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EFFICIENCY OF STATE-OWNED BANKS AND FOREIGN BANKS IN INDONESIA: STOCHASTIC FRONTIER ANALYSIS AND ANALYSIS OF VARIANCE

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ABSTRACT

The dominant role of banks in Indonesia makes bank should have a healthy financial performance. A way to maintain good financial performance by analyzing the level of efficiency so it can be seen how banks are efficient, healthy and able to survive in any economic conditions.

The purpose of this research is to analyze the efficiency level of state-owned banks and foreign banks in Indonesia in period between 2010-2014 based on three approaches; operational approach, intermediation approach and asset approach. The analytical method used are Stochastic Frontier Analysis (SFA) using production function and Analysis Of Variance (ANOVA). SFA method used to measure efficiency level and the result appears in numeric score 0-1 form. The closer the result with score 1 so the banks getting closer with the perfect efficiency level. One Way ANOVA is used to find out the difference of state-owned bank and foreign bank efficiency level in every approaches.

This research shows the results that efficiency level of state-owned banks and foreign banks in Indonesia is increasing in every period between 2010-2014 using operational approach, intermediation approach and asset approach. At operational approach, the average efficiency on state-owned banks are 0,97677198 and foreign banks are 0,78301436. At intermediation approach, the average efficiency on state-owned banks are 0,98241996 and foreign banks are 0,42062963. At asset approach, the average efficiency on state-owned banks are 0,322442 and foreign banks are 0,22159316. The results of hypothesis testing shows that there is significance difference in efficiency level of state-owned banks and foreign banks based on operational approach, intermediation approach and asset approach. Both state-owned banks and foreign banks have to increase the efficiency level on asset approach because it has the lowest values.

***Keywords** : Efficiency, Operational Approach, Intermediation Approach, Asset Approach, Stochastic Frontier Analysis (SFA), ANOVA.*

INTRODUCTION

Globalization and the implementation of ASEAN Economic Community causing the increase of banking competition in Indonesia. This research is using state-owned banks as the research object because apart from being the ruler of asset ownership, the shareholding mostly belonging to the Government of Indonesia so that state-owned banks have a responsibility to conduct its business as much as possible. The use of foreign banks as the research object not only because of the phenomena that stated foreign banks can help drive the economy Indonesia but also the shareholding that comes from overseas. So, it needs a research to determine the level of efficiency when foreign banks operating in Indonesia.

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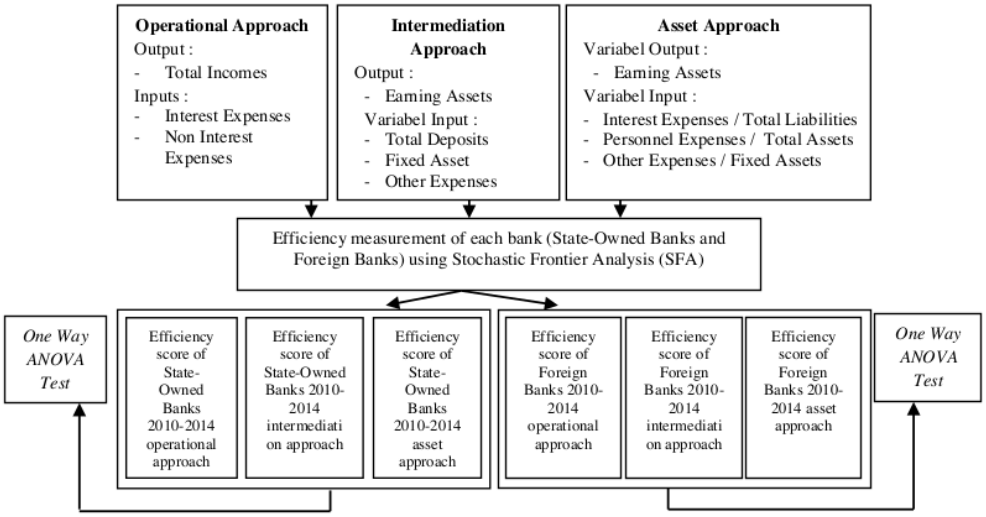
The dominant role of banks in Indonesia makes bank should have a healthy financial performance. A way to maintain good financial performance by analyzing the level of efficiency so it can be seen how banks are efficient, healthy and able to survive in any economic conditions. Efficiency can be defined as the ratio of output to input. That performance measures are expected to generate maximum output with existing input. When measuring efficiency, financial institutions are expected to exist in condition of how to get optimal output level with any input or by obtaining the minimum input level with a given level of output. Efficient banking condition is also characterized by improvement in the operations so that the bank is able to increase firm value.

In general, the researches about analyzation of bank efficiency in Indonesia are prefer to use the intermediation approach compared with other approaches. This research referring to research that has been done by Simanjuntak and Armanto (2010) concerning bank efficiency using three approaches; operational approach, the intermediation approach, and asset approach.

The purpose of this research is to analyze the efficiency level of state-owned banks and foreign banks in Indonesia in period between 2010-2014 based on three approaches; operational approach, intermediation approach and asset approach.

THEORITICAL FRAMEWORK

Picture 1
Theoritical Framework



Sources : Pusvitasari and Muharam (2007); Simanjuntak and Armanto (2010)

HYPOTHESIS

From Simanjuntak and Armanto (2010) rsearch results that used three approaches, can be concluded that there are differences in the efficiency score of each approach. The bank is relatively higher when using operational approach and intermediation approach, while the asset approach obtaining low efficiency score, both in state-owned banks and foreign banks. Therefore, the proporsed hypothesis is as follows :

H_1 : There are significant differences in the efficiency score of state-owned banks based on operational approach, the intermediation approach and asset approach

H_2 : There are significant differences in the efficiency score of foreign banks based on operational approach, the intermediation approach and asset approach

RESEARCH METHODOLOGY

Variables

Approaches	Variable	Scale
Operational	Total Incomes	Nominal
	Interest Expenses	Nominal
	Non Interest Espenses	Nominal
Intermediation	Earning Assets	Nominal
	Total Deposits	Nominal
	Fixed Assets	Nominal
	Other expenses	Nominal
Asset	Earning Assets	Nominal
	Interest Expenses/ Total Liabilities	Ratio
	Personnel Expenses/ Total Assets	Ratio
	Other Expenses/ Fixed Assets	Ratio

Samples

The population in this research are state-owned banks and foreign banks registered in Bank Indonesia. The sample determination in this research using purposive sampling technique; sampling conducted in accordance with the purpose of the research that has been determined. There are 14 state-owned banks and foreign banks which meet the criteria for purposive sampling. The type of data used is quantitative data. Source of data used is secondary data obtained from Laporan Publikasi Otoritas Jasa Keuangan.

Analysis Methods

The analysis technique used in this research are Stochastic Frontier Analysis (SFA) and Analysis Of Variance (ANOVA). SFA is used to measure the efficiency score of state-owned banks and foreign banks based operational approach, the intermediation approach and asset approach, with the production standard functions as follows:

1) Operational Approach

$$\ln(Q_1) = \beta_0 + \beta_1 \ln(K_1) + \beta_2 \ln(K_2) + (V_i - U_i)$$

Q_1 = total incomes
β = unknown parameter vector
K_1 = interest expenses
K_2 = non interest expenses
V_i = random factors can't be controlled which is assumed to iid $N(0,\sigma_V^2)$
U_i = random factors can be controlled (inefficiency) which is assumed to iid $|N(0,\sigma_U^2)|$.

2) Intermediation Approach

$$\ln(Q_1) = \beta_0 + \beta_1 \ln(K_1) + \beta_2 \ln(K_2) + \beta_3 \ln(K_3) + (V_i - U_i)$$

Q_1 = earning assets
β = unknown parameter vector
K_1 = total deposits
K_2 = fixed assets
K_3 = other expenses

V_i = random factors can't be controlled which is assumed to iid $N(0,\sigma_V^2)$
U_i = random factors can be controlled (inefficiency) which is assumed to iid $|N(0,\sigma_U^2)|$.

3) Asset Approach

$$\ln(Q_1) = \beta_0 + \beta_1\ln(K_1) + \beta_2\ln(K_2) + \beta_3\ln(K_3) + (V_i - U_i)$$

Dimana
Q_1 = earning assets
β = unknown parameter vector
K_1 = interest expenses divided by total liabilities
K_2 = personnel expenses divided by total assets
K_3 = other expenses divided by fixed assets
V_i = random factors can't be controlled which is assumed to iid $N(0,\sigma_V^2)$
U_i = random factors can be controlled (inefficiency) which is assumed to iid $|N(0,\sigma_U^2)|$.

ANOVA is used to test the hypothesis. This research focuses on the use of one-way ANOVA, which is used to test the significance of differences in the average count that only includes one classification. Classification referred to this research is the efficiency.

RESULTS AND DISCUSSION

Efficiency Score Results

Table 1
Efficiency Score of State-Owned Banks and Foreign Banks using Operational Approach

Year/ Bank	State-Owned Bank	Foreign Bank
Operational Approach		
2010	0.95098739	0.76827175
2011	0.96971445	0.77582104
2012	0.98141974	0.78319246
2013	0.98865129	0.79038572
2014	0.99308705	0.79740082
Averages	**0.97677198**	**0.78301436**

Source : Data processing using Frontier 4.1 c

Based on **Table 1**, state-owned banks have efficiency score 0,97677198, while foreign banks have efficiency score 0,78301436. Therefore, it can be concluded that in the opperational approach, state-owned banks have a higher efficiency score than foreign banks.

Table 2
Efficiency Score of State-Owned Banks and Foreign Banks using Intermediation Approach

Year/ Bank	State-Owned Bank	Foreign Bank
Intermediation Approach		
2010	0.97105216	0.39055090
2011	0.97834122	0.40553857
2012	0.98381325	0.42059366
2013	0.98791303	0.43568455
2014	0.99098013	0.45078046
Averages	**0.98241996**	**0.42062963**

Source : Data processing using Frontier 4.1 c

Based on **Table 2**, state-owned banks have efficiency score 0,98241996, while foreign banks have efficiency score 0,42062963. Therefore, it can be concluded that in the intermediation approach, state-owned banks have a higher efficiency score than foreign banks.

Table 3
Efficiency Score of State-Owned Banks and Foreign Banks using Asset Approach

Year/ Bank	State-Owned Bank	Foreign Bank
Asset Approach		
2010	0.23895437	0.20003413
2011	0.27875785	0.21041660
2012	0.32086353	0.22119616
2013	0.36455485	0.23237331
2014	0.40907941	0.24394561
Averages	**0.32244200**	**0.22159316**

Source : Data processing using Frontier 4.1 c

Based on **Table 3**, state-owned banks have efficiency score 0,32244200, while foreign banks have efficiency score 0,22159316. Therefore, it can be concluded that in the asset approach, state-owned banks have a higher efficiency score than foreign banks.

Discussion of Results

The results of efficiency score using Stochastic Frontier Analysis (SFA) shows that based on all approaches; operational approach, interermediation apporoach and asset approach, state-owned banks are more efficient than foreign banks because the efficiency score is higher than foreign banks in each period of the research. State-owned banks have been able to have efficiency scores until it reaches level 0.9 in the operational approach and the intermediation approach. However, the asset approach is still have very low efficiency score when compared to other approaches.

Foreign banks have the highest efficiency score in operational approach that reach 0,7. While in the intermediation approach and asset approach is still low at under 0.5. It can be concluded that both state-owned banks and foreign banks have the lowest efficiency value at the asset approach.

Hypothesis Test

Table 7
Results of ANOVA – State-Owned Banks

ANOVA

State-Owned Banks Efficiency

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	1.440	2	.720	441.696	.000
Within Groups	.020	12	.002		
Total	1.459	14			

Source : Data processing using SPSS 21

Based to **Table 7**, the significance level of the ANOVA table is 0.000 or below 0.05. It can be concluded that the **H_1 is received** or **there are significant differences in the efficiency score of state-owned banks based on operational approach, the intermediation approach and asset approach.**

Table 8
Results of Post Hoc Test – State-Owned Banks

Multiple Comparisons

Dependent Variable: State-Owned Banks Efficiency

	(I) Approaches	(J) Approaches	Mean Difference (I-J)	Std. Error	Sig.
Tukey HSD	Operational Approach	Intermediation Approach	-.00564797	.025531238	.973
		Asset Approach	.65432998*	.025531238	.000
	Intermediation Approach	Operational Approach	.00564797	.025531238	.973
		Asset Approach	.65997796*	.025531238	.000
	Asset Approach	Operational Approach	-.65432998*	.025531238	.000
		Intermediation Approach	-.65997796*	.025531238	.000
Bonferroni	Operational Approach	Intermediation Approach	-.00564797	.025531238	1.000
		Asset Approach	.65432998*	.025531238	.000
	Intermediation Approach	Operational Approach	.00564797	.025531238	1.000
		Asset Approach	.65997796*	.025531238	.000
	Asset Approach	Operational Approach	-.65432998*	.025531238	.000
		Intermediation Approach	-.65997796*	.025531238	.000

*. The mean difference is significant at the 0.05 level.

Source : Data processing using SPSS 21

Based on **Table 8**, it can be seen the difference of efficiency of state-owned banks between each approaches. The difference of efficiency score between operational approach and intermediation approach is 0.00564797, while difference of efficiency score between operational approach and asset approach is 0.65432998. The difference between the intermediation approach and asset approach is 0.65997796. It can be concluded that the biggest difference is between intermediation and asset approach that is equal to 0.65997796.

Table 9
Results of ANOVA – Foreign Banks

ANOVA

Foreign Banks Efficiency

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.810	2	.405	1214.016	.000
Within Groups	.004	12	.000		
Total	.814	14			

Source : Data processing using SPSS 21

Based to **Table 9**, the significance level of the ANOVA table is 0.000 or below 0.05. It can be concluded that the **H_2 is received** or **there are significant differences in the efficiency score of foreign banks based on operational approach, the intermediation approach and asset approach.**

Table 10
Results of Post Hoc Test – Foreign Banks
Multiple Comparisons

Dependent Variable: Foreign Banks Efficiency

	(I) Approaches	(J) Approaches	Mean Difference (I-J)	Std. Error	Sig.
Tukey HSD	Operational Approach	Intermediation Approach	.36238473*	.011553254	.000
		Asset Approach	.56142120*	.011553254	.000
	Intermediation Approach	Operational Approach	-.36238473*	.011553254	.000
		Asset Approach	.19903647*	.011553254	.000
	Asset Approach	Operational Approach	-.56142120*	.011553254	.000
		Intermediation Approach	-.19903647*	.011553254	.000
Bonferroni	Operational Approach	Intermediation Approach	.36238473*	.011553254	.000
		Asset Approach	.56142120*	.011553254	.000
	Intermediation Approach	Operational Approach	-.36238473*	.011553254	.000
		Asset Approach	.19903647*	.011553254	.000
	Asset Approach	Operational Approach	-.56142120*	.011553254	.000
		Intermediation Approach	-.19903647*	.011553254	.000

*. The man difference is significant at the 0.05 level.

Source : Data processing using SPSS 21

Based on **Table 10**, it can be seen the difference of efficiency of foreign banks between each approaches. The difference of efficiency score between operational approach and intermediation approach is 0,36238473, while difference of efficiency score between operational approach and asset approach is 0,56142120. The difference between the intermediation approach and asset approach is 0,19903647. It can be concluded that the biggest difference is between operational and asset approach that is equal to 0,56142120.

CONCLUSION AND LIMITATION

From the results of this research with the title "Efficiency of State-Owned Banks and Foreign Banks in Indonesia: Stochastic Frontier Analysis and Analysis of Variance", it can be concluded as follows:

1. The results shows that state-owned banks are more efficient than foreign banks on operational approach, intermediation approach and asset approach. This research results is consistent with the researches conducted by Tahir and Haron (2008); Tahir, Mazlina and Haron (2009); San, Theng and Hen (2011).
2. The results shows that the lowest efficiency score both state-owned banks and foreign banks is on asset approach. The efficiency score is still below 0,5 so that needed more attention especially for state-owned banks, foreign banks and regulator in order to increase the score.
3. The results shows that there are significant differences in the efficiency score of state-owned banks based on operational approach, the intermediation approach and asset approach. The biggest difference occurred between the intermediation approach and asset approach which indicates that state-owned banks have the highest efficiency score in the intermediation approach and the lowest efficiency score in the asset approach.
4. The results shows that there are significant differences in the efficiency score of foreign banks based on operational approach, the intermediation approach and asset approach. The biggest difference occurred between the operational approach and asset approach which indicates that foreign banks have the highest

efficiency score in the operational approach and the lowest efficiency score in the asset approach.

This research has several limitations. *First*, the research sample are using only state-owned banks and foreign banks. This research has not been using another bank group. *Second*, the limitations of reference for each approach in determining the variable output and input variables. *Third*, this research is only analyze the level of efficiency in the production function, not using a cost function.

Based on these limitations, for the further research is recommended to use the other bank group which can be used as a comparison in analyzing the efficiency score. *Second*, it is suggested for the next research to use the other variables on each approach. It aims to determine whether using different variables, the efficiency becomes higher or even lower. *Third*, further study is expected to analyze the efficiency with cost function, with the use of the price factor. So it can be know the difference of using the production function and the cost function.

REFERENCES

Athoammar, Nabila H. N. F dan Muharam, H. 2015. *Analisis Pengaruh Kompetisi, Size, Capitalization dan Loans Intensity Terhadap Efisiensi Perbankan (Studi Kasus Perbankan Umum Konvensional Indonesia Periode tahun 2008-2012)*. Jurnal Skripsi, Fakultas Ekonomika dan Bisnis Universitas Diponegoro. Semarang.

Battese, G.E dan T.J. Coelli. 1992. Frontier Production Functions, Technical Efficiency and Panel Data: With Application to Paddy Farmers in India. The Journal of Productivity Analysis

Bonin, J. P., Hasan, I., & Wachtel, P. 2004. *Bank performance, Efficiency and Ownership in Transition Countries*. BOFIT Discussion Paper No. 7.

Coelli, T.J., et al. 2005. *An Introduction to Efficiency and Productivity Analysis*. Second Edition. Springer Sciennce+Business Media, Inc.

Coelli T.J. 1996. *A Guide to Frontier 4.1 : A Computer Program For Stochastic Frontier Production and Cost Function Analysis*. Australia: University of New England

Colline, Fredelline. 2010. *Studi Perbandingan Tingkat Efisiensi Bank Domestik dan Bank Asing di Indonesia*.

Ghozali, Imam. 2005. *Aplikasi Analisis Multivariate Dengan Program IBM SPSS 19*. Semarang: Badan Penerbit Universitas Diponegoro.

Hadad, Muliaman D, dkk. 2003. *Pendekatan Parametrik Efisiensi Perbankan Indonesia*. www.bi.go.id

Hadad, Muliaman D, dkk. 2004. *Fungsi Intermediasi Bank Asing dalam Mendorong Pemulihan Sektor Riil di Indonesia*. Research Paper Bank Indonesia .

Haqiqi, Teuku. M., & Muharam, H. 2015. *Analisis Perbandingan Efisiensi Bank Umum Syariah (BUS) dan Unit Usaha Syariah (UUS) Dengan Metode Stochastic Frontier Analysis (SFA) Periode 2010-2013*. Undergraduate Thesis, Fakultas Ekonomika dan Bisnis Universitas Diponegoro .

Kuncoro, Mudrajad dan Suhardjono. 2002. *Manajemen Perbankan: Teori dan Aplikasi*. BPFE Yogyakarta.

Matthews, K., & Ismail, M. 2006. *Efficiency and Productivity Growth of Domestic and Foreign Commercial Banks in Malaysia*. Cardiff Business School Working Paper Series .

Moffat, B. dan Valadkhani A. 2008. *Technical Efficiency in Botswana's financial institutions: a DEA Approach*. Research Online, Faculty Of Business Economics Working Papers University of Wollongong.

Muljawan, D., Hafidz, J., Astuti, R. I., & Oktapiani, R. 2014. *Faktor-faktor Penentu Efisiensi Perbankan Indonesia serta Dampaknya Terhadap Perhitungan Suku Bunga Kredit*. Working Paper Bank Indonesia .

Nugroho, Rino A. 2011. *Analisis Perbandingan Efisiensi Bank Umum Syariah (BUS) dan Unit Usaha Syariah (UUS) dengan Mtode Stochastic Frontier Analysis (SFA) Periode 2005-2009*.

Pusvitasari dan Harjum Muharam. 2007. *Analisis Perbandingan Efisiensi Perbankan Syariah dengan Metode Data Envelopment Analysis*. Jurnal Skripsi, Fakultas Ekonomi dan Bisnis Universitas Diponegoro, Vol. 2, No. 3.

Putra, Indra Permana 2013. Analisis Tingkat Efisiensi Perbankan BUMN dan Bank Asing di Indonesia.

San, O. T., Theng, L. Y., & Hen, T. B. 2011. *A Comparison on Efficiency of Domestic and Foreign Banks in Malaysia: A DEA Approach*. Business Management Dynamics .

Simanjuntak, Rustam dan Armanto, Boedi. 2010. *Relationship Between Efficiency Of Commercial Banks In Indonesia And Ownership Structure, Scale Of Business, Status Of Bank Listed, And Global Financial Crisis By Using Non-Parametric Method For The 2002-2009 Period*. https://www.researchgate.net/publication/234109229. Diakses 1 Januari 2016.

Sugiyono. 2004. *Metode Penelitian Bisinis*. Bandung: Alfabeta, CV.

Tahir, I. M., & Haron, S. 2008. *Technical Efficiency of the Malaysian Commercial Banks: A Stochastic Frontier Approach*. Banks and Bank System, volume 3, issue 4, 2008.

Tahir, I. M., Bakar, N. M., & Haron, S. 2009. *Evaluating Efficiency of Malaysian Banks Using Data Envelopment Analysis*. International Journal of Business and Management, Vol. 4, No.8, August, 2009.

Wardana, Sandi Kurnia. 2013. *Analisis Tingkat Efisiensi Perbankan dengan Pendekatan Non Parametrik Data Envelopment Analysis (DEA)*.

Wild, Jhon. J dan Subramanyam, K.R. 2010. *Analisis Laporan Keuangan*. Edisi 10. Salemba Empat: Jakarta.

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