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# BANK EFFICIENCY IN INDONESIA
# (AN EMPIRICAL ANALYSIS USING DEA)

**BY**

**RONALD RULINDO**

**INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA**

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# BANK EFFICIENCY IN INDONESIA
# (AN EMPIRICAL ANALYSIS USING DEA)

**BY**

**RONALD RULINDO**

**A Research Paper Submitted in Partial Fulfillment of the Requirement for Degree of Master Science in Finance**

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## Abstract

This research attempts to investigate the efficiency of banking industry specifically in Indonesia. Three objectives are identified for this study. The first objective is to compare efficiency of big-sized banks with efficiency of medium-sized banks whilst the second objective is to compare bank efficiency based on ownership criteria and the efficiency of Islamic banks vis-a vis conventional banks. The methodology applied in this research is non parametric approach using Data Envelopment Analysis (DEA) combine with Malmquist Index. The variables identify as inputs are total deposit, personal expenses and capital expenditures while the outputs are loan and advances, capital market investment and money market investment. This research used financial data of 50 banks in Indonesia. These banks are classified into two groups: big-sized and medium-sized banks. The result shows that big-sized banks are more efficient than medium-sized banks and foreign banks are more efficient compared to other types of banks either in big-sized or medium-sized banks category. Lastly, the efficiency of Islamic banks is relatively higher than the average efficiency of conventional banks. Malmquist Index also produces almost similar results. Malmquist Total Factor Productivity (TFP) index of big-sized banks is higher than the TFP index of medium-sized banks and the TFP Index of Islamic banks is higher than TFP index of average conventional banks.

# ملخص البحث

يقوم هذا البحث بالتحري عن الكفائة المصرفية للمصانع وبشلك محدد المصانع المجودة في اندونيسيا. هانك ثلاثة أهداف مميزة لهذه الدراسة. الهدف الأول هو مقارنة الكفائة بين البنوك الكبيرة والبنوك المتوسطة، بينما الهدف الثاني هو مقارنة الكفائة المصرفية مستندة على المعايير الملكية ، والهدف الثالث هو المقارنة بين البنوك الإسلامية والبنوك التقليدية من حيث الكفائة. إن المنهج الذي ينطبق على هذا البحث غير يعتبر غير مقياسي ولكنه يعتمد على تحليل البيانات مع استخدام دليل الماليكيوست . تعتبر المتغيرات في هذا البحث كمساهمات أيداع كلي، نفقات ومصروفات لرأس المال الشخصي. بينما تعتبر النواتج عبارة عن قروض ، استثمار لرأس المال ، واستثمار لسوق العملة. استخدم هذا البحث حوالي بيانات مالية لحوالي 50 بنك في أندونيسيا. وصنفت هذه البنوك الى بنوك كبيرة وبنوك متوسطة. وتطلع النتيجة على أن النوك الكبيرة أكثر كفائة من البنوك المتوسطة، والبنوك الأجنبية أكثر كفائة مقارنة بالبنوك الكبيرة أو المتوسطة . أخيرا كفائة البنوك الإسلامية أعلى نسبيا من الكفائة المتوسطة مقارنةللبنوك التقليدية. ونجد نفس النتيجة باستخدام دليل الماليكيوست. نجد أن المعدل للمحصل الإنتاجي للبنوك الكبيرة أكبر من المعدل للمحصل الإنتاجي للبنوك المتوسطة و المحصل الإنتاجي للبنوك الأسلامية أكثر من المحصل الإنتاجي لمعدل البنوك التقليدية .

# APPROVAL PAGE

I certify that I have supervised and read this study and that in my opinion, it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a thesis for the degree of Master of Science in Finance

.....
Mohd Azmi Omar
Supervisor

This research was submitted to the Department of Business Administration and is accepted as a partial fulfillment of the requirements for the degree of Master of Science in Finance

.....
Rafikul Islam
Head, Department of
Business Administration

This dissertation was submitted to the Kulliyyah of Economics and Management Sciences and is accepted as partial fulfillment of the requirements for the degree of Master of Science in Finance

.....
Jamil bin Hj Osman
Dean, Kulliyyah of Economics
and Management Sciences

## DECLARATION

I hereby declare that this dissertation is the result of my own investigations, except where otherwise stated. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at IIUM or other institutions.

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**BANK EFFICIENCY IN INDONESIA**
**(AN EMPIRICAL ANALYSIS USING DEA)**

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**For Knowledge and**

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## LIST OF ABREVEATIONS

| | |
|---|---|
| AE | Allocative Efficiency |
| ANOVA | Analysis of Variance |
| API | Arsitektur Perbankan Indonesia (Indonesian Banking Architecture) |
| BCA | Bank Central Asia |
| BCC | Banker, Charnes, and Choper |
| BNI | Bank Negara Indonesia |
| BPD | Bank Pembangunan Daerah (Regional Development Bank) |
| BPR | Bank Perkreditan Rakyat |
| BRI | Bank Rakyat Indonesia |
| BTN | Bank Tabungan Negara |
| CAMEL | Capital adequacy, Asset quality, Management, Earning, Liquidity |
| CCR | Charnes, Choper, and Rhodes |
| CRS | Constant Return to Scale |
| DEA | Data Envelopment Analysis |
| DFA | Distribution Free Approach |
| EFA | Economic Frontier Analysis |
| FB | Foreign Bank |
| FDH | Free Disposal Hull |
| JVB | Joint Venture Bank |
| OE | Overall Efficiency |
| PNB | Private National Bank |
| RDB | Regional Development Bank |

| | |
|---|---|
| ROA | Return on Asset |
| ROE | Return on Equity |
| SB | State Bank |
| SBM | Slack Based Model |
| SFA | Stochastic Frontier Approach |
| TE | Technical Efficiency |
| TFA | Thick Frontier Approach |
| TFP | Total Factor Productivity Index |
| VRS | Variable Return to Scale |

# CHAPTER ONE

# INTRODUCTION

## 1.1 Introduction

Bank as intermediary institution play a vital role in the economy of a country. This importance arises because bank not only provide major source of financial intermediation but also its checkable deposit liabilities represent the bulk of a nation's money stock (Yue, 1991). Given such importance, it is therefore deemed necessary for depositors, shareholders, investors, bank managers as well as regulators to evaluate bank performance.

Most of the previous studies on bank performance such as Bashir (1999), Eberl, and Schwaiger (2005) tend to use financial ratios as tool to measure performance. However, financial ratio cannot capture long-term performance and also it aggregates many aspects of performance such as operations, marketing and financing (Sherman and Gold 1985). The business of evaluating bank's overall economic performance is essentially a complicated matter since we have to consider many criteria such as profit, liquidity, asset quality, attitude toward risk, and management strategies as a whole and not individually.

Based on these limitations, researchers have been trying to develop better methods to measure bank performance. One popular approach is to measure bank efficiency. There are several benefits in measuring bank efficiency. Berger (1993) mentioned that for financial institution, efficiency means increase in profitability, increase in fund for turnover, provide better services at reduced charges, and lower bank's risk via increase in retained earning. Mochtar et al (2005) noted that greater efficiency also implies that individual banks can adapt to new operating environment

via the improvement of their ability to combine and utilize inputs. Vujcic and Jemric (2001) mentioned that bank efficiency had been an important issue in transitional countries, since they have faced at least one banking crisis. Based on these opinions, efficiency is an important element in the banking industry. Measuring bank efficiency is also important since it gives a benchmark for one bank to assess its activities and to see whether its activities have been efficient compared to the best practices of the banking industry.

### 1.2 Research Problem

This research attempts to investigate the efficiency of the banking industry in Indonesia. Similar studies have been conducted in other countries such as United States, United Kingdom, Australia, Japan, India, and Malaysia (Drake et al, 2006, Omar et al., 2006). Studying bank efficiency in Indonesia is considered important since the Indonesian banking industry had experienced a major Asian financial crisis in 1997 and is still in midst of recovery trying to recover from it. Hence, by measuring the efficiency of the Indonesian banking industry, this research is expected to provide a benchmark to the banking industry with the purpose of evaluating the achievements of its recovery program.

### 1.3 Objectives of the Research

Many bank efficiency studies relate efficiency measurements to several determinants such as time, bank type, ownership status, and geographical region as well as bank size, capital adequacy, loans quality, profitability, expenses and bank age. Similar to earlier studies this study attempt to investigate the efficiency of Indonesian banking industry specifically focusing on post 1997/1998 period, i.e, the period after 1997/1998 Asian financial crisis. Three objectives are identified for this study. The

first objective is to compare efficiency of big-sized banks with efficiency of medium-sized banks whilst the second objective is to compare bank efficiency based on ownership criteria and finally the efficiency of Islamic banks vis a vis of conventional banks.

### 1.4 Significance of the Research

The research provides a number of contributions. Indonesian banks will be able to know their position in the Indonesian banking industry which is in accordance with their efficiency level. If the results show that the bank is inefficient, it can take necessary action in order to improve its performance. Islamic banks can also determine their level of efficiency and compare their efficiency level with their competitors from conventional banks. This research also contributes to the existing literature on the efficiency of banking industry especially in Indonesia. Based on our survey, this is the first study on the efficiency of Indonesian banking industry utilizing DEA combined with Malmquist Productivity Index. It will therefore provide the impetus to future research on the efficiency of Indonesian banks.

### 1.5 Organization of the Research

This study is organized in six chapters. Chapter two discusses the background of the study, such as overview of Indonesian banking industry, and the concept of efficiency. Chapter three discusses the literature review on bank efficiency studies especially those using Data Envelopment Analysis (DEA). It will also review some of the efficiency studies on Islamic banking. Chapter four discusses the data and research methodology used in this study. Chapter five presents the result of this study while the final chapter presents the conclusion of this research, the research's limitations, and suggestions for future research.

# CHAPTER TWO

# BACKGROUND OF THE STUDY

## 2.1 Introduction

The concept of efficiency has been widely applied in studies on banking industry. Berger and Humprey (1997) noted that there were 130 studies that apply this concept to financial institutions in 21 countries. This concept is important because the efficiency measure is one of the success indicators for individual banks and the industry as a whole.

Based on that reason, this study attempts to investigate the efficiency of Indonesian banks. To give a more comprehensive understanding, this chapter will provide an overview of the Indonesian banking industry and will explain the concept of efficiency as used in this study.

## 2.2 Overview of Indonesian Banking Industry

According to Indonesian Banking Booklet 2005, a bank is an institution which collects fund in the form of savings and return it back to the community in the form of credit and other related services with the purpose of increasing the wealth of the community[1].

In general, banks in Indonesia can be grouped into two, commercial bank (Bank Umum) and rural credit bank (Bank Perkreditan Rakyat). The main difference between a commercial bank and rural credit bank is in terms of activities. Unlike commercial banks, rural credit banks cannot offer current account facility and any

[1] Indonesian Banking Booklet 2005, (2005), Vol:1, No 2 pp 5

foreign currency services[2]. A commercial bank can operate its business by utilizing either conventional or Islamic banking services or both. However, a rural credit bank cannot have both conventional and Islamic banking business in its operation. If a bank wants to provide Islamic banking services, the activities in that particular bank must conform to Islamic principles[3].

Commercial banks can be further classified into four types based on ownership, state bank which is owned by government, private national bank which is owned by private sector, regional development bank which is owned by provincial government and foreign and joint venture bank which is jointly owned by foreign bank and local company. Private national bank can be sub classified into banks which have foreign exchange division and banks which do not have[4].

Table 2.1 shows the types of commercial bank and its respective numbers in Indonesia. Private national bank represents the largest group, followed by foreign and joint venture bank, regional development bank and state bank. Unlike state banks and regional development bank, the number of private national bank and foreign and joint venture banks shows a reduction from 2001 to 2006. In January 2001, there were 81 private national bank and 39 foreign and joint venture banks but in January 2006, the number dropped to 71 private national banks and 28 foreign and joint venture banks. The number of state bank and regional development bank remained stable during the same period which is five state banks and 26 regional development banks respectively. The main reason for the reduction of the number of private national banks and foreign and joint venture banks during this period is due to merges and liquidation activities.

[2] Indonesian Banking Booklet 2005, (2005),Vol:1, No 2, pp 11
[3] Banking Act No.10/1998
[4] http://www.bi.go.id/web/id/Laporan+Keuangan+Publik+Bank/PGWS/

**Table 2.1**

**Number of Commercial Banks in Indonesia According to Type of Banks**

| Type of Commercial Bank | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|---|
| State Banks | 5 | 5 | 5 | 5 | 5 | 5 |
| Regional Development Banks | 26 | 26 | 26 | 26 | 26 | 26 |
| Private National Banks | 81 | 80 | 76 | 76 | 71 | 71 |
| Foreign & Joint Venture Banks | 39 | 34 | 34 | 31 | 30 | 28 |

Table 2.2 shows the number of bank branches according to type of banks. Private national bank had 1070 branches in January 2001 and increase to 1274 at the beginning of 2006. State banks began with 902 branches in January 2001 but saw a reduction to 767 in January 2006. The numbers of branches of regional development bank shows a slight increase from 300 branches in January 2001 to 371 branches in January 2006. The number of branches of foreign and joint venture banks also increase from 40 branches to 62 branches in January 2006.

**Table 2.2**

**Number of Branches According to Type of Banks**

| Type of Commercial Bank | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|---|
| State Banks | 902 | 870 | 870 | 765 | 763 | 767 |
| Regional Development Banks | 300 | 311 | 311 | 344 | 359 | 371 |
| Private National Banks | 1079 | 1137 | 1132 | 1218 | 1218 | 1274 |
| Foreign & Joint Venture Banks | 40 | 41 | 41 | 52 | 57 | 62 |

Table 2.3 shows the total asset of Indonesian banks in January 2001 which stood at 994,635 billion Rupiah and increase to 1,416,967 billion Rupiah in January 2006. Share capital also increase from 60,134 billion Rupiah in January 2001 to 146,812 billion Rupiah in January 2006. It was also reported that since 2004,

Indonesian banks have already fulfilled the minimum eight percent capital adequacy requirements set by Bank Indonesia[5]

**Table 2.3**

**Total Asset & Share Capital of Indonesian Banks**
**(In Billion Rupiah)**

| Item | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|---|
| Total Assets | 994.6 | 1032.8 | 1066.2 | 1115.6 | 1206.7 | 1416.9 |
| Share Capital | 60.1 | 75.5 | 74.9 | 118.7 | 135.8 | 146.8 |

Table 2.4 shows that saving deposit represents the bulk of demand deposit in Indonesian banks. This figure also shows that the number of current and saving deposit increase during the period of 2001 to 2006.

**Table 2.4**

**Demand Deposit of Indonesian Banks**
**(In Billion Rupiah)**

| Item | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|---|
| Current Deposit | 83.7 | 96.3 | 102.5 | 124.5 | 146.1 | 167 |
| Saving Deposit | 457.2 | 516.9 | 550.3 | 588.6 | 629.8 | 725 |

Table 2.5 shows the loans and advances of Indonesian banks based on the ownership of banks. From January 2001 until January 2004, state banks dominated other types of bank in giving loans to creditors. However, since January 2005 its position was taken over by private national banks. Table 2.5 shows that loans and advance of state banks, private national banks and regional development banks increased from January 2001 to January 2006 whilst foreign and joint venture banks remain uneven.

[5] www.bi.go.id

**Table 2.5**

**Loans and Advance of Indonesia Banks**
**(In Billion Rupiah)**

| Type of Commercial Banks | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|---|
| State Banks | 98.9 | 115.2 | 143.9 | 171.1 | 213.9 | 243.1 |
| Regional Development Banks | 10.2 | 15.7 | 21.7 | 29.3 | 37.4 | 449.6 |
| Private National Banks | 81.3 | 100.2 | 133.6 | 170.8 | 222.9 | 289.3 |
| Foreign & Joint Venture Banks | 74.3 | 70.8 | 58.8 | 61.3 | 74.6 | 957.8 |

Based on the data, we can conclude that Indonesian banks have succeeded in recovering after the financial crisis of 1997/1998. This can be shown by the increasing number of branches, total assets, share capital, demand deposits, and loans and advances.

## 2.3 CONCEPT OF EFFICIENCY

The concept of efficiency was first discussed by Farrell (1957). He extended the research of Debreu (1951) which provided the first measurement of efficiency called the ‘coefficient of resource utilization', and the study of Koopmans (1957) which first defined the concept of technical efficiency. According to Farrell (1957), the concept of efficiency measurement can be divided into two components, namely technical efficiency (TE) and allocative efficiency (AE). According to him, technical efficiency is the firm’s ability to obtain maximal output from a given set of inputs while allocative efficiency means the firm’s ability to use inputs in optimal proportions, given their respective prices and production technology. Based on this concept, the combinations of two components will produce overall economic efficiency (OE).

Figure 2.1 illustrates technical efficiency and allocative efficiency according to Farrell (1957) by using input-oriented measures under the assumption of constant returns to scales. The input-oriented measure is assumed by the question of “by how much can input quantities be proportionally reduced without changing the output