others; on top of that, an object in a certain period will be totally different with the condition of its object in the other period. In order to determine the differences of constant among objects with the same coefficient regression, hence fixed effect model (FEM) is applied in this research (Winarno, 2006). Panel data consist of cross section (4 Islamic banks) and time series (quarterly data from January 2008 to September 2014). There are three assumptions of bank efficient to measure bank efficiency, such as: overall technical efficiency (OTE), pure technical efficiency (PTE) and scale efficiency (SE). However, OTE will be employed as the only dependent variable in this research since it's assumed that bank could produce outputs in the same level of inputs. Bank specifics as internal factors consist of return on assets (ROA), financing to deposit ratio (FDR), capital adequacy ratio (CAR), size (log total assets) and operational efficiency ratio (OER). Meanwhile, macroeconomics as external factors consists of GDP growth rate and inflation rate. The data of Indonesian Islamic Banks in this research is unbalanced panel data with three Indonesian Islamic

Banks (BMI, BSM and BMS) started from January 2008 to September 2014 quarterly data, while BNIS started from January 2011 to September 2014 since the data is just available from that year and categorized as Indonesian Islamic banks that offer foreign exchange transaction. The equation for determinants of bank efficiency and non-performing financing (NPF) are as follows:

Equation 1:

$$EFF_{it} = \alpha_i + \beta_1 ROA_{it} + \beta_2 FDR_{it} + \beta_3 CAR_{it} + \beta_4 SIZE_{it} + \beta_5 OER_{it} + \beta_6 GDP_{it} + \beta_7 INF_{it} + \varepsilon_{it} \quad \ldots\ldots (1)$$

Equation 2:

$$NPF_{it} = \alpha_i + \beta_1 ROA_{it} + \beta_2 FDR_{it} + \beta_3 CAR_{it} + \beta_4 SIZE_{it} + \beta_5 OER_{it} + \beta_6 GDP_{it} + \beta_7 INF_{it} + \varepsilon_{it} \quad \ldots\ldots (2)$$

Where α as constanta, β as coefficient regression, i as the total number of banks, t as the total number of observations for each bank, and ε as its error terms.T-test examines the effect of each independent variables on dependent variable and utilized 10% significance level where $\alpha = 0.1$.

### 3.3. Determination of Inter-temporal Relationship between EFF and NPF

The inter-temporal relationships between bank efficiency (OTE) and non-performing financing (NPF) will be determined by Vector Autoregressions (VARs) for panel data. VARs analysis is an appropriate tool to understand the inter-temporal relationships among economic variables. Schwert (1994–2009) explained that it is commonly used for forecasting systems of interrelated time series and analyzing the dynamic impact of random disturbance on the system of variables. As it is approaching the time series data, where the data in the period of reseach must not have any trend. Thus, the granger causality test will be tested to understand the causality between two variables. Further, the VAR approach sidesteps the need for structural modeling by treating every endogenous (independent) variable in the system as a function of the lagged values of all the endogenous variables in the system. EViews reports the estimated coefficient, its standard error and the t-statistics. The first equation determines bad management hypothesis and the second equation determines bad luck hypothesis.

The general mathematical representation of a VAR is:

$$NPF_{i,t} = f_1\left(NPF_{i,t-1} \ldots NPF_{i,t-n};\ EFF_{i,t-1} \ldots EFF_{i,t-n}\right) + e_{i,t} \quad \ldots\ldots\ldots (1)$$

$$EFF_{i,t} = f_2\left(EFF_{i,t-1} \ldots EFF_{i,t-n};\ NPF_{i,t-1} \ldots NPF_{i,t-n}\right) + e_{i,t} \quad \ldots\ldots\ldots (2)$$

Where:

NPF =Non-performing Financing

EFF = Bank efficiency as measured by the efficiency scores of(OTE)

n = Number of lags

$e_{i,t}$ = a vector of innovations that may be contemporaneously correlated but are uncorrelated with their own lagged value and uncorrelated with all of the right-hand side variables as the standard procedure for granger-causality models.

## 4. THE FINDINGS

In this section, we will discuss the results and interpretation of the objectives of this study. The tables below show the results of the fourth main objectives of the research. Measuring bank efficiency through non-parametric approach where data envelopment analysis (DEA) as the tools and assuming three assumptions; OTE, PTE and SE. The results of bank efficiency will be

regressed in order to find the determinant factors internal and externally. Non-Performing Financing utilized as dependent variable as well to determine the explanatory variables internal and externally. As suggested by Berger and De Young (1997) there are two hypotheses will be examined for the inter-temporal relationships between bank efficiency and non-performing financing (NPF).

### 4.1. Non-Parametric Approach by DEA

Table 2 reveals the fully efficient; when the score is 1, as well as inefficient results; the score is less than 1.There are 10, 11, and 14 inefficient periods of BMI, BSM, and BMS based on OTE and SE. However, there are 5, 2, and 5 inefficient periods of BMI, BSM, and BMS based on PTE. The available data of BNIS is provided from January 2011 until September 2014. Totally, there are 15 periods and it indicates inefficient during 2012 to 2013 for OTE, PTE and SE.

**Table-2.** Bank Efficiency of Indonesian Islamic Banking

| Period | Bank Muamalat Indonesia | | | Bank SyariahMandiri | | | Bank Mega Syariah | | | Bank Negara Indonesia Syariah | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | OTE | PTE | SE | OTE | PTE | SE | OTE | PTE | SE | OTE | PTE | SE |
| Mar-08 | 1.0000 | 1.0000 | 1.0000 | 0.9790 | 1.0000 | 0.9790 | 1.0000 | 1.0000 | 1.0000 | | | |
| Jun-08 | 0.9708 | 1.0000 | 0.9708 | 1.0000 | 1.0000 | 1.0000 | 0.9311 | 1.0000 | 0.9311 | | | |
| Sep-08 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | | | |
| Dec-08 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | | | |
| Mar-09 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | | | |
| Jun-09 | 0.8772 | 0.8891 | 0.9866 | 1.0000 | 1.0000 | 1.0000 | 0.8735 | 0.9823 | 0.8893 | | | |
| Sep-09 | 0.8863 | 0.9565 | 0.9266 | 1.0000 | 1.0000 | 1.0000 | 0.9699 | 1.0000 | 0.9699 | | | |
| Dec-09 | 0.9041 | 1.0000 | 0.9041 | 1.0000 | 1.0000 | 1.0000 | 0.9811 | 1.0000 | 0.9811 | | | |
| Mar-10 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9153 | 1.0000 | 0.9153 | | | |
| Jun-10 | 1.0000 | 1.0000 | 1.0000 | 0.9966 | 1.0000 | 0.9966 | 0.9087 | 1.0000 | 0.9087 | | | |
| Sep-10 | 0.9352 | 1.0000 | 0.9352 | 1.0000 | 1.0000 | 1.0000 | 0.8582 | 1.0000 | 0.8582 | | | |
| Dec-10 | 0.9087 | 1.0000 | 0.9087 | 0.9779 | 1.0000 | 0.9779 | 0.8168 | 1.0000 | 0.8168 | | | |
| Mar-11 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Jun-11 | 1.0000 | 1.0000 | 1.0000 | 0.9945 | 1.0000 | 0.9945 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Sep-11 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9936 | 1.0000 | 0.9936 | 1.0000 | 1.0000 | 1.0000 |
| Dec-11 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Mar-12 | 0.9702 | 1.0000 | 0.9702 | 0.9965 | 1.0000 | 0.9965 | 0.8001 | 0.9841 | 0.8130 | 0.9061 | 0.9381 | 0.9660 |
| Jun-12 | 0.9699 | 0.9735 | 0.9963 | 1.0000 | 1.0000 | 1.0000 | 0.8302 | 0.9906 | 0.8380 | 0.8651 | 0.9080 | 0.9528 |
| Sep-12 | 0.9732 | 0.9879 | 0.9851 | 1.0000 | 1.0000 | 1.0000 | 0.8462 | 0.9995 | 0.8466 | 0.9385 | 0.9437 | 0.9945 |
| Dec-12 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9397 | 1.0000 | 0.9397 | 0.9733 | 0.9738 | 0.9995 |
| Mar-13 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.8837 | 0.8902 | 0.9927 |
| Jun-13 | 1.0000 | 1.0000 | 1.0000 | 0.9930 | 1.0000 | 0.9930 | 1.0000 | 1.0000 | 1.0000 | 0.9316 | 0.9630 | 0.9674 |
| Sep-13 | 1.0000 | 1.0000 | 1.0000 | 0.9686 | 1.0000 | 0.9686 | 1.0000 | 1.0000 | 1.0000 | 0.9794 | 0.9938 | 0.9855 |
| Dec-13 | 1.0000 | 1.0000 | 1.0000 | 0.9739 | 1.0000 | 0.9739 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Mar-14 | 1.0000 | 1.0000 | 1.0000 | 0.9753 | 1.0000 | 0.9753 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Jun-14 | 1.0000 | 1.0000 | 1.0000 | 0.9642 | 0.9911 | 0.9729 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Sep-14 | 0.9804 | 1.0000 | 0.9804 | 0.9243 | 0.9617 | 0.9611 | 0.9305 | 0.9547 | 0.9747 | 1.0000 | 1.0000 | 1.0000 |

**Source:** proceed data by DEA

In order to find the most efficient banks among the sample of research, the researchers provide descriptive statistics for each bank, as follows:

**Table-3.** Bank Efficiency of Bank Muamalat Indonesia

| EFF | OTE | PTE | SE |
|---|---|---|---|
| Mean | 0.977 | 0.993 | 0.984 |
| Median | 1.000 | 1.000 | 1.000 |
| Maximum | 1.000 | 1.000 | 1.000 |
| Minimum | 0.877 | 0.889 | 0.904 |
| Std. Dev. | 0.039 | 0.023 | 0.030 |
| Observations | 27 | 27 | 27 |

**Source:** proceed data by EViews7

The range score of OTE of BMI is between 0.8772 and 1, with mean and standard deviation (SD) is 0.9769 and 0.0388 respectively. Thus, the average level of OTIE of BMI is to the tune of 2.312 percent. By adopting the best practice technology, it suggests that BMI could reduce their inputs; deposits, fixed assets, and operational expense averagely by at least 2.312 percent and still produce the same level of outputs; financing and operating income.

On the other words, BMI couldn't well utilize the inputs in order to create the same level of outputs at least in order to achieve maximum score of OTE (1) known as fully technical efficient. PTE range score is between 0.8891 and 1, with mean and standard deviation (SD) is 0.9928 and 0.0229 respectively.

It means that, the average level of PTIE is to the tune of 0.715 percent. It figures out that 0.715 percent points of 2.312 percent of OTIE is due to inappropriate management practices that organize by the management. Bank's managers couldn't utilize its inputs during the banking operations. Further, the range score of SE is between 0.9041 and 1, while the mean score and standard deviation (SD) is 0.9838 and 0.0294 respectively.

The remaining part of OTIE is due to the sub-optimal scale size of bank operations that reveals the average level of SIE is to the tune of 1.615percent. Thus, the OTIE of BMI is more dominant sourced by SIE rather than PTIE.

**Table-4.** Bank Efficiency of Bank Syariah Mandiri

| EFF | OTE | PTE | SE |
|---|---|---|---|
| Mean | 0.991 | 0.998 | 0.992 |
| Median | 1.000 | 1.000 | 1.000 |
| Maximum | 1.000 | 1.000 | 1.000 |
| Minimum | 0.924 | 0.962 | 0.961 |
| Std. Dev. | 0.017 | 0.008 | 0.012 |
| Observations | 27 | 27 | 27 |

**Source:** proceed data by EViews7

Bank Syariah Mandiri stands as the most efficient Islamic bank compare to other banks. The range score of OTE is between 0.9243 and 1, with the mean score and standard deviation (SD) is 0.9905 and 0.0174 respectively.

Averagely, BSM tune to the OTIE for about 0.948 percent. It means that BSM couldn't minimize the inputs in order to produce given output levels while working on the maximum level in order to achieve fully technical efficient.

On the other words, BSM could reduce the inputs for 0.948 percent in order to produce the same level of outputs. PTE score is between 0.9617 and 1, with the mean score and standard deviation (SD) is 0.9983 and 0.0075 respectively.

It reflects pure technical efficient through its managerial performance in organizing the inputs on the production activities for 0.175 percent averagely. Thus, the remaining 0.780OTIE is reflected by SIE of BSM since the mean score and standard deviation (SD) is 0.9922 and 0.0123. This implies that, the dominant source of OTIE is SIE and PTIE is relatively diminutive one.

**Table-5.** Bank Efficiency of Bank Mega Syariah

| EFF | OTE | PTE | SE |
|---|---|---|---|
| Mean | 0.948 | 0.997 | 0.951 |
| Median | 0.994 | 1.000 | 0.994 |
| Maximum | 1.000 | 1.000 | 1.000 |
| Minimum | 0.800 | 0.955 | 0.813 |
| Std. Dev. | 0.068 | 0.010 | 0.066 |
| Observations | 27 | 27 | 27 |

**Source:** proceed data by EViews7

The range score of OTE of BMS is between 0.8001 and 1, with the mean score and standard deviation (SD) is 0.9480 and 0.0677 respectively. As the average score of OTIE are 5.205 that BMS couldn't reflect fully technical efficient of inputs into the same level of outputs. However, the bank could reduce the inputs averagely at least 5.205 percent in order to produce outputs on the same level. It suggests that BMS indicates the inability to use the set of inputs to generate the highest attainable output from those inputs. Further, the PTE range score is between 0.9547 and 1, with the mean score and standard deviation (SD) is 0.9967 and 0.0096 respectively. It reveals that, 0.329 is the tune point of PTIE. Thus, 0.329 percent point of 5.205 percent of OTIE is due to the underperformance of managerial during the banking operations where the bank's manager couldn't employ very well the inputs into certain level of outputs. The remaining 4.904 percent of SIE is due to the sub-optimal scale size of bank operations where the mean score and standard deviation of its bank is 0.9510 and 0.0655 respectively. Meanwhile, the range score of SE is between 0.8130 and 1. On the other words, SIE is the main source of OTIE rather than PTIE.

**Table-6.** Bank Efficiency of Bank Negara Indonesia Syariah

| EFF | OTE | PTE | SE |
|---|---|---|---|
| Mean | 0.965 | 0.974 | 0.991 |
| Median | 1.000 | 1.000 | 1.000 |
| Maximum | 1.000 | 1.000 | 1.000 |
| Minimum | 0.865 | 0.890 | 0.953 |
| Std. Dev. | 0.048 | 0.037 | 0.016 |
| Observations | 15 | 15 | 15 |

**Source:** proceed data by EViews7

The range score of OTE of BNIS is between 0.8651 and 1, with the mean score and standard deviation (SD) is 0.9652 and 0.0478 respectively. It suggests that, the OTIE score is 3.482 percent. As the OTIE score is revealed, BNIS couldn't produce outputs on the maximum levels from its inputs by fully technical efficient. Otherwise, BNIS could reduce its input at least 3.482 percent in order to produce output on the same level. PTE range score is between 0.8902 and 1, with the mean score and standard deviation (SD) is 0.9740 and 0.0373 respectively. The PTIE score is due to the managerial performance of the bank that couldn't organize its inputs for about 2.596 percent. Out of 3.482 percent of OTIE, it represents 2.596 as the PTIE. Further, the range score of SE is between 0.9528 and 1, with the mean score and standard deviation (SD) is 0.9906 and 0.0156. The remaining part of OTIE for about 0.945 percent is due to the bank that couldn't choose the

optimum size of resources. Hence, the OTIE is mainly caused of PTIE rather than SIE. It has the same results as Gulati (2011) and Zeitun and Benjelloun (2013) which inefficient is due to pure technical inefficient (PTIE).

The fourth Indonesian Islamic Banks as the samples of this research are not fully efficient averagely. However, Bank Syariah Mandiri maintain as the most efficient bank in term of OTE, PTE, and SE compare to other banks since the mean efficiency scores of BSM are slightly higher than other Islamic banks. Bank Mega Syariah reveals as the most inefficient bank based on OTE and SE, while Bank Negara Indonesia Syariah reveals as the most inefficient bank based on PTE since it reveals as the lowest average score of efficiency. Although Bank Syariah Mandiri classified as the most efficient Islamic bank in the period of study, they still couldn't perform very well since they are still dealing with inefficiency.

Overall, the banks are not fully efficient since the mean scores are less than 1. The banks are categorized as overall technically inefficient when the bank operates below frontier. The Indonesian Islamic Banks couldn't produce multiple outputs based on multiple inputs that working on maximum level or even the bank should reduce inputs in certain level in order to produce outputs on the certain level as well.

Scale Inefficient indicates as the dominant source of Overall Technical Inefficient in the three Islamic banks, such as; Bank Muamalat Indonesia, Bank Syariah Mandiri, and Bank Mega Syariah. The overall technical inefficient is due to problem of the bank that couldn't operate on the most productive scale size (MPSS).

A production correspondence is said to exhibit increasing returns to scale if an increase in all inputs (keeping mix constant) results in a greater than proportionate increase in the output; and decreasing returns to scale if the increase in the output is less than the proportionate increase in all the inputs (Banker, 1984). As the data run by DEA, the results indicates increase returns to scale (IRS) and decrease returns to scale (DRS) and inefficiency is due to both condition. Increase Returns to Scale (IRS) explains deposits of Islamic banks that obtained from wadiah current account and mudharabah mutlaqah (unrestricted investment), fixed assets and operational expense increase and results greater outputs of financing offered and operating income.

It means that, BMI, BSM and BMS increase the inputs and resulted even more financing (mudharabah, musyarakah, murabahah, istishna, qardh and ijarah) to the customer and investor as well as could earn profit from the business. However, the technical inefficient of Bank Negara Indonesia Syariah is dominantly due to the managerial underperformance. Bank's managers are not able to organize its inputs during the banking operations.

BNIS may deal with inappropriate management as they provide new transaction in foreign transaction. Thus, they should re-organize the strategy of management and bank managers should be more critical since Islamic banks operates contrary from conventional banks. The results of this study are quite different from the previous study regarding the scores because it has different sample and periods. In term of ranking the Indonesian Islamic Banks, this research agrees with Afiatun and Wiryono (2010) that Bank Syariah Mandiri ranks as the most efficient bank and indicates trend of fluctuation suggested by Firdaus and Hosen (2013) yet Bank Muamalat Indonesia rank as the most efficient based on their research.

**Table-7.** DEA Descriptive Statistics of Indonesian Islamic Banks

| All Islamic Banks | OTE | PTE | SE |
|---|---|---|---|
| Mean | 0.971 | 0.993 | 0.978 |
| Median | 1.000 | 1.000 | 1.000 |
| Maximum | 1.000 | 1.000 | 1.000 |
| Minimum | 0.800 | 0.889 | 0.813 |
| Std. Dev. | 0.049 | 0.021 | 0.042 |
| Observations | 96 | 96 | 96 |

**Source:** proceed data by EViews7

As the whole data of DEA in Indonesian Islamic Banks, it reveals inefficient results averagely. The score of OTE is between 0.8001 and 1, with mean and standard deviation (SD) is 0.9708 and 0.0486. Thus, the OTIE score is tune to 2.9247 percent. It suggest that Indonesian Islamic Banks could reduce their inputs; deposits, fixed assets, and operational expense at least 2.9247 percent in order to produce the same level of outputs; financing and operational income. On the other words, Islamic banks couldn't operate on maximum level since they couldn't produce outputs from its inputs with the score of 1, which means fully technical efficient. The score of PTE is between 0.8891 and 1, with mean and standard deviation (SD) is 0.9925 and 0.0214 respectively. Hence, PTIE reveals for 0.7484 percent averagely where bank operations indicate as management underperformance. Bank's manager couldn't utilize its input during the banking operations. There are 0.7484 percent of inputs wasted under the management performance. Further, the range score of SE is between 0.8130 and 1, with mean and standard deviation (SD) is 0.9780 and 0.0423 respectively. Its SIE is due to the sup-optimal scale size of bank operations for 2.2005 percent. Since the bank couldn't choose the right scale of size or even resources, its SIE of OTIE reveals for 2.2005 percent. In conclusion, OTIE is dominantly due to the inappropriate scale size of bank (SIE) rather than management underperformance (PTIE).As reported from the individual efficiency of each bank, there are three inefficient banks due to SIE and one inefficient bank due to PTIE. Public policy point of view suggests about scale efficiency perspective, banks that were found to operate at IRS may raise their efficiency by expanding, while larger banks operate at DRS may need to scale down their operations by managing and controlling their existing costs more efficiently. It takes more time consuming to overcome scale inefficiency within market mergers and business collaborations compared to addressing pure technical inefficiency in the short term by experimenting with new combinations of inputs and outputs observed from the operations of efficient peers within the sample (Sufian, 2006 & 2007). It agrees the research of Sravani (2014).

### 4.2. Determinants of Bank Efficiency and Non-Performing Financing (NPF)

The panel regression is applied in order to find the effect of bank specific and macroeconomics factor on bank efficiency. As the previous explanation above, there are three assumptions of bank efficiency such as; overall technical efficiency, pure technical efficiency, and scale efficiency. This research consider overall technical efficiency as dependent variable of bank efficiency since this variable is expected to produce outputs in the same level of inputs and the bank operates in maximum level. There are five independent variables of bank specifics, such as; Return on Assets

(ROA), Financing to Deposit Ratio (FDR), Capital Adequacy Ratio (CAR), Size (Log total assets), and Operational Efficiency Ratio (OER). Further, there are two independent variables of macroeconomics, such as; GDP and Inflation (INF).

**Table-8.** Fixed effect model results of Bank Efficiency (EFF)

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| ROA | -0.027 | 0.013 | -2.124 | 0.037 |
| FDR | 0.000 | 0.001 | 0.275 | 0.784 |
| CAR | 0.002 | 0.001 | 1.147 | 0.255 |
| SIZE | -0.011 | 0.062 | -0.177 | 0.860 |
| OER | -0.003 | 0.001 | -2.822 | 0.006 |
| GDP | 0.055 | 0.333 | 0.165 | 0.870 |
| INF | 0.002 | 0.001 | 1.794 | 0.076 |
| C | 0.945 | 1.489 | 0.635 | 0.527 |
| R-squared | 0.305 | F-statistic | 3.732 | |
| Adjusted R-squared | 0.223 | Prob(F-statistic) | 0.000 | |
| Durbin-Watson stat | 1.401 | | | |

**Source:** proceed data by EViews7

There are 3 explanatory variables have significant effect on bank efficiency, such as; ROA, OER and inflation. ROA has negative effect on bank efficient and statistically significant with t-statistic and probability for -2.124 and 0.037 respectively. OER has significant effect with t-statistic value -2.822 and statistically significant with probability 0.006 respectively. Inflation has positive effect and statistically significant with the value of t-statistic and probability for 1.794 and 0.076 respectively. However, FDR, CAR and GDP have positive effect, while size has negative effect, but statistically insignificant on bank efficiency. T-statistic value of FDR, CAR and GDP are 0.275, 1.147 and 0.165 with probability 0.784, 0.255 and 0.870 respectively. T-statistic and probability of size are -0.177 and 0.860.The research agrees with the study of Soetanto and Rizky (2011) that profitability has contrary association with efficiency. The ratio of FDR which is lower than 90% must add certain Reserve Requirement (RR) equal to 1% of the third party funds since Bank Indonesia was trying to increase the Financing to Deposit Ratio by imposing Reserve Requirement (RR). Thus, the return earns acquire from other activities such as placing their fund in Bank Indonesia, financial market investments and credit for consumption rather than coming from the main business activity of bank as intermediary between customers and banks. Moreover, higher operational efficiency ratio (OER) decreases bank efficiency since it explains the usage of operating expense to generate operating income. It is necessary to measure how cost (expense) are changing to income.Increment on operating expense reduces income, hence the lower ratio of OER will increase bank efficiency. In the Islamic banks, the profit generated from the margin and fee of financing activities (Mudharabah, Musyarakah, Murabahah, Istishna, Ijarah and qardh). Further, high inflation is often associated with higher cost and higher income. The positve impact indicates when the increase of income is greater than increase of cost (Wasiuzzaman and Ayu, 2010). As the price is increasing in period of times constinously and it is a demand of society for having more income. Thus, they may deposit their funds into Islamic banks in form of saving (wadiah) or even

investment (mudharabah muthlaqah) and the Islamic banks will utilize its funds into financing activities. This will lead to efficient bank since they play the role as intermediate among the users. Overall, bank efficiency is determined by bank specifics and macroeconomics factors.Furthermore, bank has high risk in lending finance since the possibility of borrowers for not paying back the lending fund. Especially in the Islamic banks, they may deal with non-performing financing (NPF) due to many different contracts of financing. Thus, it is necessary to examine the determinants of NPF in the Indonesian Islamic Banks. The determinant factors are the same as independent variables of bank efficiency (bank specific and macroeconomics).

**Table-9.** Fixed effect model results of Non-Performing Financing (NPF)

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| ROA | 0.143 | 0.261 | 0.547 | 0.586 |
| FDR | 0.001 | 0.011 | 0.091 | 0.928 |
| CAR | -0.008 | 0.040 | -0.203 | 0.840 |
| SIZE | -5.819 | 1.199 | -4.855 | 0.000 |
| OER | 0.068 | 0.034 | 2.016 | 0.047 |
| GDP | 19.064 | 5.242 | 3.637 | 0.001 |
| INF | 0.006 | 0.031 | 0.192 | 0.848 |
| C | 2.796 | 20.849 | -3.492 | 0.001 |
| R-squared | 0.456 | F-statistic | 7.112 | |
| Adjusted R-squared | 0.392 | Prob(F-statistic) | 0.000 | |
| Durbin-Watson stat | 1.286 | | | |

**Sources:** proceed data by Eviews7

There are 3 independent variables have significant effect on non-performing financing (NPF) in the Indonesian Islamic Banks, those are; size (log total assets), OER, and GDP. The remaining independent variables; ROA, FDR, CAR, and inflation have insignificant effect statistically on NPF. T-statistics of SIZE is -4.855 with significant level of 0.000 that indicates negative effect of size on NPF. OER and GDP growth rate indicate positive effect on NPF with the t-statistic value 2.016 and 3.637 in the significance level of 0.047 and 0.001 respectively. Further, t-statistics of the remaining determinant variables reveals positive effect on NPF, except CAR that indicates negative effect on NPF, but statistically insignificant.

T-statistic of ROA, FDR, inflation and CAR are 0.547, 0.091, 0.192, -0.203in the significance level of 0.586, 0.928, 0.848 and 0,840 respectively.Smaller size of the banks leads to higher non-performing financing. It means that banks with smaller total assets may deal with higher non-performing financing since they could not well manage its credit risk. Small total assets indicate lower sound of banking industry and trust of customers. Hence, the operational activities might not work well due to non-perform of financing. When GDP growth rate decrease, the non-performing financing will decrease as well.

### 4.3. The Inter-temporal Relationships between EFF and NPF

**Table-10.** Bad Management Hypothesis

| **Dependent: NPF** | | | | | |
|---|---|---|---|---|---|
| | Sum of Coefficient | Sum of Std Error | Sum of T-ratio | R-squared | F-statistic |
| EFF *Lag 2* | 0.194 | -4.182 | 0.091 | 0.600 | 31.180 |
| EFF *Lag 3* | -0.446 | -6.801 | -0.388 | 0.613 | 20.321 |
| EFF *Lag 4* | -0.299 | -9.421 | -0.247 | 0.638 | 15.650 |

**Source:** proceed data by EViews7

**Table-11.** Bad Luck Hypothesis

| **Dependent: EFF** | | | | | |
|---|---|---|---|---|---|
| | Sum of Coefficient | Sum of Std Error | Sum of T-ratio | R-squared | F-statistic |
| NPF *Lag 2* | -0.003 | -0.010 | -0.553 | 0.314 | 9.518 |
| NPF *Lag 3* | -0.002 | -0.018 | -0.378 | 0.332 | 6.367 |
| NPF *Lag 4* | -0.003 | -0.027 | -0.588 | 0.331 | 4.390 |

**Source:** proceed data by EViews7

Table 10 and table 11 shows the findings on the inter-temporal relation between bank efficiency where technical efficiency as the proxy and problem loans as shown by the ratio of non-performing financing in the Indonesian Islamic Banks. The results reveals that the R-squared for the equation where the ratio of non-performing financing (NPF) as dependent variable are 0.600, 0.613 and 0.638 respectively for lag 2, lag 3 and lag 4. The sum of coefficient on the lagged efficiency is -0.551 that indicate negative association with NPF. It supports the evidence of "Bad Management" proposed by Berger and De Young (1997) which decreasing of bank efficiency will increase non-performing financing (NPF). Further, only the EFF lag 2 indicates statistically significant at the 1 percent level. Thus, bad management hypothesis is accepted, but weak significant statistically. Likewise, the R-squared for the equation where bank efficiency as dependent variable (EFF) are 0.314, 0.332 and 0.331 respectively for lag 2, lag 3 and lag 4. The sum of coefficient on the lagged non-performing financing is -0.008 indicates negative association with EFF. However, none of the individual of the coefficient on the lagged of non-performing financing is significant. Thus, it rejects the hypothesis of "Bad Luck" proposed by Berger and De Young (1997). Briefly, this research accept the "Bad Management" hypothesis since the R-squared and F-statistic of NPF as dependent variable is higher compare to EFF as dependent variable and reveals significant effect on EFF lag 2. Poor managerial performance affects loan granting behavior. Bank managers do not frequently monitor loan portfolio management and inadequate allocation of resources to loan monitoring Podpiera and Weill (2008). It supports the research of Setiawan and Putri (2013) and Podpiera and Weill (2008). Banking industry in Indonesia applies dual banking system; conventional and Islamic banking system. It is firstly established Islamic banks in Indonesia in 1992, namely Bank Muamalat Indonesia, followed by Bank Syariah Mandiri in 1999 and Bank Mega Syariah in 2004. However, Indonesia is lack of human resources expert in Islamic finance. Thus, the new Islamic banks hired the employee from Conventional banks and train them for Islamic banking system. Briefly, they are still lack of knowledge about Islamic banking, hence lead them dealing with practical problems, especially for bank's managers.

## 5. SUMMARY AND CONCLUSIONS

The main objective of this research understands the inter-temporal relationship between Bank Efficiency (OTE) and Non-Performing Financing (NPF) in the Indonesian Islamic Banks. In order to examine the relationship, it consists of some approaches beforehand. The first approach seeks the bank efficiency based on three assumptions (OTE, PTE and SE). Bank efficiency is measured by non-parametric approach DEA. Further, banking industry is not only measured by efficiency, but also the capability to offer financing since it is the main business activity of banks. Banks with high non-performing financing approximately might be inefficient. The results of OTE will be regressed in order to find the determinants of bank efficiency and determining the determinants of NPF from bank specifics and macroeconomics factors. Panel least square by estimating fixed effect method determine the determinants of bank efficiency and non-performing financing. Further, it goes to the main objectives by seeking the inter-temporal relationships by applying panel VARs (Vector Autoregressions).

The period of the study covers from January 2008 to September 2014 using quarterly published data from central bank of Indonesia (Bank Indonesia) with 4 full-fledged Indonesian Islamic banks as the samples of the research. DEA apply inputs and outputs variables, such as; deposits, fixed assets and operational expense (inputs); financing and operating income (outputs). The determinants factors of bank efficiency and non-performing financing (NPF) are Return on Assets (ROA), Financing to Deposits Ratio (FDR), Capital Adequacy Ratio (CAR), size (log total assets), operational efficiency ratio (OER), GDP and Inflation.

It indicates that technical inefficient is due to scale inefficient (SIE) compare to pure technical inefficient (PTIE) in the Indonesian Islamic Banks. Scale Inefficient is due to two conditions; increase returns to scale (IRS) and decrease returns to scale (DRS). Briefly, inefficient due to scale inefficient takes more time consuming to overcome. Further, ROA and OER have negative association and statistically significant on bank efficiency, while inflation has positive association and statistically significant on bank efficiency. Size has negative association and statistically significant on non-performing financing (NPF), while OER and GDP have positive association and statistically significant on non-performing financing (NPF). The inter-temporal relationship indicates bad management caused of poor financing portfolio management. Bank managers do not frequently monitor loan portfolio management and inadequate allocation of resources to loan monitoring. Further, Indonesian Islamic banks are still lack of human resources and knowledge about Islamic banks, thus they need to deepen their knowledge. Moreover, this research limits due to data availability and sample of research. There are 12 Islamic Commercial Banks (full-fledged), but only 4 banks offer the foreign transaction. Thus, the researchers decide to sample the four banks (BMI, BSM, BMS and BNIS). As the four banks are sampled, it represents the whole Islamic banks in Indonesia since they have more experience and offer more transactions.

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