

Non-Performing Loans and Bank Efficiency of Conventional and Islamic Banks in the Organization of Islamic Cooperation (OIC) Countries

Chandra Setiawan¹, Taufiq Hasan², M. Kabir Hassan³, Shamsheer Mohamad⁴

ABSTRACT

This paper investigates the inter-temporal relationships between bank efficiency and problem loans as well as financing of conventional and Islamic banks as proposed by Berger and DeYoung (1997). The efficiency level and the managerial behavior of conventional and Islamic banks in the Organization of Islamic Cooperation (OIC) countries divided into the regions: Asian, African, Middle East and Turkey are investigated during the period 1993-2007. The findings show that cost efficiency is higher than profit efficiency for the sampled banks in the OIC countries. As for the inter-temporal relationships between bank efficiency and problem loans and financing, suggests that there is no evidence for 'bad luck' of conventional banks in all regions, but support the 'bad management' and 'skimping' except in the African region. On the other hand for Islamic banks, there is evidence of 'bad luck' in Asia, the Middle East and Turkey, and support for 'bad management' in African and Middle East region and Turkey, except in Asia. All regions support 'skimping' behavior for Islamic banks. These findings imply that the increase of non-performing loans of conventional banks is mainly caused by poor management rather than external factors, but the increase of non-performing financing of Islamic banks are caused by both internal and external factors.

JEL Classification Code : G23, 24, 28, 34, Z12

Keywords : NPL, Efficiency Measures, Bad Management, Bad Luck, Islamic Banks

-
1. President University, Indonesia, Phone: 62-81-69-70-795, Email: chandra08setiawan@gmail.com
 2. Department of Accounting and Finance , Faculty of Economics and Management, University Putra Malaysia, 43400 Serdang, Selangor, Malaysia, Phone: 603-89467691, Fax: 603 8948 6188, Email: taufiq@econ.upm.edu.my
 3. (Corresponding Author), Department of Economics and Finance, University of New Orleans, New Orleans, LA 70148, USA, Phone: 504-280-6163, Fax: 504-280-6397, Email: mhassan@uno.edu
 4. Faculty of Economics and Management, University Putra Malaysia, 43400 Serdang Selangor, Malaysia, Phone: 603-8946 7600, Fax: 603 8948 6188, Email: shamshermohd57@gmail.com

1. INTRODUCTION

Banking has experienced dramatic changes over the last decade or so. Deregulation, financial innovation and automation have been major forces impacting on the performance of the banking sector. This phenomenon is more relevant for emerging economics rather than already developed economies. However, a large number of bank failures occurred in emerging countries during the 1990s and, to a lesser degree, at the beginning of the current decade due to the various types of financial crisis. For this reason banks have become increasingly concerned about controlling and analyzing their costs and revenues, as well as measuring the risks taken to produce acceptable returns.

It is of utmost interest to know the factors which can predict bank failures. The empirical literature identifies two main factors predicting bank failures. The first one is the volume of non-performing loans in the loan portfolio. A large proportion of non-performing loans has been observed in the portfolios of failing banks (Lanine & Vennet, 2006). The second factor is a low level of cost efficiency which is a proxy for management quality. Therefore, the underlying argument is that bad management increases the likelihood of bank failures.

These two topics might seem to be unrelated because operations personnel typically do not participate in screening and monitoring loan customers and loan officers normally do not participate in overseeing operations costs. Despite the obvious disassociation, problem loans and cost efficiency are related in several important ways. For example, banks with poor senior management may have problems in monitoring both their cost and their loan customers, which is more common in emerging countries, the losses of capital generated by both of these phenomena can potentially lead to failure. On the other hand, due to the loan quality, a problem which is caused by external factors such as economic downturns, extra costs may be added with the nonperforming loans and can create the appearance of low cost efficiency.

A number of studies have found a negative relationship between efficiency and problem loans (William, J, 2005; Karim, M.Z.A.K., et al., 2010). This relationship does not indicate the causal effect between cost efficiency and NPL, therefore the decrease in efficiency does not automatically mean an increase in the NPL. This is because the NPL variable is determined by a large number of exogenous variables. However, there may be a bidirectional relationship between bank efficiency and NPL. Berger and Young (1997) explained the inter-temporal relationships between bank efficiency and NPL by four hypotheses called 'bad luck', 'bad management,' 'skimping' and 'moral hazard.'

(Kabir, can we add few lines to explain the ‘moral hazard’ here?)

A few researchers have investigated the issue for developed countries. For example, Berger and DeYoung (1997) provide some support for both hypotheses on a sample of US banks, as they observe that the relationship runs in both directions. Williams (2004) concludes in favor of the bad management hypothesis on a sample of European savings banks. However, this question is of greater importance in emerging countries, owing to the importance of the bank failure phenomenon in these countries. Secondly, there is no empirical evidence of Islamic banks, which are principally different than conventional banks, on these issues even though Islamic banks are growing very fast.

This study estimates two types of bank efficiency: the cost efficiency which measures the operating costs and profit efficiency. The cost efficiency is chosen because the resources that may be expended because of ‘bad luck’, ‘bad management’, ‘skimping’ or ‘moral hazard’ behavior impacts either the staff costs or non-interest expenses. The bank efficiency literature reports that operating costs comprise the bulk of bank cost inefficiency (Berger and Humphrey, 1991). Profit efficiency is chosen as an efficiency measure to test the ‘skimping’ behavior as recommended by Berger and DeYoung (1997). This is done because the concept of cost efficiency classifies banks that increase costs in order to generate higher revenues as inefficient, whereas profit efficiency is not beset by this problem (Berger and Mester, 1997). Skimping behavior reduces output quality, which affects both costs and revenues. As problem loans increase, bank costs rise for reasons such as the need for increased monitoring of borrowers. Revenues, on the other hand, will be lost because of rising problem loans.

Non-performing loan to total loans (NPL_TL) and non-performing financing to total financing (NPF_TF) ratios are used as proxy on the quality of assets and credits of conventional and Islamic banking institutions respectively (Babihuga R., 2007; Safakli, O.V., 2007). The relationship between NPL_TL ratio and banking efficiency scores are used by several literatures to test the ‘bad luck’, ‘bad management’ and ‘skimping’ hypotheses, especially for conventional banks. This approach has been used by U.S. commercial banks (Berger and De Young, 1997; Guillén, J., 2006); Turkish banks (Isik and Hassan, 2003); European savings banks (William J., 2005) and Czech banks (Podpiera, J., et al., 2008). This study revisits the three hypotheses mentioned earlier (‘bad luck’, ‘bad management’ and ‘skimping’) and test them on conventional and Islamic banks in selected OIC countries from Asia, Africa, Middle Eastern regions and Turkey.

Historically, conventional banking is believed to have begun in the middle of the twelfth century, while Islamic banking first emerged in the mid seventies to early eighties, for example: Bank Islam Malaysia Berhad was established in 1983 and was

public-listed on January 17th, 1992. Indonesia launched an Islamic Bank (Bank Muamalat) in the 1990's. Over the last two decades, Islamic banking has become one of the fastest growing segments of the Islamic Financial Services Industry (IFSI)¹. Since the early 1990s the market has gained enough momentum to attract the attention of policy makers and of institutions interested in introducing innovative products. Meanwhile, due to the growing demand for Shariah-compliant products, international conventional banks have also started to offer "Islamic windows" such as the Hong Kong and Shanghai Banking Corporation (HSBC), Citibank, American Express Bank Ltd, and Chase Manhattan (Iqbal, Zamir, Mirakhor, A., 2007, p. 27). There are over 300 Islamic banks and financial institutions worldwide, with an estimated investment between US\$ 200 and US\$ 300 billion in more than 75 countries (Qorchi, E.M., 2005, Solé, J., 2007, Pollard, J and Samers, M., 2007). Islamic banking has experienced double-digit growth, spurred by the licensing of new banks, largely in local markets, the establishments of Islamic windows and subsidiaries by major international banks, partial or full conversion of conventional banks into Islamic banks, increased awareness and population growth², the spread of the Islamic religion globally, and a number of other factors work jointly in boosting the growth of Islamic banking³. The efficiency of the banking sector in providing these services, particularly at the intra-bank level and conditions in the external environment, influence the effectiveness of the domestic financial intermediation mechanism (Adongo, J., et al., 2005).

Moreover, it is important in the banking industry to operate efficiently, because banks do not only compete within the banking industry, but also compete with non-banks and other financial institutions (Chen, Y.K, 2001). The most efficient banks will have a competitive advantage. Therefore, in order to be as efficient as possible, banks must choose an appropriate scale of operation (Rim, K.T., 1996). In addition, for bankers and policymakers to know whether and how the financial sector is becoming more efficient will be useful information, since as efficiency improves, financial services will improve, and as such, higher volumes of funds become available in the market. The higher level of funds will improve the financial positions of banks and contribute positively to the economic development of the country (Ahmad, 2000).

Since loans are one of the major outputs provided by banks, loan management is very important. A loan is a risk output; there is always a possibility that the bank will face

1. See "Islamic Financial Services Industry Development, Ten-Year Framework and Strategies". <http://www.irti.org>

2. According to Islamic Financial Services Board publication and OIC that Muslims population is around 1.5 billion worldwide, or about 25% of the world's population. Ahmed, S. (2006) states more than one billion Muslims live in the present-day world.

3. For further explanation see "Islamic Financial Services Industry Development, Ten-Year Framework and Strategies". <http://www.irti.org>

loan delay or a default problem. Therefore, there is always an ex-ante risk for a loan to eventually become non-performing. Non-performing loans (NPL) are undesirable outputs to any bank that extends loans, as they decrease the bank's efficiency (Li, Y., et al., 2004). If the rate of non-performing loans (NPL) in total credit portfolio is high, it implies the bank has allocated its funds inefficiently. For this reason banks are required to make high loan-loss provisions (LLP) for potential loan losses. Therefore, management of NPL is important for both an individual bank's efficiency measure of overall performance and an economy's financial soundness (Chang, 2006, Li et al., 2004). A high percentage of inefficiently allocated financial resources have a negative impact on the economic development of the country.

In this paper, at the first stage, we investigate the cost, and profit efficiency of conventional and Islamic banks in the Organization of Islamic Countries (OIC) that are divided into regions: Asian: Bangladesh, Indonesia, Malaysia and Pakistan; African: Algeria, Gambia, Egypt, Mauritania, Sudan and Tunisia; Middle East: Bahrain, Jordan, Kuwait, Mauritania, Qatar, Saudi Arabia, United Emirates Arab, Yemen; and Turkey using the Data Envelopment Analysis (DEA) method, a non-parametric approach. The cost efficiency scores are used as dependent and independent variables. The profit efficiency scores are used as independent variables. The second stage, we analyze the inter-temporal relationships between problem loans and problem financing and cost efficiency as well as profit efficiency of conventional and Islamic banks. These analyses aim to test the four hypotheses as proposed by Berger and DeYoung (1997) namely 'bad luck', 'bad management', 'skipping' and 'moral hazard'.

This paper assumes that both conventional and Islamic banks are cost minimizers and profit maximizers both try to maximize profits by raising revenues and reducing costs. On this basis, this paper investigates the mean of cost and profit efficiency scores of conventional versus Islamic banks and uses the mean of cost and profit efficiency scores as a dependent or independent variable. This study examines the inter-temporal relationships between non-performing loans and cost and profit efficiency scores of conventional banks and non-performing financing and cost and profit efficiency scores of Islamic banks in the selected OIC countries in Asia, Africa, the Middle East region and Turkey. The signing and direction of these inter-temporal relationships is constructed as evidence of specific types of management behavior: 'bad luck', 'bad management' and 'skipping'.

2. LITERATURE REVIEW

2.1 Nonperforming loans (NPL) and Nonperforming financing (NPF)

Loans become non-performing when it cannot be recovered within a certain stipulated time that is governed by some respective laws. There is no global standard to define

non-performing loans at the practical level (Frost, S.M., 2004, Hou, Y., and Dickinson, D., 2007). However, the most common definition of non-performing loan is when the borrower has fallen more than a defined number of days behind in the scheduled payments on the loan (Frost, S.M., 2004). Most countries normally adopt the International Monetary Fund's (IMF, 2002) definition of Non-performing Loans (NPL) a loan is non-performing when (1) the principal and interest payments on a loan are past due by 90 days or more; (2) at least 90 days of interest payments have been capitalized, refinanced, or delayed by agreement; or (3) payments are less than 90 days overdue, but there are other good reasons to doubt that payments will be made in full. Due to the important role of financing activities in Islamic banking the Islamic Financial Service Board (2007) has issued a Compilation Guide on Prudential and Structural Islamic Finance Indicators. Although national practices may vary, the 90 day period is the most widely used practice across countries to determine whether a financing is non-performing.

Among various indicators of financial stability, non-performing loans assume critical importance for banks since it reflects on the asset quality, credit risk and efficiency in the allocation of resources to productive sectors. The coefficient for the level of NPL is always related to bank inefficiency (Girardone, C., et al, 2004). A common perspective is that the problem of banks' non-performing loans is ascribed to political, economic, social, technological, legal and environmental (PESTLE) factors across countries (Ranjan, R and Dhal, S.C., 2003). In the banking literature, the problem of NPL has been revisited in several theoretical and empirical studies. A synoptic review of the literature brings forward insights into the determinants of NPL across countries.

2.2 Bank Efficiency

Since the 1990s, studies that are focused on the efficiency of financial institutions have become an important part of banking literature (Berger & Humphrey, 1997). The efficiency of commercial banks is important for at least two reasons. First, efficiency measures are indicators of success by which the performance of individual banks and the industry as a whole can be gauged. Efficiency becomes an important factor for financial institutions to successfully maintain their business with increasing competition in the financial markets and rapid technological advances in banking operations and services. A second reason to analyze the efficiency of banks is the potential impact of the government policies on efficiency. It is of the interest of regulators to know the impact of their policy decision to the performance and efficiency of the banks, as they will hugely affect the economy (Mokhtar, H.S.A., et al., 2006).

Starting from Berger and DeYoung (1997) there are several studies using the Granger causality framework to describe the relationship between efficiency, especially cost

efficiency and non-performing loans (Hassan and Isik, 2003, Guillén, 2006, Podpiera and Weill, 2008). Berger and DeYoung (1997) construct the relationship between non-performing loans and efficiency (cost) under the four hypotheses: ‘bad luck’, ‘bad management’, ‘skimping’ and moral hazard’. Since this paper only tests the first three hypotheses, there will be further elaboration only on each of them.

The ‘bad luck’ hypothesis refers to external events which are out-management factors that assert loans problems. So, the causes are uncontrollable by management of the bank. The bank incurs additional monitoring costs to face those external events, so NPLs rise as a result of the increase in expenditures. The hypothesis can be empirically verified if the data shows a negative Granger Causality from NPLs to efficiency. In other words, a higher amount of NPLs reduce efficiency. The latter would be observed because when a bank faces an exogenous increase in NPLs, it will purchase additional inputs necessary to administer the credit problem itself. The higher cost for the bank is associated with higher NPLs. Rossi, S.P.S., et al, (2005) add that under the ‘bad luck’ hypothesis exogenous shocks in the level of non-performing loans Granger causes changes in cost/profit efficiency levels.

The ‘bad management’ hypothesis implies a negative relationship between efficiency and shares of NPL. ‘Bad management’ occurs when low efficiency is a signal of poor senior management practices, loans problem are generally caused by controllable factors by management which applies to the day-to-day operations and the management of the portfolio. There is a possibility that managers in these banks do not practice adequate loan underwriting, monitoring, and control. As ‘bad’ managers, they may a) have poor skills in credit scoring and therefore choose a relatively high proportion of loans with low or negative net present values, b) be less than fully competent in appraising the value of collateral pledged against the loans, and c) have difficulty monitoring and controlling the borrowers after loans are used to assure that covenants are obeyed. So, low efficiency, or simply inefficiency, occurs before high NPLs. Note that this is just the opposite causality considered in the ‘bad luck’ hypothesis. Thus, under the ‘bad management’ hypothesis, low cost efficiency is expected to occur before or Granger-cause higher non-performing loans.

Under the ‘skimping’ hypothesis, the amount of resources allocated to underwriting and monitoring loans affects both loan quality and cost efficiency. There is a trade-off between short run operating cost and future loan performance. A maximizing-profit bank may rationally choose to have lower costs in the short run by ‘skimping’ on the resources devoted to underwriting and monitoring loans, but bear with bad loan performance problems and the possible cost of dealing with these problems in the future. In this case, there is a positive Granger Causality from efficiency to NPLs. In

order to test this hypothesis, Berger and DeYoung (1997) consider a sub-sample of banks with as score of efficiency above the average to capture the skimping banks. Banks with an efficiency score above the average for every year in the sample is considered. The sub-sample can keep a record of banks that are suspicious to be skimpers or efficient in the long run. Rossi, S.P.S., et al., (2005) add that under the Skimping hypothesis high cost/profit efficiency Granger causes high non-performing loans.

3. DATA AND METHODOLOGY

3.1 Variables

This study evaluates a cross-country level data compilation from the financial statements of each bank. The data collected for each year over the period 1993-2007 is available in the BankScope data base that the University Putra Malaysia library is subscribed to. BankScope reports the data in the original currencies of the respected countries and provides a choice to convert the data to any other currency, including the USD, which this paper used. It must be noted that there will be an issue of heterogeneity of the selected banks in different countries for comparative purposes.

We calculate efficiency using Data Envelopment Analysis (DEA). Cost Efficiency gives a measure of how close a bank's cost is to what a best practice bank's cost would be for producing the same output bundle under the same conditions. Profit efficiency indicates how well a bank is predicted to perform in terms of profit relative to other banks in the same period for producing the same set outputs (Bader, M.K., et al. (2008). A set of inputs and outputs is needed in order to measure the efficiency, and therefore, the relative productivity of our sample banks using data envelope analysis. The output vector includes (1) net loans; (2) other earning assets: loans to special sectors, inter-bank funds sold and investment securities (treasury bills, government bonds and other securities); 3) off-balance sheet items: guarantees and warranties (letters of guarantee, bank acceptance, letters of credit, guaranteed pre-financing, endorsements and others), commitments, foreign exchange and interest rate transactions as well as other off-balance sheet activities; all output and input prices are estimated as proxies, which are calculated as flows over the years divided by these: (1) price of loans is the total interest income divided by net loans; (2) price of other earning assets is defined as other operating income divided by other earning assets; and (3) price of off-balance sheet items is other operating income divided by the off-balance sheet items. Inputs vector include: (1) loanable funds: the sum of deposit (demand and time) and non-deposit funds including inter-bank loans borrowed; (2) physical capital: the book value of premises and fixed assets and (3) labor cost proxy by the personnel expenses. Input prices are estimated as proxies as follows: price of

funds is calculated as total interest expenses and other operating expenses divided by loanable funds; price of capital is the ratio loan loss provision to total fixed assets, and price of labor is the ratio of personnel expenses to loanable funds.

Non-performing loan to total loans (NPL_TL) and non-performing financing to total financing (NPF_TF) ratios are used to proxy the quality of the assets and credit quality of conventional and Islamic banking institution respectively (Babihuga R., 2007; Safakli, O.V., 2007). The income statements of financial reports for conventional banks and Islamic banks in the African region do not provide the information that is needed to calculate the ratios of non-performing loans to total loans (NPL_TL) and the non-performing financing to total financing (NPF_TF). Therefore, loan loss provisions to total loans (LLP_TL) is used as a proxy to the ratio of non-performing loans to total loans (NPL_TL) of conventional banks and financing loss provisions to total financing (FLP_TF) is used as a proxy to the ratio of non-performing financing to total financing (NPF_TF) of Islamic banks. Table 3.1 shows the number of observations of conventional and Islamic banks in each region. The conventional banks are much larger since many of the Islamic banks' financial data are not available for the observation periods (1993-2007) and there are a limited number of full-fledged Islamic banks in each country in the selected sample.

Table 3.1: Sample size: Conventional and Islamic Banks across Countries

Countries	Asia	Africa	Middle East and Turkey	Total
N obs. of CBs	205	299	562	1066
N obs. of IBs	55	99	92	246
Total	260	398	654	1312

Note: N obs. = number of observation; CBs = conventional banks; IBs = Islamic Banks

3.2. Data envelopment analysis

This paper follows the DEA non-parametric approach. The DEA is non-parametric in the sense that it simply constructs the frontier of the observed input-output ratios by linear programming techniques. In this study, the DEA Excel Solver developed by Zhu (2009) is used to solve the following models as summarized by Zhu. He summarizes the cost efficiency and profit efficiency. The cost and the profit efficiency scores are within the range of 0 and 1.

3.3. The Econometric Model

We adopt the Granger Causality framework used by Berger and De Young (1997) in their study of US banks. The structure of Equations (1) – (2) shows that each dependent variable is regressed on annual lags of it and another variable.

For the Bad Luck, Bad Management and Skimping hypotheses testing the formulas are as follows:

$$NPL_{i,t} = f1(NPL_{i,t-1}, \dots, NPL_{i,t-n}; EFF_{i,t-1}, \dots, EFF_{i,t-n}) + e_{1i,t} \dots\dots\dots(1)$$

$$EFF_{i,t} = f2(NPL_{i,t-1}, \dots, NPL_{i,t-n}; EFF_{i,t-1}, \dots, EFF_{i,t-n}) + e_{1i,t} \dots\dots\dots(2)$$

$$NPL_{i,t} = f3(NPL_{i,t-1}, \dots, NPL_{i,t-n}; CAP_{i,t-1}, \dots, CAP_{i,t-n}) + e_{1i,t} \dots\dots\dots(3)$$

Where

NPL = is for the conventional banks and it will be replaced by NPF for the Islamic banks. The dependent variable in equation (1) is the non-performing loans ratio ($NPL_{i,t}$).

n = is the number of lags,

NPL = Non-performing loans as a percentage of total loans for conventional banks;

NPF = Non-performing financings as a percentage of total financing for Islamic banks

EFF = efficiency as measured by the efficiency scores for cost and profit efficiency.

-The variables on the right-hand side in equations (1) and (2) include lagged values of the dependent variable NPL, and efficiency, as is standard procedure for Granger-causality models.

-The first equation is for testing bad management, and the second equation is for bad luck and skimping.

3.4. Variable Selection

All variables are measured in millions of US dollars. All the banks within the intermediation framework in this study are modeled as multi-product firms, producing three outputs and employing three inputs. Selection of variables from the database reduces the bias owing to different accounting practices, even in the same country, as different banks might use different accounting standards. In this respect, selection of variables clearly affects the results of efficiency scores.

4. EMPIRICAL RESULTS

4.0 Results and Discussions:

If the total effect of efficiency is negative and significant in Equation (1), we can conclude that the 'bad management' hypothesis, according to which reduced efficiency favors excessive risk-taking, is consistent with the data. If the total effect of the nonperforming loans ratio is negative and significant in equation (2), we can say that the data is consistent with the 'bad luck' hypothesis. In order to test under the 'skimping' hypothesis, Berger and DeYoung (1997) consider a sub-sample of banks with a score of efficiency above the average.

Therefore, the ‘bad luck’ hypothesis sustains those external factors, outside the managers control would increase the share of NPL; the ‘bad management’ hypothesis states that management practices would increase such proportion, a signal of poor management practices, so low efficiency, or simply inefficiency, occurs before high NPL; under the ‘skimping’ hypothesis, the bank may find it optimal to lower costs in the short run by skimping on the resources devoted to underwrite and monitor loans. At the end, the bank will bear the consequences of a high share of non-performing loans. Therefore, there is a trade-off between short run operating costs and future loan performances; this affects both loan quality and efficiency.

4.1. Overall results: conventional and Islamic banks

A bank can be cost efficient if it can create a relatively high volume of income-generating assets and liabilities for a given level of capital. The best asset quality is represented by the least problem loan and financing of the conventional and Islamic banks.

Table 4.1 shows the descriptive statistics for the average cost efficiency of conventional banks is better than cost efficiency of Islamic banks in each region. In total, there are 1066 observations for conventional banks and 246 observations for Islamic banks in OIC countries. The mean cost efficiency of conventional banks at 94.6 percent is 8.3 percent higher compared to the mean cost efficiency of Islamic banks at 86.3 percent. On an individual region basis, for conventional banks, the African region is the most cost efficient and for Islamic banks, the Middle Eastern region and Turkey are the most cost efficient.

Table 4.1 Descriptive Statistics of Cost Efficiency and NPL/TL, NPF/TF of Conventional and Islamic Banks in OIC countries

Conventional Banks				Islamic Banks		
Region	N obs.	CE-CBs	NPL/TL LLP/II	N obs.	CE-IBs	NPF/TF FLP/TF
Asia	205	0.950 [0.098]	8.813 [7.036]	55	0.873 [0.277]	6.596 [5.703]
Africa	299	0.951 [0.068]	2.303* [2.202]	99	0.873 [0.168]	2.849* [3.304]
ME&T	562	0.937 [0.112]	8.264 [11.917]	92	0.884 [0.155]	7.969 [9.998]
Total/ Mean	1066	0.946	8.538**	246	0.877	7.282**

Note: standard deviations are in parentheses; CE = cost efficiency; NPL/TL = non-performing Loans to total loans; LLP/TL = loan loss provisions to total loans; NPF/TF = non-performing Financing to total financing; FLP/TL = financing loss provisions to total financing; CBs = conventional banks; IBs = Islamic banks; ME& T = Middle East and Turkey; * is used LLP/TL for CBs and FLP/TF for IBs. ** A simple average is only for Asian and ME region &T.

The mean ratio of non-performing loans to total loans of conventional banks shows a higher variation compared to the mean ratio of non-performing financing to total financing of Islamic banks in OIC countries. The most problem loans or the poorest asset quality for conventional banks is the Asian region. The most problem financing or the poorest asset quality for Islamic banks is the Middle East region and Turkey.

4.2. Regression results on NPL_TL/NPF_TF and Cost Efficiency

4.2.1 NPL and NPF and Bank Efficiency

Table 4.2.1 shows the findings on the inter-temporal relationships between banks' cost efficiency and problem loans is proxied by the ratio non-performing loans to total loans (NPL_TL) for conventional banks and the ratio non-performing financing to total financing (NPF_TF) for Islamic banks in Asian, African, Middle East and Turkey Regions. The sample banks in the Asian region come from Bangladesh, Indonesia, Malaysia and Pakistan. For the conventional banks in the African region, the samples are from Algeria, Egypt, and Tunisia, and for the Islamic banks the samples are from Algeria, Gambia, Egypt, Mauritania, Sudan, and Tunisia. For the conventional and Islamic banks of Middle East region the samples come from Bahrain, Iran, Jordan, Kuwait, Mauritania, Qatar, Saudi Arabia, Sudan, United Emirates Arab, Yemen and Turkey⁴.

The samples for the African region were taken from different countries due to the availability of the data between conventional and Islamic banks in this region. The income statements of financial reports for conventional banks and Islamic banks do not provide the information that is needed to calculate the ratios of NPL_TL and the NPF_TF. Therefore, loan loss provisions to total loans (LLP_TL) is used as a proxy to the ratio of NPL_TL of conventional banks and financing loss provisions to total financing (FLP_TF) is used as a proxy to the ratio NPF_TF of Islamic banks.

Table 6.1 shows that average conventional banks have 8.264 percent NPL_TL ratio, 0.295 percent higher than their Islamic counterpart, which has an average score of 7.969 percent. This result shows that there is less problem financing in Islamic banks

4. This study decides to exclude Iran from the conventional banks because the government of Iran allows only one banking system, Islamic banking without any alternatives.

than problem loans in conventional banks, but Islamic banks are less cost efficient compared to their conventional counterpart. Table 6.1 shows on average conventional banks score 93.7 percent cost efficiency, 5.30 percent higher than their Islamic counterpart. Therefore, the finding shows that conventional banks in the Middle Eastern region and Turkey are more cost efficient than Islamic banks. The comparison between conventional and Islamic banks in the Asian region shows a similar pattern.

Table 4.2.1 The Test ‘Bad Luck’ and ‘Bad Management’ Hypotheses of Conventional Banks for Asian, African, Middle Eastern and Turkish Regions

Region	Variable	Dep. Var. NPL_TL	Dep. Var COST_EFF	Variable	Dep. Var. NPL_TL	Dep. Var. COST_EFF
Asia	Intercept	1.51 [0.425]	0.293*** [6.300]	Intercept	2.597*** 3.240]	0.005 0.426]
	NPL_TL(-1)	0.757*** [6.848]	0.001 [1.016]	NPL_TL(1)	1.240*** [3.599]	0.005 1.513]
	NPL_TL(-2)	0.045 [0.338]	0.001 0.611]	NPL_TL(2)	0.855* 1.781]	0.010 [1.512]
	NPL_TL(-3)	0.116 [0.777]	0.002 1.306]	NPL_TL(3)	0.578** [2.538]	0.009* 2.050]
	NPL_TL (-4)	0.106 0.918]	0.003** [2.017]	NPL_TL(4)	0.148 [0.640]	0.001 0.256]
	Sum of Coefficient	0.812	0.001	Sum of coefficient	1.111	0.004
	COST_EFF (-1)	1.829 [0.234]	0.581*** [5.680]	COST_EFF(1)	10.579 0.648]	0.672*** [7.717]
	COST_EFF (-2)	7.437 0.858]	0.060 [0.531]	COST_EFF(2)	33.134 [1.699]	0.047 0.427]
	COST_EFF (-3)	1.221033 [0.148]	0.053 [0.495]	COST_EFF(3)	49.706** 2.370]	0.723** [2.793]
	COST_EFF (-4)	3.603 [0.586]	0.001 [0.019]	COST_EFF(4)	29.968* [2.137]	0.290 1.265]
	Sum of Coefficient	0.784	0.697	Sum of coefficient	2.816	1.058
	statistic	35.203***	32.067***	statistic	18.062***	90.466***
Adj. R squared	0.734	0.715	Adj. R Squaæd	0.883	0.975	
Africa	INTERCEPT	3.237* [1.779]	0.087 [1.040]	INTERCEPT	0.119 [0.085]	0.160 [0.777]
	LLP_TL(-1)	0.347*** [6.632]	-0.001 [-1.063]	FLP_TF(-1)	0.485*** [5.472]	0.022* [2.083]
	LLP_TL(-2)	0.196** [2.068]	0.004* [1.827]	FLP_TF(-2)	0.500** [2.460]	-0.004 [-0.306]
	LLP_TL(-3)	0.083 [1.064]	0.002 [1.552]	FLP_TF(-3)	0.266 [1.205]	-0.013 [-0.675]
	LLP_TL(-4)	-0.052 [-0.594]	-0.002 [-1.377]	FLP_TF(-4)	-0.258** [-2.385]	0.004 [0.287]

	SUM OF COEFF	0.573	0.002	SUM OF COEF	0.994	0.009
	COST_EFF(-1)	-6.399*** [-2.609]	0.675** [9.088]	COST_EFF(-1)	-1.124 [-0.678]	0.643*** [5.428]
	COST_EFF(-2)	5.988*** [3.073]	0.264*** [3.851]	COST_EFF(-2)	1.747 [1.064]	-0.166 [-0.883]
	COST_EFF(-3)	1.780 [0.975]	-0.052 [-0.832]	COST_EFF(-3)	-1.740 [-1.299]	0.126 [0.445]
	COST_EFF(-4)	-3.874* [-1.774]	0.017 [0.414]	COST_EFF(-4)	0.832 [0.658]	0.176 [1.542]
	SUM OF COEF	-2.505	0.904	SUM OF COEF	-0.285	0.778
	Adj. R-squared	0.285	0.576	Adj. R-Squared	0.824	0.421
	F-Statistic	10.067***	31.905***	F-Statistic	32.093***	5.816***
Middle East and Turkey	INTERCEPT	1.448 [0.788]	0.2997*** [4.0533]	INTERCEPT	18.290*** [3.011]	0.587*** [3.024]
	NPL_TL(1)	0.871*** [5.925]	0.0010 [0.8052]	NPF_TF(1)	0.813*** [3.172]	-0.006** [-2.202]
	NPL_TL(-2)	-0.012 [-0.087]	-0.0006 [-0.7884]	NPF_TF(-2)	-0.294 [-1.114]	0.004* [1.751]
	NPL_TL(-3)	-0.055 [-1.156]	0.0006 [0.7157]	NPF_TF(-3)	0.107** [2.240]	-0.002** [-2.425]
	NPL_TL(-4)	0.073* [1.658]	-0.0005 [-1.2415]	NPF_TF(-4)	-0.037 [-0.820]	0.002 [1.533]
	Sum of Coefficients	0.877	0.0004	Sum of Coefficients	0.588	-0.002
	COST_EFF(-1)	5.805 [1.333]	0.5317*** [6.9982]	COST_EFF(-1)	-11.595* [-1.833]	0.743*** [5.369]
	COST_EFF(-2)	-2.835 [-0.544]	-0.0582 [-0.5415]	COST_EFF(-2)	5.392 [0.821]	-0.596*** [-3.560]
	COST_EFF(-3)	-8.158* [-1.814]	0.0942 [0.7461]	COST_EFF(-3)	-18.447** [-2.524]	0.177 [1.202]
	COST_EFF(-4)	3.795 [0.665]	0.1198 [1.4029]	COST_EFF(-4)	6.946 [1.531]	0.049 [0.578]
	Sum of Coefficients	-1.392	0.6875	Sum of Coefficients	-17.704	0.373
	Adj. R-squared	0.762	0.4424	Adj. R-squared	0.617	0.445
	F-statistic	139.052***	35.2096***	F-statistic	9.870***	5.501***

The table reports coefficients and t-statistics in [], *, **, *** denote estimates significantly at 0.10, 0.05, 0.01 levels.

Note: The table reports coefficients and t-statistics in [], *, **, *** denote estimates significantly at 10%, 5% and 1% levels, respectively. Dep. Var. = dependent variable

The table reports coefficients and t-statistics in [], *, **, *** denote estimates significantly at 10 %, 5% and 1% levels, respectively

Bad Luck' Hypothesis Testing

The results show that for the Asian region, the adjusted R-squared for the equation where the ratio of NPL_TL as dependent variable and cost efficiency score as independent variable is 73.4% with F-statistic 35.203, which implies that the model is a good fit for estimating the NPL_TL. On the other hand, when the position changes where the cost efficiency is dependent variable and NPL_TL is the independent variable, the adjusted R-squared decreases to 71.5%. This result shows the joint effects of all the independent variables are significant. However the result is not statistically strong, because not all the variables are statistically significant. Since the interpretation of the result is based on the sum of coefficients, this finding is still meaningful and needs to be explored further. The results are the opposite for the Islamic banks, where the fraction of the variance of the ratio NPF_TF has more explanatory power to explain the cost efficiency.

For the African region the results obtained from the panel regression equation model shows that the value for the adjusted R-squared for the equation where the ratio of LLP_TL of conventional banks as dependent variable and cost efficiency score as independent variable implies that the model is good fit for estimating the LLP_TL. On the other hand, when the position changes to cost efficiency as dependent variable and LLP_TL as independent variable the adjusted R-squared increases. This result implies that the LLP_TL variable is higher. The results are not statistically strong, since the interpretation of the result is based on the sum of coefficients. The results show that the variation of LLP_TL is better in explaining the fraction of the variance of the cost efficiency, compared to the fraction of variance of the cost efficiency to explain the LLP_TL of conventional banks.

In addition, the opposite results are obtained for the Islamic banks, where the fraction of the variance of the cost efficiency has more explanatory power to explain the FLP_TF. The findings reveal the different impact of problem loan to cost efficiency ratio of conventional banks and problem financing to cost efficiency ratio of Islamic banks. The cost efficiency of conventional banks is more affected by the problem loans, but the Islamic counterpart is less affected by problem financing.

For the Middle Eastern and Turkey region the findings do not support the 'bad luck' hypothesis as there is no negative impact of non-performing loans to total loans ratio on the cost efficiency of conventional banks. These results are weak statistical support since among the four lags there is no significant lagged NPL_TL coefficient and the sum of the lagged NPL_TL coefficients is close to zero. Therefore, the result is not convincing to support the 'bad luck' hypothesis. On the other hand, the sum of the lagged NPF_TF coefficients of Islamic banks indicates the result supports 'bad luck'

hypothesis. The result is statistically significant, because three among the four lags of the coefficients are statistically significant. The sum of the lagged NPF_TF coefficients is close to zero; therefore, the economic impact of this result is typically small. This result suggests that the external events increase the non-performing financing in Islamic banks in Middle East region and Turkey, which in turn reduces cost efficiency as monitoring costs are increased as a consequence.

‘Bad Management’ Hypothesis Testing

The ‘bad management’ hypothesis predicts that the sum of coefficients on the lagged cost efficiency where the NPL_TL ratio as a dependent variable should be negative. So, low efficiency, or inefficiency, occurs before high non-performing loans. The result of the sum of the coefficients on the lagged cost efficiency is negative and is statistically weak support, because none of the individual coefficients of the lagged cost efficiency is significant. The findings above exhibit characteristics of ‘bad management’ for the four Asian countries’ conventional banks. This suggests that after measuring cost efficiency declines, non-performing loans increase, possibly because of poor loan portfolio management as predicted by the ‘bad management’ hypothesis. In addition, a different result is found for the Islamic banks; the result of the lagged cost efficiency coefficients is positive and is supported by two of the lagged NPF_TF coefficients which are statistically significant. Therefore, these findings imply that there is no evidence of ‘bad management’ in the relationship between cost efficiency and the NPF_TF ratio in Islamic banks in the Asian region.

The result of the sum of the coefficients on the lagged cost efficiency for the African region is found to be negative and the results are statistically significant. The results above support the evidence of bad management in the relation between LLP_TL and cost efficiency of conventional banks in the region. This suggests that after measured cost efficiency declines, LLP increases, possibly because of poor loan portfolio management as predicted by the ‘bad management’ hypothesis. The findings of Islamic banks revealed that the sum of the coefficients on the lagged cost coefficients where the FLP_TF is a dependent variable is negative, but the support is statistically weak, because none of the coefficients of the lagged cost efficiency are significant. This result supports the ‘bad management’ hypothesis in African region, but statistically the support is weak.

There is a similarity in negative signs of the sum of the lagged cost efficiency coefficients between the conventional banks and Islamic banks. The sum of the lagged cost efficiency coefficients is also negative. This finding shows two among four lags of the cost efficiency coefficients are statistically significant. In general the findings support the ‘bad management’ hypothesis in Islamic banks in the Middle East and

Turkey. These findings imply that the increase of problem loans in the conventional banks, as well as the increase of the problem financing of Islamic banks in the Middle East and Turkey are mainly contributed by poor management rather than external factors.

Skimping Hypothesis Testing

Table 4.2.2 Test of Skimping Hypothesis of Conventional and Islamic Banks in Asian, African, Middle Eastern and Turkish Regions (NPL_TL and NPF_TF as Dependent Variable)

Region	Variable (CBs)	Coefficient	t-statistic	Variable (IBs)	Coefficient	t-statistic
Asia	Constant	-2.037	-0.506	Constant	-3.042	-0.173
	PR_EFF(-1)	13.802***	7.145	PR_EFF(-1)	-3.966	-0.259
	PR_EFF(-2)	-3.846*	-1.997	PR_EFF(-2)	8.125*	1.817
	PR_EFF(-3)	13.244***	3.800	PR_EFF(-3)	-	-
	PR_EFF(-4)	-20.316***	-5.522	PR_EFF(-4)	-	-
	Sum of Coeff.	2.883		Sum of Coeff.	4.159	
	Adj. R-squared	0.952		Adj. R-squared	0.861	
	F-statistic	47.694***		F-statistic	27.253***	
Africa	Constant	4.744	0.970	Constant	-15.302	-1.124
	PR_EFF(-1)	-4.314**	-2.327	PR_EFF(-1)	5.60	1.263
	PR_EFF(-2)	-0.710	-0.155	PR_EFF(-2)	-10.643**	-2.725
	PR_EFF(-3)	7.026*	1.700	PR_EFF(-3)	-5.467	-2.725
	PR_EFF(-4)	-6.058**	-2.371	PR_EFF(-4)	<u>25.508***</u>	5.841
	Sum of Coeff.	<u>-4.057</u>		Sum of Coeff.	15.001	
	Adj. R-squared	0.972		Adj. R-squared	0.899	
	F-statistic	180.964***		F-statistic	21.845***	
Middle East and Turkey	Constant	-1.880	-0.098	Constant	-4.019	-0.797
	PR_EFF(-1)	1.453	0.082	PR_EFF(-1)	-0.473	-1.050
	PR_EFF(-2)	1.551	0.151	PR_EFF(-2)	0.287	0.718
	PR_EFF(-3)	1.557	0.355	PR_EFF(-3)	4.852	1.056
	PR_EFF(-4)	-2.309	-1.070	PR_EFF(-4)	-	-
	Sum of Coeff.	2.252		Sum of Coeff.	4.667	
	Adj. R-squared	0.882		Adj. R-squared	0.899	
	F-statistic	94.219***		F-statistic	21.845***	

Note: CBs = conventional banks; IBs = Islamic banks, the number of observations for conventional banks is 406 and the number of observation of the Islamic banks number of observations is 54. ***, ** denote estimates significantly at 10%, 5% and 1% levels, respectively

Note: CBs = conventional banks; IBs = Islamic banks. LLP_TL is dependent variable for conventional banks and FLP_TF is dependent variable for Islamic banks.

Note: CBs = conventional banks; IBs = Islamic banks. Number of observations for conventional banks = 146, and number of the Islamic banks number of observations = 38. NPL_TL is dependent variable for conventional banks, and NPF_TF is dependent variable for Islamic banks.

The reasons for using the profit efficiency estimation are as follows: under the 'skimping' hypothesis output quality is a choice variable considered from a sub-sample of the most efficient banks because output quality affects both costs (underwriting and monitoring costs) and revenues (lost revenues from NPL). Therefore, this study used the sub-sample of the most profit efficient banks which comprise banks whose efficiencies are greater than the average efficiency in each year.

The results for the Asian region in Table 4.2.2 show that the model is fit and can be used to explain the NPL_TL, because 95.2 percent of the fraction of the variance of the NPL_TL is explained by the lagged values of profit efficiency. The t-statistic results show that all the lagged coefficients of profit efficiency are significant at the 1 percent level, except the lagged (-1) of profit efficiency is significant at the 10 percent level. Therefore the result of the sum of the lagged profit efficiency coefficients is statistically significant suggesting that measured profit efficiency positively causes non-performing loans among highly efficient banks, supporting the 'skimping' hypothesis. Due to limitation of available data, the 2-year lags model is used for the NPF_TF of Islamic banks equation when the selected sub-sample is above average. The result reveals similar positive signs of the lagged profit efficiency coefficients of the Islamic banks as their counterpart of conventional banks. Therefore, the results show the tendency towards 'skimping' behavior for profit efficiency of Islamic banks in Asian region. This result suggests that measured profit efficiency of Islamic banks in Asian region positively causes non-performing financing among highly efficient banks. Thus, supports the 'skimping' hypothesis.

The result of the sum coefficients on the lagged profit efficiency for the African region equals -4.057 and is supported by significantly statistical results. This result indicates that there is no indication of 'skimping' behavior of conventional banks in the African region. The result of the sum of coefficients on the lagged profit efficiency of Islamic banks is positive. The result seems to support 'skimping' behavior in Islamic banks in the region. This suggests that measured profit efficiency of Islamic banks in the African region positively causes problem financing among highly efficient banks, supporting the 'skimping' hypothesis.

The findings of both conventional and Islamic banks in the Middle East and Turkey support the 'skimping' hypothesis. There is a possibility that the high volume of problem loans or financing in these regions is based on a conscious decision of the bank because its management might be trading off between short-term operating costs and long-run profitability. The management might rationally decide to reduce short-term expenses by 'skimping' resources allocated to loan origination and monitoring, at the expense of greater problem loans and costs in the future (Isik and Hassan, 2003).

Moral Hazard Hypothesis Testing

The final hypothesis, “moral hazard” predicts that sum of coefficients on the CAP lags in the LLP_TL of conventional banks or FLP_TF of Islamic Banks will be negative. The moral hazard hypothesis is tested only for subsample thinly capitalized banks (below median), because banks with high level capital likely do not face significant moral hazard incentives.

Table 4.2.3 The Test of ‘Moral Hazard’ Hypothesis on Conventional and Islamic Banks in Asian, African, Middle Eastern and Turkish Regions (NPL/TL and NPF/TF as Dependent Variable)

Region	Variable (CBs)	Coefficient	t-statistic	Variable (IBs)	Coefficient	t-statistic
Asia	Constant	2.535	1.01	Constant	6.100	1.463
	CAP(-1)	-0.177	0.358	CAP(-1)	-1.325	-1.884*
	CAP(-2)	-0.556	1.255	CAP(-2)	0.989	1.559
	CAP(-3)	-0.365	0.759	-	-	-
	Sum of Coefficients	-0.368	-0.259	Sum of Coefficients	-0.336	-0.251
	NPL/TL(-1)	0.997	5.295***	NPF/TF(1)	0.602	1.635
	NPL/TL(-2)	0.202	0.934	NPF/TF(2)	-0.184	0.652
	NPL/TL(-3)	-0.311	-2.014*	-	-	-
	Sum of Coefficients	0.887	1.588	Sum of Coefficients	0.418	0.652
	Adj. R-Squared	0.928			0.841	
	F-Statistic	97.301	0.000***		15.505	0.001***
	Africa	Variable (CBs)	Coefficient	t-statistic	Variable (IBs)	Coefficient
Constant		4.514	2.235**	Constant	-0.461	-1.168
CAP(-1)		-0.491	-1.079	CAP(-1)	-0.089	-1.074
CAP(-2)		-0.084	-0.108	CAP(-2)	0.064	0.833
CAP(-3)		0.113	0.177	CAP(-3)	0.085	1.219
Sum of Coeff.		-0.462	-0.246	Sum of Coeff.	0.060	0.263
LLP/TL(-1)		0.019	0.145	LLP/TL(1)	1.064	4.904***
LLP/TL(-2)		0.966	2.143*	LLP/TL(2)	-0.174	-0.631
LLP/TL(-3)		-0.620	-1.418	LLP/TL(3)	0.014	0.092
Sum of Coeff.		0.365	0.359	Sum of Coeff.	0.905	1.395
Adj. R-squared		0.035		Adj. R-squared	0.893	
F-statistic		1.349	0.253	F-statistic	52.451	0.000

Middle East and Turkey	Variable	Coefficient (CBs)	t-statistic	Variable (IBs)	Coefficient	t-statistic
	Constant	2.571	2.007**	Constant	3.044	0.168
CAP(-1)	-0.002	-0.012	CAP(-1)	-3.424	1.779*	
CAP(-2)	0.022	0.088	CAP(-2)	0.522	0.286	
CAP(-3)	-0.138	-0.739	CAP(-3)	2.725	1.558	
CAP(-4)	-0.159	-1.161	CAP(-4)	-	-	
Sum of Coeff.	-0.277	-0.355	Sum of Coeff.	-0.177	-0.032	
NPL/TL(-1)	0.849	9.164***	NPF/TL(1)	0.707	3.250***	
NPL/TL(-2)	-0.033	-0.347	NPF/TL(2)	0.021	0.148	
NPL/TL(-3)	-0.091	-1.082	NPF/TL(3)	0.183	1.414	
NPL/TL(-4)	0.130	1.873*	NPF/TF(4)	-	-	
Sum of Coeff.	0.855	2.493**	Sum of Coeff.	0.910	1.875*	
Adj. R-squared	0.789		Adj. R-squared	0.450		
F-statistic	52.475		F-statistic	3.723		

Null Hypothesis: CAP does not cause NPL/TL Reject CAP does not cause NPF/TF Reject *** significant at 1%; ** significant at 5%; * significant at 10%

Table 4.2.4 shows the result that the sum of coefficients on the CAP lags of conventional banks in Asia indicates that null hypothesis that CAP does not cause NPL is rejected, and accepts the moral hazard hypothesis. This result implies that decreases in bank capital ratios generally precede increases in non-performing loans for banks with low capital ratios, evidence that thinly capitalized banks may respond to moral hazard incentives by taking increased portfolio risks. The results for Islamic banks indicate that null hypothesis CAP does not cause NPF/TF is rejected, and accepted the moral hazard hypothesis.

The results for the African region indicate that the null hypothesis CAP does not cause LLP_TL is accepted, and rejects the moral hazard hypothesis. The table shows that for conventional banks, the sum of coefficients on the CAP lags (-1 to -3) is - 0.462. This result indicates that null hypothesis does not cause LLP_TL is rejected, which means that the moral hazard hypothesis is accepted.

The result in table 6.4.4 below shows that the sum of coefficient on the CAP lags (1 to 4) of conventional Banks is -0.277. This result indicates that null hypothesis CAP does not cause NPL_TL is rejected, and accepts the moral hazard hypothesis. For Islamic banks, the sum of coefficient on the CAP lags (-1 to -3) is -0.177. This result indicates that null hypothesis CAP does not cause NPF_TF is rejected, and accepts the moral hazard hypothesis.

5. CONCLUSIONS

The objectives of this paper are twofold. First, this study describes whether there are similarities and differences in problem loan and financing and efficiencies between the conventional and Islamic banks in three regions, namely Asia (4 countries), Africa (6 countries), and the Middle East (13 countries) and Turkey. Second, this paper seeks to explain the inter-temporal relationship between non-performing loans and conventional bank efficiency; and to explain the inter-temporal relationship between non-performing financing and Islamic bank efficiency. Using actual data of both conventional and Islamic banks from 1993 to 2007, cost and profit efficiency are estimated by Data Envelopment Analysis (DEA) method. The efficiency scores are then used in the second stage to investigate the inter-temporal relationship between non-performing loans and non-performing financing and banking (conventional and Islamic) efficiency.

Table 5.1 shows the cost efficiency estimation results of conventional banks, indicating an average cost efficiency score of 94.60 percent for the total sample. This suggests that conventional banks are wasting 5.71 percent⁵ of their inputs. The cost efficiency estimation results of the total sample of Islamic banks indicate an average cost efficiency score of 87.70 percent. This suggests that Islamic banks are wasting 14.02 percent of their inputs. Overall findings show that conventional banks on average are more cost efficient compared to Islamic banks, for the total sample.

Table 5.1 Summary of the average of NPL_TL, NPF_TF and Cost Efficiency of Conventional and Islamic Banks in OIC Countries

REGION	NPL_TL/ LLP_TL (CBs)	COST_EFF (CBs)		NPF_TF/ FLP_TF (IBs)	COST_EFF (IBs)
Asian	8.813	0.950		6.596	0.873
African Region*	2.303	0.951		2.849	0.873
Middle East & Turkey	8.264	0.937		7.969	0.884
Simple average	8.538**	0.946		7.282**	0.877

Note: * African region uses LLP_TL of conventional banks, and FLP_TF of Islamic banks.

CBs = conventional banks; IBs = Islamic banks. ** the simple average for NPL_TL and NPF_TF of Conventional and Islamic banks in Asian and Middle East and Turkey

A table 5.1 show on average NPL_TL of conventional banks is 8.538 percent, 1.256 percent higher than the Islamic banks counterpart, which on average has an NPF_TF of 7.282 percent. These results clearly indicate that higher non-performing loans do not reduce cost efficiency of conventional banks. In other words, efficiency of

5. The relationship between efficiency (E) and inefficiency (IE) is $IE = (1-E)/E$. Thus, the 94.60 percent efficiency implies 5.71 percent inefficiency, not 5.4 percent (or not $1 - 0.946$).

conventional banks is still high, but non-performing loans do not decrease or even increase efficiency as supported by the results for two of the regions, Asia and the Middle East and Turkey, thus supporting the ‘skimping’ hypothesis as shown in the table 5.2.

Table 5.2 The Summary of the result of the Three Hypotheses for Conventional and Islamic Banks of OIC Countries

Conventional Banks				Islamic Banks		
Hypothesis	Asian	African	ME & T	Asian	African	ME & T
Bad Luck	Reject	reject	Reject	accept	Reject	Accept
Bad Management	Accept	accept	Accept	reject	accept	Accept
Skimping	Accept	reject	Accept	accept	accept	Accept

Note: ME & T = Middle East and Turkey

Table 5.2 summarizes the results of the inter-temporal relationship between bank efficiency and problem loan proxied by non-performing loans to total loans (NPL_TL) of conventional banks and problem financing is proxied by non-performing financing to total financing (NPF_TF) of Islamic banks for Asia, the Middle East and Turkey. Problem loans is proxied by loan loss provisions to total loan (LLP_TL) for conventional banks and problem financing is proxied by financing loss provisions to total financing (FLP_TF) for Islamic banks in the African region. The results support the ‘bad management’ hypothesis for both conventional and Islamic banks (except in Asian region). This hypothesis suggests that an increase in non-performing loans and non-performing financing of conventional and Islamic banks is preceded by a decrease in cost efficiency.

The result rejects the ‘bad luck’ hypothesis for conventional banks in all regions. However, the result supports ‘bad luck’ hypothesis for Islamic banks in the Asian and Middle East regions and Turkey. This hypothesis suggests that an increase in non-financing precedes the decrease in cost efficiency of Islamic banks. The result implies that problem financing of Islamic banks may be driven by uncontrollable external or exogenous factors. Therefore, the banks incur additional monitoring costs to face these external events, which results in a decrease in the cost efficiency. The result supports the ‘skimping’ hypothesis for conventional and Islamic banks in all regions, except for conventional banks in the African region. This hypothesis suggests that there is a positive relationship between the problem loan or problem financing and profit efficiency. The finding implies that there is a possibility that the high volume of problem loans and financing in these regions is based on a conscious bank management decision because the management might be trading off between

short-term operating costs and long-run profitability. The management might rationally decide to reduce short-term expenses by skimping resources allocated to loan origination and monitoring, at the expense of greater problem loans and costs in the future (Isik and Hassan, 2003).

The limitation of analysis to fulfill the requirement of DEA Solver, the data in inputs or outputs cannot be allowed to be negative, and the DEA approach can be used if only one observation in each year is available. The results range from $0 < 1$. A lot of missing data has to be proxied in order to get the results. The negative scores and efficiency scores of more than 1 are excluded in this study. The outliers may influence the results. On the other hand, panel regression is used to construct the inter-temporal relationship between NPL or NPF and efficiencies. The inter-temporal relationships revealed by the panel regression techniques are gross statistical associations only, and do not necessarily prove economic causation.

REFERENCES

- Adongo, J., et al (2005). Measuring the Alternate Profit X-efficiency of Namibia's Banking Sector. NEPRU RESEARCH REPORT No. 36
- Ahmad, T.K. (2000). The efficiency of the banking system in Jordan 1990-1996. Unpublished doctoral dissertation, Colorado State University, Fort Collins, Colorado.
- Al-Deehani, T., et al. (1999). The Capital structure of Islamic banks under the contractual obligation of profit sharing. *International Journal of Theoretical and Applied Finance*. 2, No. 3, pp. 243-283.
- Babihuga, R (2007). Macroeconomic and financial soundness indicators: An empirical investigation. IMF Working Paper, 07/115
- Bader, M.K.(2007). International evidence on cost, revenue, and profit efficiency of conventional and Islamic banks. Unpublished doctoral dissertation, Graduate School of Management, Universiti Putra Malaysia, Serdang, Malaysia.
- Bader, M.K., et al. (2008). Cost, Revenue, and Profit Efficiency of Islamic versus Conventional Banks: International Evidence Using Data Envelopment Analysis. *Islamic Economic Studies*. Vol. 15. No. 2
- Berger, A.N., & DeYoung, R (1997). Problem loans and cost efficiency in commercial banks. *Journal of Banking and Finance*, 21(6), 849-870
- Berger, A.N., & Humphrey, D.B. (1997). Efficiency of financial institutions: international survey and directions for future research. *European Journal of Operational Research*, 98: 175-212

Berger, A.L. & Mester, L.J. (1997). Inside the black box: What explains differences in the efficiencies of financial institution. *Journal of Banking & Finance* 21.895-947

Caprio, G and Klingebiel, D. (2003). Episodes of systemic and borderline financial crises. World Bank: Finance Research.

Chang, T., & Chiu, Y. (2006). Affecting factors on risk-adjusted efficiency in Taiwan's banking industry. *Contemporary Economic Policy*, 24(4), 634-648.

Chen, Y.K., (2001). Three essays on bank efficiency. Unpublished doctoral thesis, Drexel University.

Demirgüç-Kunt, A. and Levin (1996). Stock Market Development and Financial Intermediaries, The World Bank. WPS: 1462

Frost, S.M., (2004), *The Bank analyst's handbook, money, risk and conjuring tricks*. England: John Willey & Sons, Ltd.

Ghannadian, F.F., Goswami, G. (2004). Developing economic banking: the case of Islamic banks. *International Journal of Social Economics*. Bradford: Vol. 31

Girardone, Claudia, et al. (2004). Analysing the determinants of bank Efficiency: The case of Italian banks. *Applied Economics Journals*, 36(3) 215-227.

Gray, J.L., Harvey, T.W.(1992). *Quality value banking*. NY: John Wiley & Sons, Inc.

Guillén, J. (2006). Three Essays on Banks' Relative Efficiency. Ph.D thesis (unpublished). West Virginia University, Morgantown, West Virginia.

Haron, Sudin and Wan Nursofiza Wan Azmi (2005, November 21-24). Measuring depositors' behaviour of Malaysian Islamic banking system: A co-integration approach. Paper presented at 6th International Conference on Islamic conomics and Finance, Jakarta- Indonesia.

Hassan, T., Mohamed, S., & Bader, M. K. I. (2009). Efficiency of conventional versus Islamic banks: evidence from the Middle East. *International Journal of Islam and Middle Eastern Finance and Management*, 2(1), 46-65.

Iqbal, Zamir, Abbas Mirakhor (2007). *An introduction to Islamic finance theory and practice*. Singapore: John Wiley & Sons.

Isik, I., & Kabir Hassan, M. (2003). Financial deregulation and total factor productivity change: An empirical study of Turkish commercial banks. *Journal of Banking & Finance*, 27(8), 1455-1485.

Karim, M.Z.A., et al.(2010). Bank efficiency and non-performing loans: Evidence from Malaysia and Singapore. *Prague Economic Papers*, 2.

Khair, K., Gupta, L., Shanmugam, B. (2008). *Islamic banking a practical perspective*. Selangor Darul Ehsan, Malaysia: Pearson Malaysia Sdn. Bhd.

Li,Y., Jin-L.H, Hsin-W.L (2004). Non-performing loans and bank efficiencies: An Application of the Distance Function Approach. *Journal of Statistics and Management System* (forthcoming).

Li,Y., Jin-L.H, Hsin-W.L (2004). Non-performing loans and bank efficiencies: An Application of the Distance Function Approach. *Journal of Statistics and Management System* (forthcoming).

Mokhtar, H.S.A., et al., (2006). A conceptual framework for and survey of Banking Efficiency Study. *UNITAR E-JOURNAL*, 2 (2).

Pollard, J and Samers, M. (2007). Islamic banking and finance: postcolonial political economy and the decentring of economy geography. *Journal Compilation*, ISSN 0020-2754.

Podpiera, J., & Weill, L. (2008). Bad luck or bad management? Emerging banking market experience. *Journal of Financial Stability*, 4(2), 135-148.

Qorchi,E.M., (2005). Islamic finance gears up. *Finance and development*. 42 (4). Washington: International Monetary Funds.

Ranjan, R and Dhal, S.C. (2003). Non-performing loans and terms of credit of public sector banks in India: An empirical assessment. *Reserve Bank of India Occasional Paper*. 24 (3) (Winter).

Rim, K.T. (1996). International comparison of bank efficiency: An empirical study of large commercial banking in the United State and Japan. A Ph.D. dissertation in The Graduate School of the Ohio State University. Unpublished.

Rossi, S.P.S., et al.(2005). Managerial behavior and cost/profit efficiency in the banking Sectors of Central and Eastern European countries. *Oesterreichische National Bank. Working Paper No. 96*.

Safakli, O.V. (2007). Credit Risk Assesment for the Banking Sector of Northern Cyprus <http://joy.yasar.edu.tr/makale/6.sayi/safakli.pdf>

Samad, A. & Hassan, M.K. (1999). The Performance of Malaysian Islamic bank during 1984-1997: An exploratory study. *International Journal of Islamic Financial Services*.1 No 3

Solé, Juan (2007). Introducing Islamic banks into conventional banking systems. Washington: International Monetary Funds Working paper. 07/175

Williams, J.(2004). Determining management behaviour in European banking. *Journal of Banking & Finance* (28) 2427-2460

Zaher, T.S., Hassan, M.K. (2001). A comparative literature survey of Islamic finance and banking. *Financial Markets, Institutions & Instruments*, V.10, 4.

Zhu, Joe (2009). *Quantitative Models for Performance Evaluation and Benchmarking: DEA with Spreadsheets* (2nd edition), Boston: Springer.

