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An Efficiency Determinant of Banking Industry in Indonesia

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ABSTRACT

The Objective of this study is to estimate the factors influencing the level of technical efficiency of banks as measured by a non-parametric Data Envelopment Analysis (DEA). This study applies to panel data regression models with random effects approach to 110 conventional bank over 2006-2010. Based on estimation of the determinants of bank efficiency levels, it can be informed that bank size factors, types of banks, capital adequacy ratio, loans deposit ratio, operating expenses and net interest margin affect the level of technica lefficiency significantly. This study has implications both theoretically and managerially. Theoretical implications for this research provide an important contribution to the development of the theory of efficiency and financial performance. Finnaly the managerial implications of this research have the consequences of improving the especially for the domestic banks.

Keywords: Technica lEfficiency, Data Envelopment Analysis, Panel data regression model

1. Introduction

Phenomenon draws related to banking industry condition of Indonesia which expresses indisposed profitability performance and operational efficiency and with continuation (sustainable). This thing there because of among others by weakening of productive asset structure of banks, earnings of banking which partly comes from traditional activity which fluktuatif and the low of asset ratio per client which makes banking operating expenses of Indonesia relatively high compared to other nations. Beside that, most of bank especially domestic bank do not maximize earnings of fee itsthe income base.

Berger and Mester (1997), tell that efficiency for a banking industry as a whole represents most important variable paid attention to to realize a healthy finance performance and with continuation (sustainable). Wheelock and Wilson (2001) note that efficiency is important size of bank operational condition and represents one of successful indicator of a bank in is individual after comparing to all banking industry.

Banking industry efficiency level can be evaluated from the aspect of macro or micro approach. From perspective of micro, in emulation which increasingly tight a bank so that can stay and develops must efficient in activity of itsthe operating. Inefficient bank will difficulty keep up faithfulness of its(the client as well as is not enthused by candidate of client for the agenda of to enlarge itsthe customer-base.

In macro perspective, efficient banking industry can affect expense of monetary intermediation and as a whole financial system stability. With higher level efficiency level, banking performance increasingly better in monetary resource allocation, and in the end can increase invesment activity and economic growth (Weill, 2003).

Many empirical studies of good banking industry efficiency used approach of parametrik or non-parametrik have experienced mushroom growth. Bank efficiency study uses approach of parametrik among others performed by: Altunbas et al. (2001), Bikker and Hu (2002), De Guevara and Maudos (2002). While study with approach of non-parametrik, among others performed by; Lozano-Vivas et al. (2001, 2002), Casu and Molyneux (2003).

Literature study related to factors which affects banking efficiency gives result of empiric which still contradiction with various the factor identified, between it: size of bank (bank size), capital, and risk, but most of proving positive relation. Study which notes relation which are positive significant, for example; Ataul lah at.al.,

2004; Chen et.al., 2005, while the other study shows relation of significant negativity (for example; Girardone et.al, 2004; Isik & Hassan, 2002).

While study relation between bank efficiency and capital level still mixed, some studies shows big capital ratio found more efficient (see; Carvallo & Kasman, 2005; Casu & Girardone, 2004; Chang & Chiu, 2006), however some of the the other studies shows relation of negativity (Altunbas et al., 2001; Freixas and Rochet, 1997).

2. Purpose of Research

Based on above mentioned background, then this research which aim to wish to be produced in this research is: "To analyse the factors which affects to technical efficiency level of banking industry in Indonesia"

3. Literature Review and Previous Research

3.1 The Efficiency theory

In general, meaning of efficiency of a production unit or service refers to comparison between input and output which is used in goods production process or service. Banking efficiency represents one of important indicator in value of the best performance a bank. A bank with maximum efficiency performance estimated able to implement banking intermediation function in an optimal fashion and is able to increase value of company (value of the firm).

Farrell (1957) express that efficiency of a company consists of two components, that is technical efficiency and efficiency alokatif. Technical efficiency expresses ability of company in optimizing available input usage, with its(the structure of price and production technology. While efficiency alokatif there defined as capacities of a company to choose input combination and output which minimizes expense of or maximizes profit. Combination from both sizes applicable to measure economic efficiency.

Kumbhakar and Lovell (2000) tell that technical efficiency represents one of economic efficiency component as a whole. However, for the agenda of reaching its(the economics efficiency a company must efficient technically. To reach maximum basic yield, a company must earn productive at optimal output level with certain input number (technical efficiency) and produce output with correct combination at certain price level (efficiency alokatif).

3.2 Data of Envelopment Analysis (DEA)

Method DEA is a method frontier non parametric which uses linear program model to calculate comparison of output ratio and input for all the unit compared to in a population. Intention of method DEA is to measure efficiency level from decision-making unit relatively to bank which a kind of when all units at or under efficient "curve" of itsthe frontier. So this method used to evaluate relative efficiency of some objects (performance benchmarking)

Approach of DEA more emphasizes to approach with orientation to duty and more focuses to important duty, that is performance evaluation DMU. Analysis which is performed based on to evaluation to relative efficiency from DMU proportionate. The next DMU-DMU the efficient will form line frontier.

If DMU at line frontier, then the DMU can be told efficient relatively compared to the other DMU in peer its(the group. Besides producing value of efficiency each DMU, DEA also shows the units which becomes reference for inefficient units.

$$DMU = \frac{\sum_{k=1}^{p} \mu_k \, y_{k0}}{\sum_{i=1}^{m} v_i x_{i0}} \qquad (1)$$

Where; DMU = UPK; n = UPK to be evaluated; m = different inputs; p = different output; x_{ij} = input number I which is consumed by UPKJ; y_{kj} = number of output k which is produced by UPK_J.

3.3 Banking Efficiency Study

Hadad et al (2003a), perform research at national public bank during period 1995-2003 with approach of DEA. There are three important points from result of its(the research are; firstly, credit related to bank and marketable securities has very high development?expansion potency to increase efficiency as a whole; second, merger from

bank do not forever make bank becomes more efficient; and third, group of private national bank non-devisa can be told representing most efficient during 3 years (2001-2003) in analysis epoch of 8 years (1996-2003) compared to itsthe lai banks. Mixture foreign bank for a while become most efficient the year 1997, while foreign exchange private national bank in the year 1998 and 1999.

Hadad et.al (2003b), perform research to 167 public banks during January period 1995-Juni 2003 using method parametrik with approach of stochastic frontier Approach (SFA) and Distribution Free Approach (DFA). Result of research indicates that efficiency score DFA more various compared to efficiency score SFA, if it used data of monthly and annual data which merges all bank. However, most efficient banks which is produced with using both methods are equal. Therefore calculation of by using DFA and SFA if using observation of all bank produced consistent values.

Astiyah and Husman (2006) perform research to analyse banking efficiency level in Indonesia by using derivative of function of profit. Measurement of profit efficiency in study includes model with emphasis of intermediation function and without any emphasis of intermediation function. Psychometry estimation uses method SFA with data of monthly during period 2001-2004 to 20 banks with the biggest asset. Result of research shows in average value of efficiency with intermediation emphasis model lower than model without any intermediation penekakan. Average of efficiency during research period of by using model non-intermediasi is 92,4 % there compared to 91,4 % with intermediation emphasis model.

Ariff, and Can (2008), perform research of efficiency expense of and profit in 28 commercial banks in Chinese uses technical non-parametrik period 1995-2004. This researchs tests type influence ownership of, size, risk profile, profitability and change of local of core to bank efficiency. Result of research indicates that efficiency level profit lower than efficiency expense of. In increasing efficiency, this research gives some proposals for example; quicken openness reform of banking market, improve;repair risk management, lessen government capital subsidy and propagates ownership of banks Chinese.

3.4 Banking Efficiency Determinant Study

Study which is performed by Ramli (2005), Ascarya and Yumanita (2005), Heralina (2007) and Mediadianto (2007) its the results indicates that size of bank which is proxy with asset total which is owned by bank has influence which are positive and significant. Hauner (2005) give two correct explanations why size of bank has positive influence to bank efficiency level. Firstly, big bank has the power of stronger market therefore expense of to input it lower. Second, wholesale banking with production scale increasing returns to scale passes cost allocation still to higher level service volume or profit of efficiency from better labour specialization.

Study Jemric and Vujcic (2002) express that foreign bank significantly more efficient of at domestic bank. The same conclusion also happened in bank in Polandia (Kishan and Opiela (2000), Havrylchyk (2006)) and bank in Hungaria (Hasan and Marton, 2003). Bhattacharyya et al (1997) also prove that foreign bank more efficient from Government bank. Matthews and Ismail (2006) express that foreign banks in Malaysia shows higher level technical efficiency level.

Weill (2003) in its research also proves that foreign bank in Polandia and Cekoslowakia has efficiency is larger because of foreign bank more superior in cultural practice corporate governance and higher level skill. Be differ with research before Sathye, (2001) what found that domestic bank more efficiency from foreign bank in Australian banking.

Study Estrada et.al., (2006) and Gelos, (2006) indicate that bank which more efficient tends to to have NIM low. Result of research of related to CAR, Ramli, (2005) and Mediadianto, (2007) prove that CAR has significant and positive influence to bank efficiency.

Relate to ratio NPL in general found by positive relation with un-efficiency of bank. Bank with big risk charge (shown by height of ratio NPL) tend to inefficient. Result of this study presented by, Carvallo and Kasman, (2005); Casu, et.al, (2004). Banks with higher level efficiency level performs better credit risk evaluation (Berger and Deyoung, (1997); and Altunbas, et.al. (1999). McAllister and Mcmanus, (1993) note that wholesale banking follows business strategy in risk management through larger expenditure to labour to observe risk of high loan and interest rate for risk compensation fails to payee from bank creditor.

4. Research Hypothesis

Asset Total Relation (SIZE) with Efficiency Level, Berger et al. (1993) find that efficiency correlates positively of the size bank where king sized bank more efficient compared to small bank.

H1 : Total of Asset which is owned by Bank has significant and positive influence to Efficiency Level.

Analysis to bank group, especially between domestic foreign bank and bank will give value of different efficiency. Study Bhattacharyya et.al. (1997) use stochastic frontier analysis proves that foreign bank more efficient from Government bank. Ismail (2005) express that foreign banks in Malaysia shows higher level technical efficiency level.

H2 : Bank Type have significant and positive influence to Efficiency Level

Sufficiency Ratio of Capital (CAR) can be proxy with equity ratio to asset total which shows strength of capital or banking health measurement. Bank with ratio CAR high tends to more efficient and profits. Kaparakis et.al., (2004) and Elyasani et.al., (1994) note positive relation between ratio CAR with efficiency. Master of Law (1996) and Girardone et.al. (2004) find relation of negativity between ratio CAR with un-efficiency.

H3 : Ratio CAR which is owned by Bank has significant and positive influence to Efficiency Level.

Credit ratio to third party fund total (loans to deposit ratio) represent the ratio which is used to measure banking intermediation function performance which is placed in form of credit. Ratio excelsior LDR shows more and more the fund channelled to defrayal of credit. Channeling of ever greater credit caused increasingly its efficient bank in operational activity therefore capital charges which is accounted by creditor increasingly low.

H4 : Ratio LDR which is owned by Bank has significant and positive influence to Efficiency Level.

Some of the empirical studies indicates that bank which more efficient has level NPL low (Berger and Mester, 1997). Studies Kwan and Eisenbeis (1996) also note that inefficient bank represents bank with level NPL high.

H5 : NPL which is owned by Bank has significant and negative influence to Efficiency Level.

Total cost ratio to asset total applicable to analyse relation between bank charges and efficiency. Study Berger and Mester (1997), and Bauer et al. (1998) show negative relation between bank efficiency with total cost.

H6 : Operating expenses which is owned by Bank has significant and negative influence to Efficiency Level.

Ratio NIM shows difference between rate of interest level with fund rate of interest. Study Estrada et al. (2006) and Gelos (2006) indicate that bank which more efficient tends to to have NIM low.

H7 : Ratio Net Interest Margin (NIM) owned by Bank has significant and negative influence to Efficiency Level.

5. Population and Research Sample

In all these research of conventional public bank (commercial bank) what operates in Indonesia the year 2006-2010 made by research sample or often conceived as saturated sample. As for reason all populations there made research sample is because of characteristic each different bank group.

6. Variable Operational Definition

Total of Asset (SIZE) which is intended in this research represents total of asset which is owned by each bank at specified period.

Bank Type which is intended in research represents subdividing of bank which is bases its(the kepemiliki as dummy variable the consists of domestic bank as excluded group with notation (0) and foreign bank as included group with notation (1).

Sufficiency Ratio of Capital (Capital Adequacy Ratio/CAR) which is intended in this research represents size of banking health measurement which is measured by through comparison between capital with asset there deliberated according to its risking (ATMR)

$$\text{CAR} = \frac{\text{Bank Capital}}{\text{Total ATMR}}$$

Healthy bank if having CAR/KPPM not less than 8% (Circular letter of Bank Indonesia Number 3/30/DPNP date of 14 December 2001)

Loan to deposit ratio (LDR) in research is size of banking health measurement which is measured by through comparison or ratio between channeling of fund in form of credit (execution of function of channeling of fund) to third party fund (DPK) success mustered by banking (execution of fund gathering intermediation function).

$$\text{LDR} = \frac{\text{Total Credit}}{\text{Total DPK}}$$

Based on Bank Indonesia Circular letter No.3 / 30 / DPNP tgl 14 December 2001, a bank there assumed healthy if having LDR between 85 s.d. 110 %.

Non Performing Loans (NPL) in research is ratio to measure the banking health measurement which is measured by through policy performance of bank management in managing its productive asset with holding carefulness ground

$$\text{NPL} = \frac{\text{Total Credit Bermasalah}}{\text{Total Credit}}$$

Non-performing Loan (NPL) healthy bank if the bank has NPL at the most 5%, Indonesia Bank rules Number 6/10/PBI/2004 date of 12 April 2004 about Assessment System of Common Banking health measurement. NPL high causes lowering of profit to be received by bank.

Operating expenses (Cost) which is intended in this research is ratio to measure bank efficiency level by comparing total cost ratio with asset total.

Net Interest Margin (NIM) which is intended in this research is ratio to measure the banking health measurement which is measured by through calculation of loan rate of interest difference with fund rate of interest.

Efficiency which dimasud is ability of company utilizes input to produce output in an optimal fashion. Bank as financial institution which executes intermediation function, related to ability of banking to optimize a number of the funds obtained from public, then there channelled to the doers of economics which needs.

7. Data Panel Regression Model

Data of panel is aliance between data of runtut time (time series) and data of cross (bawah). Data of runtut when usualy covers one object / individual (for example; inflation, interest rate, unemployment level and rate of exchange), but cover some periods (annual). Data of cross consists of to some or many objects, often referred by responder (for example company of Banking) with a few data type (for example; Deposit interest Tribe Level) in a certain time period. Regression by using data of panel there referred data regression model of panel.

To estimate model parameter with data of panel, there are some of the the techniques offered, are:

1)Constant coefficient Between Time and Individual (Common Effect): Ordinary Least Square
2)Effect Model Still (Fixed Effect)
3)Effect Model Random (Random Effect)

Decision of usage of effect model still and or random effect determined with using the specification which is developed by Thirsty. This specification will give assessment of by using value of Chi Square Statistics therefore decision of choosing a model will be able to determined statistically.

8. Analysis of Research Finding

Based on test Thirst indicates that estimation to variables which affects technical efficiency level of conventional banking in research uses method random effect and result of data-processing empiric uses program Ekonometrika Eviews-6 shown in tables 1. Based on parsial test uses t-test, empirically of its(the result indicates that besides variable non-performing loans (NPL), the other variable, are: size of company (SIZE), bank type (TYPE), capital adequacy ratio (CAR), loans deposit ratio (LDR), expense of operasioanl (COST) and net margin interest (NIM) affect technical efficiency level in signifikaan with confidence level of equal to 95%. While based on entirety test uses uji-F with value of F-Statistic 14.89851 indicating that all independent variables joinly affects technical efficiency level with confidence level of equal to 99%.

For examination of goodness of fit which is measured with termination coefficient (R^2) show numeral of sufficiently small that is equal to 16%, its(the meaning that change variation of explainable technical efficiency level by all independent variable only 16%, while 84 % explained by other variable outside model. For accomodated termination coefficient (R^2 adjusted) show numeral equal to 15%, mean that on reflection degree of freedom, all variable indepeden in research admits of to explain change in technical efficiency level DEA equal to 15%.

Table 1. Efficiency Estimation and Factors which Its affecting Method Random Effect

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.369589	0.119749	-3.086375	0.0021
SIZE?	0.088228	0.017060	5.171572	0.0000
TYPE?	0.140664	0.031787	4.425154	0.0000
CAR?	0.000264	7.08E-05	3.734611	0.0002
LDR?	4.76E-05	2.26E-05	2.102629	0.0360
NPL?	0.002987	0.002943	1.014869	0.3106
COST?	-0.039539	0.016443	-2.404572	0.0165
NIM?	0.009902	0.004196	2.359947	0.0186

Weighted Statistics

R-squared	0.161367	Mean dependent var	0.463689
Adjusted R-squared	0.150536	S.D. dependent var	0.231050
S.E. of regression	0.212950	Sum squared resid	24.57855
F-statistic	14.89851	Durbin-Watson stat	2.302815
Prob(F-statistic)	0.000000		

Empirical finding of tables 1. explainable that variable SIZE, TYPE, CAR, LDR, and NIM affects significant and positively to technical efficiency level of national banking, and variable Cost affects significant and negatively to technical efficiency level of national banking. This finding in line with research hypothesis. While variable NPL affects positively but is not significant to technical efficiency level of national banking. This finding is differ with research hypothesis.

From seventh of independent variable which is used to estimate the factors which affects technical efficiency level of banking of konvesional, most dominant variable of its influence is bank type with regression coefficient 0,1407, while factor loans to deposit ratio (LDR) give smallest influence with regression coefficient 0,0001.

9. Discussion

Based on empirical finding indicates that besides factor non-performing loans (NPL), all the other factors, are: size of bank, bank type, capital adequacy ratio (CAR), loans deposit ratio (LDR), operating expenses and net margin interest (NIM) affect technical efficiency level of bank significantly. Between sixth of factors which affects technical efficiency level DEA national banking significantly, most dominant factor of its influence is bank type, where technical efficiency level of foreign bank better compared to domestic bank, while factor loans to deposit ratio (LDR) give smallest influence.

Empirical study of size of bank which is proxy with bank asset total to DEA in line with result of research of Ramli (2005) and Heralina (2006). For type bank to DEA in line with result of research of Havrylchyk (2006), Bhattacharya et.al (1997), Mathews & Ismail (2006), and Weill (2003). CAR to DEA in line with research hypothesis and research of Ramli (2005. Thens of LDR to DEA in line with result of research of Werdaningtyas (2002) and Usman (2003). The next Cost to DEA in line with result of research of Berger and de Young (1997). And NIM to DEA in line with result of research of Estrada et.al (2006) and Gelos (2006).

Of seven free variables to DEA there is one variable is differ with research hypothesis of that is NPL which influential is not significant to ROA. Result of this research also is differ with result of research of Carvalho and Kasman (2005) where bank which more efficient tends to to have low NIM.

This empiric study in general supports or strengthens result of former research, but there are still which contradiction, for the purpose it needs study further to minimize difference of the things. Important finding in study is bank type what represents variable most dominant of its(the influence good to conventional banking efficiency level, especially to foreign bank which operates in Indonesia.

10. Conclusion

In general empirical conclusion of result of research of internal factor determinant of company to technical efficiency level of bank which is measured with DEA in line with formulation of problem and purpose of research, by applicating data regression model of panel as follows:

1.Variable which most dominant affects technical efficiency level of banking of konvesional, it is bank type with regression coefficient 0,1407 or 14,07%. While feeblest of itsthe influence to technical efficiency level of banking is LDR with regression coefficient 0,0001 or 0,01%.

2.Independent variable of bank type prove that technical efficiency level which is measured with DEA foreign bank better compared to domestic bank with difference of 0,1407 or 14,07%. For the purpose domestic bank can make foreign bank as benchmarking in increasing itsthe efficiency level and profitability performance.

11. Suggestion and Recommendation for Future Research

1. This research can be developed further by adding factor makroekonomi and industry for independent variable in banking efficiency level estimation.

2. This research can be developed with using approach of parametrik, for example Stochastic Frontier Analysis (SFA), Major excellence of this approach is existence of possibility to measure efficiency expense of relatively to the best value from the best producer in sample by considering random errors (external factor) and technical inefisiensi (internal factor) which is calculated to separated, important for bank manager to improve;repair its(the operational efficiency.

3. This research can be developed with using data regression model of panel kointegrasi which considers that average (mean) and constant variant a spell of therefore result of itsthe estimating expected to becoming better.

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