A COMPARATIVE STUDY OF EFFICIENCY BETWEEN CONVENTIONAL AND ISLAMIC BANKS IN INDONESIA

Shinta Amalina Hazrati Havidz[1†] --- Chandra Setiawan[2]

[1,2]Management Study Program, President University, Indonesia

ABSTRACT

This paper investigates the bank efficiency as a basis performance measurement in the Conventional and Islamic banks in Indonesia in the period of January 2008 – September 2013 using quarterly-published report data of Central Bank (Bank Indonesia) with 6 Conventional banks and 3 Islamic banks in Indonesia as the samples of the research. The Bank efficiency in this research is measured using financial ratios and macroeconomics as determinants of Return on Assets (ROA) and non-parametric approach DEA (Data Envelopment Analysis). In term of variables that determine ROA using panel least square by estimating Fixed Effect Method (FEM), the findings reveal that there are significant effects of Loans to deposit ratio (LDR), Operational efficiency ratio (OER) and GDP growth rate to ROA and there are no significant effects of Capital Adequacy ratio (CAR), Size and inflation rate in the Conventional banks in Indonesia. On the other hand, all the independent variables have significant effect to ROA, except financing to deposit ratio (FDR) in the Islamic banks in Indonesia. GDP growth rate is the highest coefficient among the determinant variables used in this research that affect ROA of both Conventional and Islamic banks and the weakest coefficient that affects ROA is CAR in the Conventional banks and FDR in the Islamic banks. The findings of DEA indicate that the bank inefficiency is caused of not-well function of banks and managers of banks are not able to use the firms' given resources.

© 2015 AESS Publications. All Rights Reserved.

Keywords: Bank efficiency, Conventional bank, Islamic bank, Financial ratios, Macroeconomics, Panel least square, Fixed effect method, Data envelopment analysis.

Contribution/ Originality

This research aims to compare the efficiency of Conventional and Islamic banks in Indonesia through parametric and non-parametric approach as one of few studies in the research of comparison banking area conducting two approaches at once.

1. INTRODUCTION

Rapid growing of Islamic finance is part of financial sector development and it is not restricted to Islamic countries and is spreading wherever there is sizeable Muslim community. A growing of more than 15% annually in the past five years for 250 financial institutions in over 45 countries practice some forms of Islamic finance. The market's current annual turnover is estimated to be $350 billion, compared with a mere $5 billion in 1985. In the early 1970s where Islamic banks firstly offered with different operational systems and attract researchers in conducting considerable research, focusing mainly on the viability, design, and operation of "deposit-accepting" financial institutions, namely basis of profit and loss sharing partnership rather than the payment or receipt of interest which extremely prohibited in Islam (Greuning and Iqbal, 2008). In financing economic activity and different segments of the market, banks play a role as the brain. Profitable and sound banks contribute to the stability of the financial sector (Rachdi, 2013).

Conventional banks, especially private owned banks are profit maximization oriented that has contrary with Islamic banks objective, to promote, foster and develop banking services and products based on Islamic principles (Khan, 1983 cited by Haron (1997)). Both, Islamic and Conventional banks are profit-making organizations with it aims to gain profit. However, riba or every business activity that is not compliance with *syariah* principles is prohibited to trade for. Conversely, it doesn't applied in the conventional system. Buying and selling principles are the base of Islamic banks since selling price is fixed from the beginning by including bank's profit margin (Khir *et al.* 2008). Profit and morality are the main objectives of Islamic banks in order to create good society prosperous and business development by giving zakat (wealth or *alm tax*) as one of Islamic duty. However, morality is not considered in the conventional banks (Haron, 1997).

Bader *et al.* (2008) explained that Conventional banks enjoy several advantages of Islamic banks. Conventional banks have more experience and longer history compare to Islamic banks. They accept revenue from interest as major source of funds and do not share loss with clients. Most transactions are guaranteed by collaterals. As of technology development, the banks spread widely and they can enjoy very huge capital and enter Islamic banking market (e.g. Citibank, Bank of America, Deutche Bank, ABN Amro, UBS, HSBC, and Standard Chartered). It proves benefited theoretically and by empirical research. Thus, it is interesting to examine both bank efficiency. Positive and negative changes had taken place in the recent years. International Conventional banks started to offer Islamic banking services that increase the number of Islamic banks causing competition among Islamic banks themselves. Knowledge and practice of Islamic banking spreads quickly and as more Islamic banking entities are established, new regulations, policies, and accounting standards are designed to accomodate these changes.

The central bank, namely Bank Indonesia, recorded the track of banking industry in Indonesia. It shows significant growth of Islamic banks in Indonesia based on total assets (billion IDR) compare to Conventional banks. As the annual report at the end of 2008, the total assets of Islamic Commercial Banks and Islamic Business Units are IDR 34,036 and IDR 15,519 respectively, while IDR 2,067,044 of Conventional banks. In the next five years per September 2013, it reveals the total assets of Islamic Commercial Banks, Islamic Business Units and Conventional banks for IDR 170,218, IDR 57,492 and IDR 4,737,308 billion respectively. There are 130 and 9,680 total banks and bank offices of Conventional banks in 2007 and the numbers of banks decrease to 120, but the bank offices increase to 17,953 offices in September 2013. Islamic Commercial Banks show rapid growth of total bank and bank offices for 3 and 398 in 2007 to 11 and 1,926 on September 2013 respectively. Islamic Business Unit have 26 and 170 becomes 23 and 535 total banks and bank offices (Indonesia, 2013). Islamic banks in Indonesia firstly established in 1992, but they can compete with Conventional banks that have longer existence and more experiences in banking industry. Indonesia has the biggest population of Muslim in the world and it is expected from Islamic banks to develop and create prosperity for societies. Some previous research suggest that Islamic banks are more efficient than conventional banks. However, there is no conclusive evidence in this regard. Specifically, the researchers propose to analyze which among the determinant variables determine the Conventional and Islamic banks' profitability appear to be important. Furthermore, bank efficiency measured by non-parametric approach DEA (Data Envelopment Analysis) employs bank inputs and outputs. This research intended to help Conventional and Islamic banks to improve their efficiency to remain competitive. The remainder of the research is organized as follows: the next section presents the literature review. The third section explains the sample, the sources of data, and the empirical model used in the study. The fourth section reports the empirical findings of the study. Section five concludes the study and provides the limitations and suggestions for future studies.

2. LITERATURE REVIEW

Profitability measures the soundness of bank, such an essential thing to analyze banks' performance for managers, depositors, and banks regulators. Measurement of banks' profit is important to understand the operational banking business to operate efficiently. It is a comparison of generated profit from the operational activities over the total assets, namely Return on Assets (Kasbal, 2012). Control of bank management is classified into internal factor with the financial statement variables. It relates directly to the items of balance sheet and income statement. Financial ratios consider as internal determinants. Factors beyond the control of the management categorizes as external factors, specifically macroeconomic environment (Haron, 2004).Bilal *et al.* (2013) examined the effect of bank specific and macroeconomics factors on profitability of commercial banks in the Pakistan over the period of 2007 to 2011. They conclude that bank size, NIM, and industry production growth rate has positive and significant impact on the ROA and ROE. NPL to total advances and inflation have negative significant effect on ROA, while real GDP has positive

effect on ROA. Al-Qudah and Jaradat (2013) determine the effect of macroeconomic variables and bank characteristic on the profitability of Jordanian Islamic banks for the period of 2000-2011 using panel data analysis fixed effect model and generalized least square. It indicates that capital adequacy and bank size have a positive and significant effect, while total deposits to total assets has negative and significant effect on ROA and ROE. Zeitun (2012) finds the determinants of Islamic and Conventional Banks performance in GCC countries using panel data analysis. The finding reveals that IB size has a negative and insignificant effect on ROA, whereas the CB size has a negative and significant effect on ROA. CIR decreases bank performance for both IB and CB and significant at least at 1% level in ROA for both IB and CB. GDP is positive and statistically significant at 1% level of ROA for CB. Interestingly, the macroeconomics variable GDP was found not to have any significant impact on Islamic banks performance. Inflation has negative and statistically significant on ROA for both CB and IB. Sastrosuwito and Suzuki (2012), revealed that OER has negative significant effect, while capitalization and loan intensity have positive and significant effect on profitability. However, the effect of bank size and inflation cannot be assessed since the result shows insignificant. Athanasoglou *et al.* (2005) reveals that capital is important in explaining bank profitability and that increased exposure to credit risk lowers profits. Operating expenses are negatively and strongly linked. Inflation clearly affect the performance of the banking sector. Mirzaei and Mirzaei (2011), investigates the Middle Eastern Banking using multi-variable and a single equation framework, the determinants of bank profitability found that bank size is negative and highly insignificant which reflects the idea of small banks may make more profits and try to grow faster than larger banks. CTI (OER) has negative and highly significant at the 1% level. As expected. Capital ratio is positive and highly significant, implying that the better capitalized banks are able to make higher profits. NL/DSF, reflects the ability and confidence of banks to pay loan base on deposits, and inflation have negative and statistically significant effect. GDP per capita (GDPPC) shows negative and insignificant on the profitability. Sufian (2011), examined the determinants of Korean Banks' profitability during the period 1992-2002. Size and bank liquidity have positive effect on profitability. The effect of GDP growth on ROA are mixed. The coefficient of GDP is negative, but it becomes positive when they control the crisis and the tranquil periods. However, the coefficient of the variable is not statistically significant in any regression models estimated. The effect of inflation is positively related.

Stiawan (2009), Sartika (2012), Pratiwi (2012), and Ruslim (2012) reveal that Loan to Deposit Ratio (LDR) or Financing to Deposit Ratio (FDR) has positive and significant effect, whereas Purwana (2009) and Rasyid (2012) found negative effect and insignificant on ROA. Hesti (2010) and Kasbal (2012) reveal that LDR/FDR has negative effect and significant on ROA. Kasbal (2012) explains that Capital Adequacy Ratio (CAR) has positive effect and significant, while positive and insignificant effect on ROA according to Hesti (2010) and Ruslim (2012). Inversely, CAR has negative and insignificant effect on ROA according to Purwana (2009), Sartika (2012), and Pratiwi (2012). Purwana (2009) and Stiawan (2009) also reveals that size has negative effect and significant, while positive effect and significant on ROA according to Hesti (2010).

Operational Effciency Ratio (OER) has negative effect and significant on ROA, a research held by Purwana (2009), Stiawan (2009), Kasbal (2012), and Pratiwi (2012), whereas positive effect and significant based on Rasyid (2012). Stiawan (2009) reveals that GDP has positive effect and inflation has negative effect on ROA, but statistically insignificant. The efficiency measurement using DEA method, it reveals that 24 Islamic banks during 2008-2010 are inefficient. The asset of Islamic Commercial Banks (BUS) is higher than Islamic Business Unit (UUS) shows much better efficiency compare to Islamic Business Unit that has much lower assets (Endri, 2011). The efficiency assessment of Islamic Commercial Banks quarter II 2010 to quarter IV 2012 indicates a fluctuative trend. Islamic Commercial Banks (BUS) have unstable efficiency score on each period of assessment (Firdaus and Hosen, 2013). Setiawan (2013) reveals that there are only 3 banks that were fully efficient during 2008-2012. The mean value of Conventional and Islamic banks during 2008-2012 are 88.74% and 92.56% respectively. Noor (2013) found that the mean value of Islamic Commercial Banks (BUS) by CRS assumption is 35.65% while 55.77% for Conventional Commercial banks (BUK). On the other hand, 84.73% of Islamic Commercial Bank (BUS) and 75.55% of Conventional Commercial Bank (*BUK*) by using VRS assumptions. The efficiency value of VRS is higher than CRS assumptions. It assumes that efficiency could be affected by technology and the bank could not always operate in optimum scale.

3. DATA METHODOLOGY

This study covers the period of January 2008 – September 2013 using quarterly-published report data of Central Bank (Bank Indonesia) with 6 Conventional banks and 3 Islamic banks in Indonesia by using the determinants of Return on Assets (ROA) and non-parametric approach DEA (Data Envelopment Analysis). There are 11 Islamic Commercial Banks in Indonesia, but there are only 3 full-fledged Islamic Commercial Banks offering foreign transaction. Thus, the researchers decide to utilize 3 full-fledged Islamic banks as the sample of research as representatives of the entire Islamic banks. Islamic bank is growing with the condition of higher total assets of Conventional banks priorly. Thus, the researchers classified conventional banks based on the total assets that comparable to the sample of Islamic banks in this research. The table as follows:

Table-1. Average Total Assets during 2008 - 2013 (in Million IDR)

No.	Conventional Banks	Total Assets	Islamic Banks	Total Assets
1	Bank Ekonomi Raharja	23,264,965	Bank Muamalat Indonesia	33,285,179
2	Bank Artha Graha Int	17,734,779	Bank Syariah Mandiri	39,769,807
3	Bank ICBC Indonesia	15,076,217	Bank Mega Syariah	5,848,681
4	Bank Mayapada International	12,911,837		
5	Bank Sinarmas	12,375,091		
6	Bank Mestika Dharma	6,464,272		

Source: Bank of Indonesia, proceed data

3.1. Estimation of Determinants of Return on Assets (ROA)

Panel least square is utilized to analyze the determinants of ROA in the Conventional and Islamic banks in Indonesia. Panel data refer to time series data in each cross section in a set of data. Generally, applying regression by panel data produce intercept and coefficient score in different slope for every cross section and each period of observation (Wooldridge, 2013). It recognizes individual characteristics of regularity and/or continuity in the cross-section units in order to establish a meaningful relationship between internal and external variables (Setiawan, 2012). The advantages give more informative data, more variability, less collinearity among variables, more degrees of freedom and more efficiency. It can enrich empirical analysis in ways that may not be possible if we use only cross-section or time series data. Fixed Effect Method (FEM) measures the intercept may differ across individuals (here the six conventional and three Islamic banks), each individual's intercept does not vary over time, known as time invariant (Gujarati, 2004). This research utilizes ROA to measure bank's profitability as dependent variable, while independent variables in this research are LDR/FDR, CAR, Size, and OER as financial ratio. GDP growth rate and inflation rate as macroeconomics. The data of Conventional and Islamic banks in this research is balanced panel that has the same number of time-series observations for each cross-sectional unit. The equation for fixed effects model is 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 as dependent variable, namely ROA, X as independent variables, β as coefficient regression, i shows total number of banks, t shows total number observations for each bank and ε shows composite error terms. Coefficient result measures the marginal contribution of independent variable on dependent variables by holding all other variables fixed (Schwert, 2010). The standard errors measure the statistical reliability of the coefficient estimates. When the value of standard error is getting larger, there are more statistical noises on the estimation. Probability is also known as p-value or the marginal significant to reject or accept the null hypothesis. This research apply 1%, 5% and 10% significant level (Johnson, 2003). T-test examines the effect of each independent variable towards dependent variable by comparing the value of significant t of each independent variable with significant standard α = 0.01, 0.5 and 0.1.

3.2. Classical Assumption Test

Firstly, normality test classify the normal distribution of data. Jarque-Bera (JB) test is an *asymptotic*, or large sample, test that compute the skewness and kurtosis. The data is normally distributed if the probability score of Jarque-Bera > α. Secondly, multicollinearity is a test among independent variables in a regression model. It is due to linear relationship among all explanatory variables. Perfect correlation among independent variables is > 80% that indicates multicollinearity in the regression model. Thirdly, autocorrelation test is necessary to identify the correlation among the periods in the research. Autocorrelation problem exists when the value of previous variable has effect to the present or future variable and most likely happens in the time series data. Durbin-Watson d test utilized in this research to determine the autocorrelation with a decision of $d_u < d < 4$-

d_u, it assumes no positive or no negative autocorrelation with the criteria $\alpha = 5\%$. The fourth is heteroscedasticity test. The disturbances might appear when the regression have the same variance, namely homoscedastic. Heteroscedastic problem used to appears in the cross section data. White test is one of heteroscedasticity test, more general than other heteroscedasticity test (Goldfeld-Quandt test, BPG test, etc). It does not rely on the normality assumption and easy to implement (Gujarati, 2004).

3.3. Estimation of Non-Parametric Approach DEA

DEA as an application to analyze data – CRS (Constant Return to Scale) and VRS (Variable Return to Scale) input oriented to know the efficiency score. Data Envelopment Analysis (DEA) is a relatively new "data oriented" approach for evaluating the performance of a set of peer entities called Decision Making Units (DMUs) which convert multiple inputs into multiple outputs (Setiawan and Putri, 2013). This research utilize 3 input variables, such as: deposits, fixed assets, and operational expense; and 2 output variables, such as: loans/financing and operational income. According to Zhu (2009), Data Envelopment Analysis (DEA) introduced by Charnes, Coopers and Rhodes in 1978 and has been proven an effective tool in identifying such empirical frontiers and in evaluating relative efficiency. CCR model assumes the ratio between additional inputs and outputs are constant (constant return to scale). It assumes bank could operate in optimum scale. CCR model was developed by Banker, Charnes, and Cooper in 1984, known as BCC model. The competition and obstacles of financial could cause the bank to not operate in optimum scale. Thus, the ratio between additional inputs and outputs are different (variable return to scale). In particular, DEA is an excellent tool for improving the productivity of service businesses (Sherman and Zhu, 2006, as cited by Zhu (2009). The envelopment models as follows:

Table-2. Envelopment Models

Frontier Type	Input-Oriented
CRS	$\min\theta - \varepsilon(\sum_{i=1}^{m} s_i^- + \sum_{r=1}^{s} s_r^+)$ subject to $\sum_{j=1}^{n} \lambda_j x_{ij} + s_i^- = \theta x_{io}$ $i = 1,2,...,m;$ $\sum_{j=1}^{n} \lambda_j y_{rj} - s_r^+ = y_{ro}$ $r = 1,2,...s;$ $\lambda_j \geq 0 j = 1,2,...,n.$
VRS	Add $\sum_{j=1}^{n} \lambda_j = 1$

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).

4. RESULTS AND DISCUSSION

4.1. Determinants of ROA in the Conventional and Islamic Banks

Regression results of panel least square employed by fixed effect method using 6 Conventional banks and 3 Islamic banks as the sample over the period of January 2008 – September 2013 is as follows:

Table-3. Empirical Results of Fixed Effect Method of Determinants of ROA

Variable	Coefficient		Std. Error		t-Statistic	
	CBs	IBs	CBs	IBs	CBs	IBs
C	-17.1128	-25.7302	7.1085	25.3865	-2.407366**	-1.0135
LDR/FDR	-0.0054	-0.0053	0.0020	0.0069	-2.664274*	-0.7736
CAR	0.0003	-0.0799	0.0038	0.0365	0.0694	-2.188892**
SIZE	-0.1481	-2.9029	0.1926	1.1464	-0.7686	-2.532095**
OER	-0.0203	-0.1132	0.0079	0.0128	-2.56476**	-8.825932*
GDP_GROWTH	3.6132	10.2802	1.3701	5.7369	2.637207*	1.791957***
INFLATION	0.0182	-0.0792	0.0168	0.0258	1.0833	-3.066806*

Source: EViews7, proceed data
**Note:** *, ** and *** indicate significance level of 1%, 5% and 10% respectively
CBs: Conventional Banks; IBs: Islamic Banks

This research shows empirical result that LDR/FDR has negative impact on ROA, but significant in the Conventional banks, while insignificant in the Islamic banks. Hesti (2010), Mirzaei and Mirzaei (2011), Kasbal (2012) and Al-Qudah and Jaradat (2013) indicate the same results that LDR has negative effect and significant on ROA. Global crisis in 2008 leads banking industry to deal with liquidation problems. Depositors draw their fund from the bank since banking performance may unstable. Thus, depositors' fund decrease while banks keep offering loan since it is their main activities. Hesti (2010) explains the negative impact of FDR on ROA in the Islamic banks may be caused of profit sharing risk with bigger responsibility of bank and resulted to decreasing of ROA. Further, CAR in the Islamic banks indicate negative effect and significant on bank profitability. Banking industry with high capital, but could not manage and generate its capital into profit may decrease bank's performance. Capital utilization for banking operational is very important to the goodness of bank's business. However, CAR in the Conventional banks could not be assessed with insignificant result. Size (log total assets) indicates negative impact and significant on ROA in the Islamic banks, while insignificant in the conventional banks. It agrees the empirical results of Athanasoglou *et al.* (2005) and Stiawan (2009). Athanasoglou *et al.* (2005) explains the increasing size of bank profitability only affects certain aspects. In fact, the bank grows larger caused a negative effect on profitability. One of the reasons is high value of financing that goes along with its non-performing financing. Banking industry should have trusty operational activities that generate higher operational income from its operational expense (Rivai *et al.*, 2007). The empirical result of OER agrees the research of Purwana (2009), Stiawan (2009), Pratiwi (2012), Kasbal (2012) and Rachdi (2013). GDP growth rate has positive effect and significant in both, Conventional and Islamic banks. It agrees the study of Zeitun (2012) and Bilal *et al.* (2013). As the increasing prosperity of society, they may deposit their fund in the bank, hence banks operate their business activities to generate profit. Banks offer the fund mostly to real sector and economic cycle turns positively leads to prosperous society. Inflation reveals negative effect and significant on

ROA in the Islamic banks and it proves the empirical result of Mirzaei and Mirzaei (2011) and Zeitun (2012). Athanasoglou *et al.* (2005) explains bank profitability will be affected by inflation depending on whether banks' wages and other operating expenses increase at a faster rate than inflation. Perry (1992) cited on Sufian (2011) suggests that inflation might affect bank performance depending on the anticipated or unanticipated situation of inflation. Definitely, inflation leads to descent of bank profitability that anticipated by banking industry. Inflation caused of money supply in the society that indicates saving fund to the banks becomes smaller because society spends their wealth more. Hence, the third party funds decrease as the saving fund from depositor decrease leads to decreasing bank profitability. Based on discussion above, it reveals that Islamic banks perform better in term of determinants of ROA that determined by internal and external factor. Islamic banks are able to maintain their performance from the financial ratio to generate profit as well as adjusting to its macroeconomics condition. Morever, Islamic banks are more stable compare to Conventional banks since they fulfill the standard of financial ratio leads to significant determinant factors. Further, the empirical results of Conventional banks in this research may give contribution to keep stable and fulfill depositors' reliance. Nevertheless, Islamic banks should keep improving, developing and offer many innovation afterwards in order to stay competitive to the counterpart party, Conventional banks.

4.2. Classical Assumption Test

4.2.1. Normality Test

To determine the normal distribution of data, probability of Jarque-Bera should be bigger than α, where 5% significance level applied to this assumption. Probability score of Jarque-Bera of Conventional Banks is 0.122401, whereas 0.006224 for Islamic Banks. It indicates that the data of Conventional banks are normally distributed, while not normally distributed in the Islamic banks. Jarque-Bera is tested from the residuals of regression that represents the combined effect of dependent variable of numerous independent variables that are not explicitly introduced in the regression model. The observations of Conventional and Islamic banks are 138 and 69 respectively. It means that, Islamic banks is dealing with small, or finite, sample size which is less than 100 observations and lead to non-normal distribution data. However, it has been noted whether normality assumption is appropriate for small sample size data and find the practical applications. As further study, the authors of basic econometrics books may develop some test to do so or conclude across situation where the normality assumption may be inappropriate (Gujarati, 2004). Thus, the empirical result of normality assumption of this study may be considered for the econometricians to have further study in order to guide the other researchers in dealing with small sample size data. Graphs and tables of Jarque-Bera results are as follows:
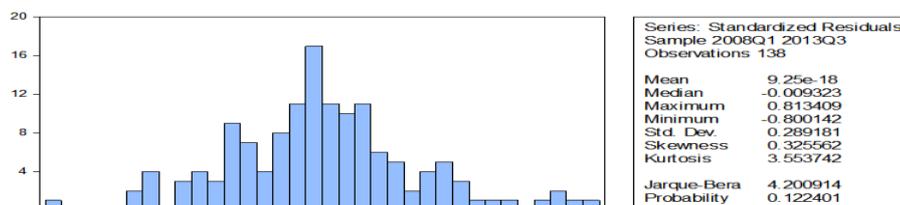
Figure-1.1. Jarque-Bera results for Conventional Banks

Source: Eviews7
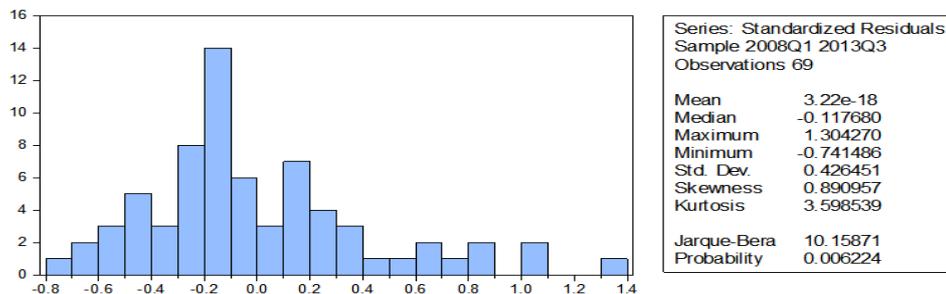
Figure-1.2. Jarque-Bera results for Islamic Banks

Source: Eviews7

4.2.2. Multicollinearity Test

Table 4 and table 5 explain matrix correlation of Conventional and Islamic banks in Indonesia. Explanatory variables may explain the effect of dependent variable when they have no correlations among independent variables. Strong associatio exist when the score of matrix $\geq$ 80% (0.80). Briefly, both tables below show no multicollinearity problem among independent variables. Thus, all the independent variables utilize in this research.

Table-4. Matrix Correlation of Conventional Banks

Independent Variable	LDR	CAR	SIZE	OER	GDP_GR	INF
LDR	1.0000					
CAR	-0.2138	1.0000				
SIZE	-0.0852	-0.6192	1.0000			
OER	0.0509	0.2773	-0.5109	1.0000		
GDP_GROWTH	0.0372	-0.2740	0.6591	-0.3775	1.0000	
INFLATION	0.0664	0.2768	-0.3528	0.2289	-0.3935	1.0000

Source: Eviews7

Table-5. Matrix Correlation of Islamic Banks

Independent Variable	FDR	CAR	SIZE	OER	GDP_GR	INF
FDR	1.0000					
CAR	0.1232	1.0000				
SIZE	-0.5167	-0.1471	1.0000			
OER	0.1054	-0.2556	-0.2343	1.0000		
GDP_GROWTH	-0.0664	0.1072	0.4707	-0.0219	1.0000	
INFLATION	0.1604	0.1071	-0.2088	-0.1833	-0.3935	1.0000

Source: Eviews7

4.2.3. Autocorrelation Test

Durbin-Watson test and the empirical results is explained by the score of D-W through D-W table in 5% significance level. D-W score of Conventional and Islamic banks are as follows:

Table-6. Durbin Watson d Test

Banks	D-W Score
Conventional Banks	1.9877
Islamic Banks	1.5413

Source: EViews7

Both, conventional and Islamic banks have 6 independent variables with 138 observations of CBs and 69 IBs. Conventional banks in the 150th observations show the score of dl and du is between 1.651-1.817. Islamic banks in the 70th obervations, show the score of dl and du is between 1.433 and 1.802. As further explanation please refer to figure 1.3 and figure 1.4 below:
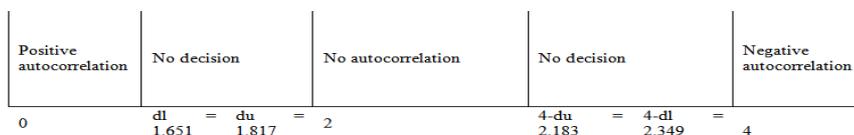
Figure-1.3. Durbin-Watson score of CBs

Source: adjusted by researchers
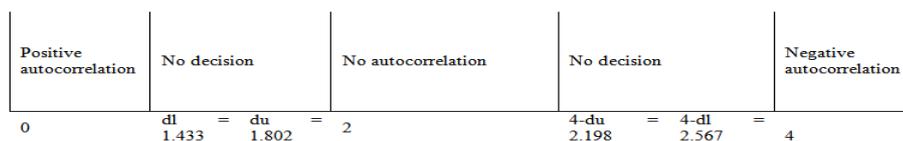
Figure-1.4. Durbin-Watson score of IBs

Source: adjusted by researchers

Hence, it proves no autocorrelation problem in the Conventional banks since the score is 1,9877, whereas indecisive of positive autocorrelation for Islamic banks since the score is 1.5413. However, panel least square is being continued since the research based on secondary data prepared by the central bank of Indonesia and it should not rise a big deal with it.

4.2.4. Heteroscedasticity Test

Based on the results of table 7, white test is tested during the regression process by ticking the heteroscedasticity test. Thus, the heteroscedasticity problem is solved directly during its process.

Table-7. White Test

Conventional Banks	Islamic Banks
Dependent Variable: ROA	Dependent Variable: ROA
Method: Panel Least Squares	Method: Panel Least Squares
Cross-sections included: 6	Cross-sections included: 3
White cross-section standard errors & covariance (d.f. corrected)	White cross-section standard errors & covariance (d.f. corrected)

Source: EViews7

4.3. Non-Parametric Approach DEA (Data Envelopment Analysis)

The banks are categorized as efficient bank when the outputs to inputs ratio equals to one based on DEA. It reveals well maintenance in using the inputs to optimize the outputs. The value of fully efficient bank is one; otherwise, the bank is categorized as inefficient when the value is

between zero and one. The results of Conventional and Islamic banks from January 2008 until September 2013 by quarterly data will be explained as follows:

Table-8. DEA of Conventional Banks

Time	Bank Ekonomi Raharja		Bank Artha Graha International		Bank ICBC Indonesia		Bank Mayapada		Bank Sinarmas		Bank Mestika Dharma	
	CRS	VRS	CRS	VRS	CRS	VRS	CRS	VRS	CRS	VRS	CRS	VRS
Mar-08	1.000	1.000	0.998	1.000	0.684	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Jun-08	1.000	1.000	1.000	1.000	0.705	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Sep-08	1.000	1.000	0.988	1.000	0.892	1.000	1.000	1.000	0.952	1.000	1.000	1.000
Dec-08	1.000	1.000	1.000	1.000	0.919	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Mar-09	0.998	1.000	0.977	0.996	1.000	1.000	0.875	0.930	0.885	0.904	1.000	1.000
Jun-09	0.961	0.983	0.978	1.000	0.955	0.960	0.938	0.955	0.861	0.892	1.000	1.000
Sep-09	0.988	1.000	0.980	1.000	0.996	1.000	0.952	0.968	0.939	0.944	0.991	0.993
Dec-09	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Mar-10	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.997	1.000
Jun-10	1.000	1.000	0.984	0.987	1.000	1.000	0.999	1.000	1.000	1.000	0.989	1.000
Sep-10	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Dec-10	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.975	1.000
Mar-11	1.000	1.000	1.000	1.000	0.859	1.000	0.951	1.000	1.000	1.000	0.821	1.000
Jun-11	1.000	1.000	0.996	1.000	1.000	1.000	0.967	1.000	1.000	1.000	0.770	1.000
Sep-11	1.000	1.000	0.999	1.000	0.915	1.000	0.935	0.999	1.000	1.000	0.814	1.000
Dec-11	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.941	1.000
Mar-12	1.000	1.000	1.000	1.000	1.000	1.000	0.934	0.993	1.000	1.000	1.000	1.000
Jun-12	0.964	1.000	0.985	0.999	0.971	0.983	0.952	0.995	1.000	1.000	0.993	1.000
Sep-12	0.948	0.956	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Dec-12	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Mar-13	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Jun-13	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Sep-13	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Source: Data Envelopment Analysis, proceed data

Table-9. DEA of Islamic Banks

Time	Bank Muamalat Indonesia		Bank SyariahMandiri		Bank Mega Syariah	
	CRS	VRS	CRS	VRS	CRS	VRS
Mar-08	1.000	1.000	0.979	1.000	1.000	1.000
Jun-08	0.971	1.000	1.000	1.000	0.931	1.000
Sep-08	1.000	1.000	1.000	1.000	1.000	1.000
Dec-08	1.000	1.000	1.000	1.000	1.000	1.000
Mar-09	1.000	1.000	1.000	1.000	1.000	1.000
Jun-09	0.877	0.889	1.000	1.000	0.873	0.982
Sep-09	0.886	0.956	1.000	1.000	0.970	1.000
Dec-09	0.904	1.000	1.000	1.000	0.981	1.000
Mar-10	1.000	1.000	1.000	1.000	0.915	1.000
Jun-10	1.000	1.000	0.997	1.000	0.909	1.000
Sep-10	0.935	1.000	1.000	1.000	0.858	1.000
Dec-10	0.909	1.000	0.978	1.000	0.817	1.000
Mar-11	1.000	1.000	1.000	1.000	1.000	1.000
Jun-11	1.000	1.000	0.995	1.000	1.000	1.000
Sep-11	1.000	1.000	1.000	1.000	0.995	1.000
Dec-11	1.000	1.000	1.000	1.000	1.000	1.000
Mar-12	1.000	1.000	0.996	1.000	0.864	0.984
Jun-12	0.978	0.982	1.000	1.000	0.884	0.991
Sep-12	0.985	0.992	1.000	1.000	0.846	1.000
Dec-12	1.000	1.000	1.000	1.000	0.947	1.000
Mar-13	1.000	1.000	1.000	1.000	1.000	1.000
Jun-13	1.000	1.000	0.993	1.000	1.000	1.000
Sep-13	1.000	1.000	0.969	1.000	1.000	1.000

Source: Data Envelopment Analysis, proceed data

It shows that there are some periods where the banks are not fully efficient with the value lower than one. Bank Ekonomi Raharja shows 5 and 2 inefficient, Bank Artha Graha International shows 9 and 3 inefficient, Bank ICBC Indonesia shows 9 and 2 inefficient, Bank Mayapada shows 9 and 6 inefficient, Bank Sinarmas shows 4 and 3 inefficient, Bank Mestika Dharma shows 9 and 1 inefficient, based on CRS and VRS assumptions respectively. On the other hand, the Islamic banks also indicate not fully efficient in some periods. Bank Muamalat Indonesia shows 8 and 4 inefficient, Bank Syariah Mandiri shows 7 inefficient and Bank Mega Syariah shows 13 and 3 inefficient, based on CRS and VRS assumptions. Bank Syariah Mandiri is fully efficient based on VRS assumption Both, Conventional and Islamic banks could operate efficiently since the efficiency score is equal to 1. However, there are some periods dealing with inefficiency with efficiency score is less than 1. Bank efficiency in optimum scale (CRS) is noteworthy that the

process of resource utilization in the aforementioned frontier banks is functioning well and featuring no waste of resources (Gulati, 2011). Vice versa, the bank won't be efficient in optimum scale when they waste some resources and not functioning well. VRS assumption isn't fulfilled when the managers of bank are not able to use the firms' given resources, namely manager inefficiency (Karimzadeh, 2012).

5. CONCLUSIONS

In this research, we examined the issue of bank efficiency with two approaches in examining bank efficiency. The first is the determinants of Return on Assets (ROA) using panel regression method (cross-sectional time-series) by fixed effect model and the second is measuring bank efficiency using non-parametric approach Data Envelopment Analysis (DEA). The findings reveal that there are significant effect of Loan to Deposit Ratio (LDR), Operational Efficiency Ratio (OER), and GDP growth rate to ROA and there are no significant effects of Capital Adequacy Ratio (CAR), Size, and inflation rate in the Conventional banks in Indonesia. On the other hand, all the independent variables have significant effect to ROA except Financing to Deposit Ratio (FDR) in the Islamic banks in Indonesia. GDP growth rate is the highest coefficient among the determinant variables used in this research that affect ROA of both Conventional and Islamic banks and the weakest coefficient that affect ROA is CAR in the Conventional banks and FDR in the Islamic banks. In term of non-parametric approach DEA, it reveals that Conventional and Islamic banks are efficient in most of periods of the research, both based on CRS and VRS assumption. However, most of the banks are also dealing with bank inefficiency that caused of not-well function of banks and wasting some resources (CRS assumption) as well as manager inefficiency since the managers of banks is not able to use the firms' given resources (VRS assumption). The scope of this study is a comparison study between Conventional and Islamic banks in Indonesia with the average total assets 6 to 40 million IDR. The researchers bound the study based on the total assets which is comparable in order to have "apple to apple" comparison. Three full-fledged Islamic banks in this study utilized as the sample since there are only 3 Islamic banks (during the period of study) offering foreign transactions and it assumes could represent the whole Islamic Commercial Banks, Islamic Business Unit and Islamic Rural Banks.

REFERENCES

Al-Qudah, A.M. and M.A. Jaradat, 2013. The impact of macroeconomic variables and banks characteristics on Jordanian islamic banks profitability: Empirical evidence. International Business Research, 6(10): 153-162.

Athanasoglou, P.P., S.N. Brissimis and M.D. Delis, 2005. Bank-specific, industry specific and macroeconomic determinants of bank profitability. Working Paper No. 25: 5-35.

Bader, M.K., S. Mohamad and T. Hassan, 2008. Cost, revenue, and profit efficiency of islamic versus conventional banks: International evidence using data envelopment analysis. Islamic Economic Studies, 15(2): 24-76.

Bilal, M., A. Saeed, A.A. Gull and T. Akram, 2013. Influence of bank specific and macroeconomic factors on profitability of commercial banks: A case study of Pakistan. Research Journal of Finance and Accounting, 4(2): 117-126.

Endri, 2011. Determinan efisiensi perbankan nasional: Aplikasi two-stage data envelopment analysis. Akuntabilitas, 1(1): 93-10.

Firdaus, M.F. and M.N. Hosen, 2013. Efficiency of syariah commercial banks using two-stage data envelopment analysis approach. Buletin Ekonomi Moneter dan Perbankan, 16(2): 167-188.

Greuning, H.V. and Z. Iqbal, 2008. Risk analysis for islamic banks. Washington DC: The World Bank.

Gujarati, D.N., 2004. Basic econometrics. 4th Edn., New York City: The McGraw−Hill Companies.

Gulati, R., 2011. Evaluation of technical, pure technical and scale efficiencies of Indian banks: An analysis from cross-sectional perspective. The 13th Annual Conference on Money and Finance in the Indian Economy. Mumbai: Indira Gandhi Institute of Development Research. pp: 1-31.

Haron, S., 1997. Islamic banking: Rules & regulations. Selangor Darul Ehsan: Pelanduk Publications (M) Sdn Bhd.

Haron, S., 2004. Determinants of islamic bank profitability. Global Journal of Finance and Economics. USA, 1(1): 1-22.

Hesti, D.A., 2010. Analisis pengaruh ukuran perusahaan, kecukupan modal, kualitas aktiva produktif (KAP), dan likuiditas terhadap kinerja keuangan. Semarang: Universitas Diponegoro.

Indonesia, B., 2013. Indonesian banking statistics. Jakarta: Bank Indonesia.

Johnson, R.R., 2003. Running a simple regression. Available from http://trenkler.vwl.uni-mannheim.de/fileadmin/user_upload/trenkler/lehre/ts/EViewsGuide.pdf [Accessed April 30, 2014].

Karimzadeh, M., 2012. Efficiency analysis by using data envelop analysis model: Evidence from Indian banks. International Journal of Latest Trends in Finance & Economic Sciences, 2(3): 228-237.

Kasbal, S.W., 2012. Analisis pengaruh capital adequacy ratio (CAR), non performing loan (NPL), loan to deposit ratio (LDR), net interest margin (NIM) dan rasio beban operasional terhadap pendapatan operasional (BOPO) terhadap profitabilitas pada perusahaan perbankan di Indonesia. Makassar: Universitas Hasanuddin.

Khir, M.K., L. Gupta and B. Shanmugam, 2008. Islamic banking: A practical perspective. Selangor: Pearson Malaysia Sdn. Bhd.

Mirzaei, A. and Z. Mirzaei, 2011. Bank-specific and macroeconomics determinants of profitability in Middle Eastern banking. Iranian Economic Review, 15(29): 101-128.

Noor, V.S., 2013. Comparison analysis of efficiency in the islamic and conventional banks using data envelopment analysis (DEA) method. Jakarta: Universitas Islam Negeri Syarif Hidayatullah.

Pratiwi, D.D., 2012. Pengaruh CAR, BOPO, NPF, dan FDR terhadap return on asset (ROA) bank Umum Syariah. Semarang: Universitas Diponegoro.

Purwana, E.G., 2009. Analisis pengaruh capital adequacy ratio (CAR), loan to deposit ratio (LDR), size, BOPO terhadap profitabilitas. Semarang: Universitas Diponegoro.

Rachdi, H., 2013. What determines the profitability of banks during and before the international financial crisis? Evidence from Tunisia. International Journal of Economics, Finance and Management, 2(4): 330-337.

Rasyid, S.W., 2012. Analisis pengaruh loan to deposit ratio (LDR), net interest margin (NIM) dan efisiensi terhadap return on assets (ROA) bank Umum Indonesia. Makassar: Universitas Hasanuddin.

Rivai, V., A.P. Veithzal and F.N. Idroes, 2007. Bank and financial institution management conventional and sharia system. Jakarta: PT Rajagrafindo Persada.

Ruslim, 2012. Analisis pengaruh capital adequacy ratio (CAR), non performing loan (NPL), dan loan to deposit ratio (LDR) terhadap return on assets (ROA) pada bank Umum Syariah yang terdaftar di bank Indonesia. Makassar: Universitas Hasanuddin.

Sartika, D., 2012. Analisis pengaruh ukuran perusahaan, kecukupan modal, kualitas aktiva produktif dan likuiditas terhadap return on assets (ROA). Makassar: Universitas Hasanuddin.

Sastrosuwito, S. and Y. Suzuki, 2012. The determinants of post-crisis Indonesian banking system profitability. Economic and Finance Review, 1(11): 48-57.

Schwert, G.W., 2010. Descriptive statistics. Available from EViews 7 User's Guide I: http://schwert.ssb.rochester.edu/a425/EV72.pdf [Accessed April 29, 2014].

Setiawan, A., 2013. Comparison analysis of efficiency in the conventional and islamic banks using data envelopment analysis (DEA) method during 2008-2012. Jakarta: Universitas Islam Negeri Syarif Hidayatullah.

Setiawan, C., 2012. Non-performing loans and bank efficiency of conventional and islamic banks in OIC countries. Selangor: Universiti Putra Malaysia.

Setiawan, C. and M.E. Putri, 2013. Non-performing financing and bank efficiency of islamic banks in Indonesia. Journal of Islamic Finance and Business Research, 2(1): 58-76.

Stiawan, A., 2009. Analisis pengaruh faktor makroekonomi, pangsa pasar dan karakteristik bank terhadap profitabilitas bank Syariah. Semarang: Universitas Diponegoro.

Sufian, F., 2011. Profitability of the Korean banking sector: Panel evidence on bank-specific and macroeconomic determinants. Journal of Economics and Management, 7(1): 43-72.

Wooldridge, J.M., 2013. Econometric analysis of cross section and panel data. London: Cambridge Massachusetts: The MIT Press.

Zeitun, R., 2012. Determinants of islamic and conventional banks performance in GCC countries using panel data analysis. Global Economy and Finance Journal, 5(1): 53-72.

Zhu, J., 2009. Quantitative models for performance evaluation and benchmarking data envelopment analysis with spreadsheets. USA: Springer.