Impact of Global Financial Crisis: Evidences from the Cross-country Islamic Banks

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Abstract

This paper explores an empirical investigation as to whether the global financial crisis (GFC) has had its impact on the efficiency of Islamic banks operating in 16 countries. Efficiencies of Islamic banks are estimated using time varying decay model of Stochastic Frontier function. This paper finds there is an 89 percent variation between actual and potential output due to technical inefficiency of the bank. Mean efficiencies between PGFC and DGFC were estimated 39 and 38 percent respectively. The statistical insignificance of the degree of inefficiency over periods and the low ANOVA F-statistics supports that the mean efficiency did not change between PGFC and DGFC suggesting that GFC did not have a significant impact on the Islamic banks' efficiency.

JEL Classification: C13, C23, C33, G21

Keywords: Islamic bank, Efficiency, Global financial crisis, Stochastic Frontier Method

Introduction

The 2008-2009 Recession was the most severe recession since the Great Depression of 1929-1933. European economy and its financial system suffered a great shock. In the U.S., the impact of recession is seen everywhere in the economy. The housing market collapsed, unemployment exceeded over 10 percent, and the growth rate of the economy was negative. The most devastating effect was seen in the financial sector. One hundred forty banks went bust in 2009 and 157 banks were wiped out in 2010 (Time, January 2012). Such a large scale bank failure has never occurred in the financial history of the United States since the Great Depression. It resulted in one of the greatest financial crisis around the world.

An important question is: does this global financial crisis have its impact on Islamic Financial Institutions, Islamic banks in particular? Citing a report from Moody's and RBS, Paul Koster, Chief Executive of DFSA said the Islamic finance industry is set to grow from $700bn (Dh2,571bn) to $4trn by 2013, and despite the global financial crisis, Islamic banking is still projected to grow by 15-20 percent annually (Koster, 2009).

While the world observes the global financial crisis (GFC), there are claims that Islamic banks (IB) are performing well and should be considered as an alternative option as the conventional banks face serious problems and challenges from the U.S. subprime lending crisis and recession (Apps, 2008). Given

the recent global credit crisis and fears of economic recession, Apps (2008) claimed that many investors reportedly consider IB to be more reliable to conventional financing.

While there are claims that Islamic banks are performing well, there are no empirical evidences that Islamic banks face no challenges from global financial crisis in terms of performances and efficiencies. So, it is time to empirically investigate the claim that Islamic banks' efficiencies and performance remain unaffected by the global financial crisis.

Finding empirical evidence that Islamic banks' efficiencies remain unhurt and stabilized following from the GFC is an important contribution of this paper in the banking literature and a lessor for conventional bank patrons.

This paper is organized as: Section II outlines a short survey of literature. Section III outlines the key characteristics of Islamic bank and its product uniqueness. Section IV describes methodology, data and model. Empirical results and conclusions are provided in Section V.

II Survey of Literature

Bank efficiency studies are voluminous. Most of these studies dealt with conventional banks and were for the developed countries[1]. There are few bank efficiency studies for less developed countries. These studies include, among others, Bhattacharya, et al, 1997; Shanmugam and Das (2004); Kumbhakar and Sarkar (2003); and Asaftei and Kumbhakar (2008). However, these studies did not deal with Islamic bank efficiencies.

There are no studies related to estimating comparative efficiencies of Islamic banks across nations between the pre GFC and the GFC period, in particular. However, there are studies that dealt with other issues as follows. For examples, Uppal an Mangla (2010) examines the experience of Islamic banks of two countries (Pakistan and Malaysia) with respect to global financial crisis (GFC) and found that Islamic banks of these countries "were not immune from the ravages of the GFC" (P.167). However, their study did not focus on the average efficiencies of Islamic banks. Their study focused on relative ratios between two periods (pre GFC and during GFC) and found that Islamic banks were not immune from the impact of GFC.

Farook (2009) thinks that the major factor behind the recent global financial crisis is financialization of the system and the growing disconnect between the monetary and the real sector. He suggested the need for Islamic finance to be connected to the real sector of the economy.

Ashkari, Iqbal, and Mirakhor (2009) study claims that Islamic banks are viable and superior alternatives to conventional banks because Islamic banks have unique product characteristics.

Samad (2004, 1999) made a comparison of performance between interest-free Islamic banks and interest-based conventional banks of Bahrain and Malaysia with respect to profitability, liquidity risk, and credit risk. Kazarian (1993) compares Islamic banking with conventional banking in Egypt. Arif (1993) evaluated the performance of Bank Islam Malaysia during the first six years of its establishment.

Studies on the theoretical front include Chapra (1985), Siddiqi (1983), Zeneldin (1990), Kahf(1999), Khan and Mirakhor (1986), Iqbal and Mirakhor (1999), and Mannan (1998). They discussed the institutional issues of Islamic bank operation, including Arabic concepts and principles of finance that are subject to interpretation. Maniam, Baxely, and James (2000) analyze the perception of Islamic financing in the U.S., along with a discussion of the problems of applying Islamic financing tools.

Samad, Gardner, and Cook (2005) focused on identifying the relative importance of Islamic financial products by examining the balance sheet of two Islamic banks, Bank Islam Malaysia and Islamic Bank of Bahrain.

[1] Berger and Humphrey (1997), Berger and Mester (1997) and Bar et al (1999).

Askari and Mirakhor (2009), Bacha (1995), and Siddiqi (1983) dealt with institutional and product issues of Islamic banks. Askari and Mirakhor argued that a profit and loss sharing contract, being equity based, is better than a conventional equity contract.

Apps (2009) study is not an empirical study. It is rather a descriptive study with statistical references.

The short survey of literature clearly shows that there are no cross country Islamic banks' efficiency studies between two periods and its impact on Islamic banking. Finding the answer to whether the GFC had its impact on Islamic banks is a major contribution of this paper.

III Key Characteristics of Islamic bank and its product uniqueness

Key characteristics of Islamic bank

The important characteristic of Islamic bank is that it operates without interest. All transactions of banks are interest free. This is based on the Divine prohibition mentioned in the Quran (2:185). The Quran explicitly prohibits 'riba' without defining and explaining what "riba" is. Based on the interpretation of the most of Islamic scholars, "riba" and interest are equivalent. The payment of interest or receiving of interest, which is the cornerstone of conventional banking and financing, is explicitly prohibited in Islamic banking and finance. Thus, the prohibition of interest, in payment or receipt, is the nucleus of Islamic banking and its financial instruments.

The Islamic banking is not simply interest-free financing. It incorporates other features such as Zakat and Qardhasan. 'Zakat' is a compulsory religious tax. Each Islamic bank must establish a 'Zakat' fund and pay 'Zakat' if it earns profits. The payment of 'Zakat does not exclude Islamic banks from the payment of corporate business tax. Qard Hassan is a "goodwill" loan as used in conventional economics. It is zero return loan.

Key characteristics of Islamic bank Products

The avoidance of interest in Islamic financing has led Islamic banks to innovate various Islamic products as a viable substitute for conventional products. Based on the nature of contracts, these Islamic financial products may be classified into two broad categories**: (A)** Equity type contract; (**B)** mark-up price (debt) type contract.

(A)Equity type contracts

Based on profit and loss sharing (PLS) principle, there are two equity type equity contracts: 'Musharakah' (partnership) and 'Mudaraba'(trust financing).

Musharakah is a partnership contract between two or more parties. The key characteristics of is that both parties contribute capital investment, and profits are shared by pre-arranged agreement, not necessarily in proportion to their invested capital. In case of loss, both parties share in proportion to their capital contribution. The second element of Musharakah contract is that both parties share and control the managements of the investment. The third element of the Musharakah is that liability is unlimited. "Therefore, each partner is fully liable for the actions and commitments of the other in financial matters"(Manian, Bexley and James, 2000, p. 26).

Mudaraba (Trust Financing) is a contract between the two parties – the financier (supplier of funds) and the entrepreneur (trustee of the venture)- share profits according to the agreed-upon profit and loss sharing (PLS) ratio. The first key element of a Mudaraba contract is that the return is not guaranteed to the lender. This is in direct contrast to conventional interest-based lending/ financing. In interest-based

lending, a loan is **not** contingent upon profit or loss outcome of the entrepreneur, and is normally secured by collateral. Thus, any losses must be borne by the debtor, not the lender. The second key element of a Mudarabah contract concerns losses that may arise from the business venture. "The financier or investor is not liable for losses beyond the capital he has contributed, and the entrepreneur or trustee does not share in financial losses except for the loss of his time and efforts" (Maniam, Bexley and James, 2000, p.4).

B. Mark-up price (debt) type contracts

The basic principle of mark-up contracts is that the bank finances the purchase of assets in exchange for a negotiated profit margin. There are two, among five, widely used instruments in this category:

Murabaha (Cost plus profit margin) is a cost-plus-profit-margin contract where the bank purchases the assets/goods on behalf of an entrepreneur/ a client and resells the asset to the client at predetermined price that covers the cost of product and an added negotiated profit margin. Under this contract, payment is made in the future in lump sum or in installments. The key characteristic of 'Murabahah' is that ownership of the asset remains with the bank until complete payments are paid up. Murabaha (Cost plus profit margin) is a substitute for interest-based conventional trade financing. From an economic point of view, Murabahah financing and interest-based trade financing appears quite similar except in the contractual features.

Al Ijarah (Lease financing) is the financing for the use of an asset. Under Al-Ijarah financing contract the Islamic bank purchases the assets on behalf of entrepreneurs or clients, and allows the entrepreneurs to use it for a fixed rental payment. The key characteristic of Al-Ijarah is that ownership of the asset/product belongs to the Islamic bank or is gradually transferred to the entrepreneur or client in a rent-to-own contract.

The key characteristics of Islamic bank and the uniqueness of its product features can claim that Islamic banks are less vulnerable or free from adverse economic shock. The claim of superiority needs to be examined and deserve examination.

IV Methodology

This paper employs the time varying decay model of stochastic frontier production function for the measuring technical efficiencies (TE) of banks. The frontier production function F(X) is defined as the maximum feasible output that can be produced by a banking firm with a given level of technology and input. The actual production function of a bank can be written as:

$Q_{it} = f(X_{it}, \beta) \exp(-u_{it})$; $0 \leq u_{it} \leq \infty$;

i= 1, 2, ----n, t = 1, 2, -------T (1)

Where Q_{it} = actual output of sample bank i in period t; X_{it} is a vector of inputs used by bank, and β is a vector of parameters

U_{it} is one sided (non-negative) residual. If the performance of a bank is inefficient, its actual output is less than its potential output. (In other words, if a bank is efficient, its output is equal to its potential output). Therefore, TE is the ratio of the actual output Q_{it} to potential output of a bank in period t as:

$$TEi = \frac{Qit}{\exp(xiB)} = \frac{\exp(xiB - ui}{\exp(xiB)} = \exp(-u_i). \quad (2)$$

When the residual term (u_{it}) is zero, the bank produces the potential output and the bank is fully TE. When (u_{it}) >0, the bank produces less than its potential output. If the bank is less than full TE, it operates below the production frontier. Thus, u_{it} is a bank's TE and it is inversely (negatively) related.

For capturing the effects of omitted variables (i.e. measurement errors), a random error, ϑ_{it} is included in (1) which gives:

$Q_{it} = f(X_{it}, \beta) \exp(\vartheta_{it} - u_{it})$ (3)

Where ϑ_I is a random error and is assumed to be iid (independent and identically distributed) as $N(0,\sigma_v 2)$ and independent of u_i which represents technical efficiency/inefficiency.

Battese and Coelli (1992), proposed a model in which the parameters of technical inefficiency (u_{ith}) are estimated with the method of maximum likelihood and can be written as:

$U_{ith} = \{\exp[-\gamma(t - T)]\}u_i$ (4)

Where γ is unknown parameter that must be estimated, u_i 's are non-negative random variable and $u_i \sim iidt(\mu,\sigma_u^2)$, $v_{it} \sim N(0, \sigma_v^2)$. That is, u_i is independently and identically distributed as truncated normal with mean μ and variance, σ_u^2.

From (4) it is seen that as t increases, u_{it} decreases, remains constant or increases depending on the value of γ. A bank TE increases, remains constant or decreases when $\gamma > 0$, $\gamma = 0$ or $\gamma < 0$ respectively.

The value of $\gamma = \frac{\sigma_u^2}{\sigma}$. Where $\sigma = (\sigma_u^2 + \sigma_v^2)$. Thus, $0 < \gamma < 1$. If $u_i = 0$, $\gamma = 0$, and all deviations from the frontier are entirely attributed to noise term, v_{it}. In this case the parameter estimate of ML is the same as OLS estimate. If $\gamma = 1$, all deviation from the frontier are due to technical inefficiency.

In time varying decay model, the inefficiency effects are modeled and estimated as:

$U_{ith} = \{\exp[-\eta(t - T)]\}u_i$ (5)

When $\eta > 0$, the degree of inefficiency decreases (efficiency increases) over time; when $\eta < 0$, the degree of inefficiency increases (efficiency decreases) over time.

The null hypothesis that $\gamma = \eta = \mu = 0$ can be tested using the generalized likelihood ratio test statistics which equals twice the difference between the logarithmic likelihood values of unrestricted and($\gamma = \mu = 0$) ML. The test statistics approximates a mixed χ^2.

Data and Model

This study collects data of 28 banks from 13 countries. Data is collected online from the annual reports of individual banks. Data for all input and output are the averages of 2006 and 2007 representing pre GFC and 2008 and 2009 representing the GFC period.

The measure of bank output (production) is controversial in banking literature mainly because a bank provides a variety of services such as issue of deposits, loans, and discounts. That is, there is no consensus over what banks produce (i.e. output) and what are banks' inputs (i.e. resources) used to product outputs. There are two approaches which most researchers use in banking study. They are either production approach or intermediate approach. Berger, *et al* (1992) provides detailed discussions about it. According to the intermediate approach, bank outputs are assets and these assets are generated by utilizing their liabilities, labor and capital. Deposit is, thus, considered as input and loans and investments are defined as output. According to the production approach, banks use capital and labor including other financial inputs to produce outputs which are services such as deposits and advances (Ferrier and Lovell,1990).

This paper uses the intermediate approach in determining bank inputs and outputs. That is, loans/advances are used as a banks' output (Q). These outputs are generated by applying two inputs such

as labor and capital. The total value of a bank's physical capital, premises, and equipment is considered as capital (K). The total number of employees is considered as labor (L). Due to lack employee data, this paper used salary expenses to represent labor.

This paper estimates the following Cobb-Douglas production function as:

$$\ln(Q_{it}) = \beta_0 + \beta_1 \ln(K_{it}) + \beta_2 \ln(L_{it}) + V_{it} - U_{it} \quad (7)$$

Where Q is the output represented by total loans and investments, K is capital, L is labor, and ln is a natural log of all variables.

V Empirical Results

Result of the ML estimation for equation (7) is presented in Table 1.

Table 1
Maximum Likelihood Estimates of Stochastic Frontier Function for Islamic Banks across Nations

Variables	Coefficient	Standard Error
Constant	5.22*	1.29
lnCapital	0.014***	0.009
lnLabor	0.95*	0.17
μ	-1.53	8.39
η	-0.66	0.13
γ	0.89*	0.21
σ^2	4.69	9.37
σ^2_u	1.68*	0.25
σ^2_v	0.49	0.13
Log likelihood = - 76.96 Wald χ^2 (2) = 414.02 Probability > χ^2 = 0.0000 Number of observation =54 Iteration 6		

*Significant at 1% level; **Significant at 5% level, and ***Significant at 10% level.

Table 1 shows that all inputs have a positive effect on output. The coefficient of capital and labor is significant at 5 percent and 1 percent level of significance respectively. Thus, H_0: $\beta_1 = \beta_2 = 0$ is rejected. Labor has dominant effect on loans and investments.

Banks operate at a decreasing return to scale as sum of elasticities i.e. $\beta_1 + \beta_2$ (0.014+0.95) is less than 1. The insignificance of μ indicates that *u* does not follow a truncated normal distribution.

The value of η is negative (0.66) which indicates banks' inefficiency decreases over time. However, the value of η is statistically insignificant which indicates that the degree efficiency did not change over time.

The value of coefficients for σ^2 and γ are positive. The value of $\gamma = 0.89$ and is significant at the 5 percent level. The significance of γ indicates that 89 percent of difference between actual and potential output is attributed to technical inefficiency of bank performance. The variance of random error measured by $\sigma^2_v = 0.49$ indicates that 49 percent of variation of output is due to model's measurement error and is statistically insignificant.

A test on the significance of technical inefficiency has been done. A test on the significance of technical inefficiency measured by random variable, u_t, is obtained from LR ratio of σ_u. The LR value has

approximately χ^2 distribution with parameter two shown in Table 1. LR = -76.96 and is significant. The significant is provided by the probability of Wald χ^2> is 0.0000. This means that the inefficiency effect as measured by u_{it} is significantly different from zero. Thus, H_0: $\sigma^2 u_i=0$ is rejected which suggests H_a: $\sigma^2 u_i>0$.

Results of technical efficiencies of 28 banks from 13 different countries between PGFC and DGFC are presented in Table 2.

Table 2
Technical Efficiency of Individual Bank between two Periods

Pre GFC Period Technical Efficiency				GFC Period Technical Efficiency			
Bank*	Efficiency	Firm	Efficiency	Firm	Efficiency	Firm	Efficiency
1	0.776	15	0.156	1	0.822	15	0.390
2	0.412	16	0.435	2	0.369	16	0.616
3	0.467	17	0.288	3	0.448	17	0.121
4	0.742	18	0.551	4	0.941	18	0.999
5	0.038	19	0.362	5	0.045	19	0.885
6	0.606	20	0.257	6	0.999	20	0.037
7	0.613	21	0.400	7	0.969	21	0.373
8	0.446	22	0.479	8	0.885	22	0.783
9	0.157	23	0.727	9	0.199	23	0.999
10	0.518	24	0.347	10	0.022	24	0.410
11	0.053	25	0.170	11	0.041	25	0.085
12	0.095	26	0.500	12	0.158	26	0.473
13	0.491	27	0.054	13	0.315	27	0.357
14	0.262	28	0.674	14	0.193	28	0.445
Mean efficiency = 0.390				Mean efficiency = 0.383			

*Banks name are provided in the Appendix

Table 2 shows that the mean efficiency of Islamic banks during the pre-global financial crisis and the global financial crisis period was 39 percent and 38.3 percent respectively. The range of bank efficiency varies from 0.038 to 0.776 and 0.022 to 0.999 during the pre GFC and the GFC period

It is seen from Table 2 that twelve banks out of 28 i.e. 42.8 percent of Islamic bank were operating below the average efficiency of 0.39 during the pre GFC. Seventeen banks out of twenty-eight i.e. 60.7 percent of Islamic banks were operating below the average efficiency of 0.38.3.

Equality of mean efficiency between the two periods is performed through parametric test (t-test and Anova test). Results of test are provided in Table 3.

Table 3
Test of Equality of Means for Pre GFC Efficiency and GFC Efficiency of Islamic Banks

Variables	Mean	Method	df	Statistics	Probability
Pre GFC Efficiency	0.390	t-test	52	0.118	0.90
GFC Efficiency	0.383	Anova F-statistics	(1,54)	0.013	0.90

The null hypothesis H_0: $\mu_{pgfc} = \mu_{gfc}$. Where μ_{pgfc}= mean efficiency of pre GFC and μ_{gfc}= mean efficiency of GFC period. T-statistics, Anova F-statistics for parametric test, in Table 3, shows that the null hypothesis of equality mean efficiency cannot be rejected with the probability of 0.90 and 0.90 respectively. This suggests that GFC does not have its impact on Islamic bank efficiency.

Conclusion

This paper estimates the efficiencies of 28 Islamic banks across 16 different countries during the pre-global financial crisis and the global financial crisis period. Bank efficiencies are measured using time varying decay models of stochastic frontier function for panel data. The results, in Table 1, indicate that labor has dominant impact on the bank production of loans and investments. Results also provide considerable evidence that banks that observed outputs are less than their respective potential outputs due to bank specific technical inefficiency. The value of $\gamma = 0.89$, in Table 1, indicates that 89 percent variation between actual and potential output is due to the echnical inefficiency of banks. Results also show that bank efficiency varies across sample banks between the PGFC and DGFC.

The insignificance of $\eta = -0.66$, in Table 1,and ANOVA F-statics, in Table 2, provides considerable evidence that the mean efficiency did not change between PGFC and DGFC suggesting that global financial crisis did have significant impact on Islamic bank performance efficiency.

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