Journal of Applied Finance & Banking, vol. 5, no. 2, 2015, 127-140
ISSN: 1792-6580 (print version), 1792-6599 (online)
Scienpress Ltd, 2015

Technical Efficiency of Banks and the Effects of Risk Factors on the Bank Efficiency in Gulf Cooperation Council Countries

Bukhari M. S. Sillah[1], Imran khokhar[2], Muhammad Nauman Khan[3]

Abstract

This paper uses production frontier model to generate and analyse the technical efficiency scores for the banks in Gulf Cooperation Council Countries. A sample of 52 banks is selected for the study. Three stages of analysis are adopted. At the first stage, the technical efficiency is analysed between countries to derive variations of between banks from one country to another. It's found that Kuwaiti and Emirati banks are regionally best performers. At the second stage of the analysis, banks are analysed within country. The within-country analysis shows that Saudi banks are the best performers and they face intense within-country competition, as their technical efficiency gaps from the country's best performer to others are lowest compared to that of other countries. At the final stage of the analysis, the papers investigates possible determinants of bank technical efficiency, and it finds that unsystematic risks of the banks and the monetary policy uncertainty do influence the level of bank technical efficiency.

JEL classification numbers: A11, B41, C21, C80
Keywords: Technical efficiency, credit risk, monetary risk, systematic and unsystematic risks.

[1]Associate Professor, Department of Economics, College of Business Administration, King Saud University, Riyadh, Saudi Arabia.
[2]Researcher, Economics Department, College of Business Administration, King Saud University, Riyadh, Saudi Arabia.
[3]Lecturer, Finance Department, College of Business Administration, King Saud University, Riyadh, Saudi Arabia & PhD Research Fellow, Institute of Islamic Banking and Finance, International Islamic University, Malaysia.

Article Info: *Received :* January 1, 2014. *Revised :* November 29, 2014.
Published online : March 1, 2015

1 Introduction

This paper attempts to analyse the effects of market, credit, idiosyncratic and monetary policy risks on the performance of the banks in the Gulf Cooperation Council countries. The bank performance is held here to be the measures of the bank technical efficiency in generating income from loans and investments. To generate income or profits, banks use capital and labour as essential input values with loans and investments as complementary inputs to generate income.

The stochastic frontier analysis is employed to produce the inefficiency scores for the banks using the profit function. These scores are analysed to assess the level of performance efficiencies within and between-country banks in the GCC. Then a truncated regression is estimated with the inefficiency scores as dependent variable to investigate the effects of risk factors on bank efficiency. A dummy for a country is included in this model to ascertain the presence of a country specific effect on bank efficiencies. The rest of the paper is organised as follows. Section 2 discusses some relevant literature and derives the expected contributions this paper adds to the existing literature. Section 3 presents the model, discusses its features, the variables and sources of the data. Section 4 analyses the results, and section 5 derives the conclusions and implications.

2 Literature Review

There have been growing research interests in studying the banking efficiency and the factors responsible for this efficiency. The driving objective of this interest is the fact that banks play a key role in the monetary policy transmission and the allocation of the nation's scarce savings resources among economic agents. If the banks are rigid and inefficient, the monetary policy transmissions will be ineffective, and hence the objectives of the policy will be defeated, as the findings of Gray (2012), Jonas and King (2008), and Al-Obadan (2009) have indicated. The relation is however found to be bi-directional. More monetary policy stability leads to more efficient banks, Al-Obadan (2009); but only efficient banks are found to be sensitive to and can react to the monetary policy shocks, Jonas and King (2008). The presence of this relation between banks and the monetary policy implies that the investigation and analysis of the banking efficiency is an on-going activity for the researchers to provide up-to-date results and evidence for the policy makers. The researchers approach the banking efficiency study at stages. The first stage is to provide information on the level and variability of the technical efficiency within banking industry from output perspectives, which attempts to determine optimal mix of input resources to produce the given level of output. With banks having multiple outputs, such as profit, loans, and deposits; the paper uses the profit as the output variable, and bank capital and administrative expenses as capital and labour input variables. The other stage of the bank efficiency study is to investigate the linkages between bank efficiency and bank risk factors. This stage investigates the link between bank efficiency and the monetary policy risk, credit risk, systematic and unsystematic risks.

This current paper discusses some of this literature and then indicates the gap it intends to fill in. For the first stage study of bank efficiency, Frimpong (2010) conducts comparative study of efficiency across domestic private banks, state bank, and foreign banks in Ghana. He finds that domestic private banks top the list of efficient banks followed by foreign banks. Comparing domestic banks with foreign banks, Matousek and Taci (2004) find

that the foreign banks have an edge over their domestic counterparts in Czech Republic. Thus, it was recommended to open up the domestic banking industry for foreign banks to boost the competition and efficiency in the banking industry. Comparing large banks with small banks, Wu et al (2008) conclude that large-sized banks are more efficient than the small-sized banks, the large-sized banks benefit from scale effects, and hence derive increasing returns to scale. This was earlier conformed in the study of Rosly and Abu Baker (2003), Matousek and Taci (2004), and recently by Zreika and Elkanj (2011).

These finding does not hold for Japanese banking industry, where small-niche forecasted banks are more efficient and enjoy significant economies of scale than large-sized banks, Drake and Hall (2003). Comparing Islamic banks and conventional banks Rosly and Abubaker (2003) find the Islamic banks to be less efficient than the conventional banks due to large scale effect enjoyed by the conventional banks. But this cannot be robust reason as evidenced in the case of Japan where small-sized banks fare better than the large-sized ones. Mokhtar et al (2008) have reached similar conclusions that Islamic bank are less efficient; wherever, Shahid et al (2010) and Akhter et al (2011) find no significant difference between the types of banks. For international comparison, Maudo and Pastor (1999) find that European and American banks enjoy better performance as cost and profit efficiencies are concerned, and hence European and Americans banks are generally more profitable than the Japanese counterparts due to the presence of efficiency inequalities between them in the Japanese banks.

For the second stage of efficiency study that investigates the linkage between bank efficiency and other factors, Maudo and Pastor (1999) find that as the level of competition increases, European banks and American banks gain more in profit efficiency than their Japanese counterparts. Increased competition by allowing more banks into the industry is found to improve the performance and overall efficiency of the banking industry, Matousek and Taci (2004), whereas the events of financial crises impact less significantly on the efficiency and performance of Islamic Banks than that of conventional banks,Hadi and Saad (2010), Said (2012a), and Said (2012b). Studying the determinants of bank efficiency in a sample of banks in China, Mathews and Zhang (2010) find that cost reduction and technical diversification of revenue away from interest earnings are significant contributors to improving bank efficiency.

The environments in which the banks operate are also important factors of bank efficiency as highlighted by Chortareas et al (2012). They find that banks operating in freer economic and political environments gain better cost advantages and overall efficiency than their counterparts in less free economic political environments. Analysing bank efficiency across eight Asian countries, Sun and Chang (2011) conclude that risk measures, such as credit risk, operational risk and market risk, are significant determinants of the variations in the level and variability of bank efficiency; and the results tend to be different across the countries and over time. Al-Jarrah (2012) finds that in Jordan systematic risks dominate non-systematic risks in explaining banking efficiency. Some researchers, such as Knaup and Wagner (2012); Lu and Wang (2012) and Chen and Liao (2011), focus on the effects of the non-systemic risk measures on the bank efficiency. Measures such as loan loss provisions, net charge offs, problem loans, debt to equity ratio, unsecured loans, and sum squared errors of the capital asset pricing model (CAPM) regression, are often used to represent the unsystematic risks. Knaup and Wagner (2012) find that loan loss provisions significantly influence the bank efficiency; and banks with higher problem loans as percentage of total loans see their inefficiency scores soar up as identified by the findings of Chen and Liao(2011).

Studying the effects of risk measures on the Taiwanese Banks, Lu and Wang (2012) conclude that unsecured loans and nonperforming loans are the most explanatory variables for bank efficiency. The loan loss provisions and net charge offs do not only explain the efficiency of a bank, but they are also "significant for predicting bank failures for US banks in 2009", Samad (2012). Instead of asking what explains efficiency, Avkiran (2011) asks inversely: what does efficiency explain? And he finds that efficiency does explain significant variations in ratio of post-tax profit/ average total assets, and ratio of returns on average equity. It implies that if a firm is efficient, it should expect its profitability ratios to improve. The GCC banks have enjoyed stable economic growth and environment, and they have so far weathered off the recent world banking and financial crises. Could it be that these banks are highly efficient? Or could it be that their risk factors are substantially low and hence have no meaningful effects on their performance efficiencies? In reviewing the current literature on banking efficiency, this paper attempts to offer some answers to the aforementioned questions. Thus, it is imperative to bring to light some current and relevant evidence and answers to these questions for the bank managers and monetary policy authorities. They need to know what the current bank performance is, and what factors influence this performance. The current paper intends to provide this information by carrying out followings:

- To conduct output efficiency of GCC banks. The output measures in this paper are income (profit) generated by the banks.
- To analyse the effects of risk factors on bank inefficiencies
- To investigate the presence (if any) of country specific effects on bank inefficiencies

3 Methodology

Assuming profit is the single output of the banking industry and its production function is defined by properties of non-negativity, weak essentiality, monotonicity and concavity in the input variables of capital and administrative expenses, and assuming further that this profit production function follows a Cobb-Douglas function form; then, we can specifically write this function as

$$P_{it} = AK_{it}^{b1}L_{it}^{b2}e^{\mathcal{E}it}$$

Where
P = profit of bank *i*
A = Technology
K = Capital of bank *i*
L = Labour of bank i,the administrative expenses are used as a proxy for the labour.
Ɛit = residuals
By taking the natural log of the function, we get

$$lnP_{it} = lnA + b1lnK_{it} + b2lnL_{it} + \mathcal{E}$$

For the simplicity let$\lambda_0 = lnA$, and B =row rector of the coefficients of b1 and b2, and X = column vector of the input variables.
The production function can be reduced to

$$lnP_{it} = \lambda_0 + BlnX_{it} + \mathcal{E}_{it} \quad (1)$$

This function is estimated using the stochastic frontier model that decomposes the residuals$\mathcal{E}_{it}$ into $V_{it} - U_{it}$

V_{it} is the conventional error term that captures the randomness effect, measurement errors, etc. where as U_{it} is the inefficiency term. It is one sided error term that takes values from 0 to 1. Thus, its distribution can be exponential, half-normal or truncated. In this paper, we employ the half-normal distributions to compute the inefficiency residuals using the LIMDEP software. The stochastic frontier is fit into the data using the maximum likelihood procedure to estimate the residuals. Given the estimated residuals, the inefficiency score is calculated. The inefficiency scores have non-zero mean and its variance is $\hat{E}\,(\,Ui) = \sqrt{\frac{2}{\pi}}\ \delta^2$, where δ^2 is the variance of the random error term, which has a zero mean.

The risk factors that we hypothesise can affect the efficiency scores of the bank are,

B = Systematic risk, which measures the linkages and co-movements of the bank performance with the total market fluctuations. It is expected that the higher the market risk, the higher the uncertainty the bank faces in managing its resources efficiently and hence the higher bank inefficiency. It is calculated as (Ross et al., 2012) $\beta_i = \frac{\mathrm{cov}(R_i, R_m)}{\mathrm{var}(R_m)}$, where R_i is the stock return of the bank, and R_m is the market return. The stock index (all listed stocks on the market) in each country is considered the market for the purpose of calculation.

U = Unsystematic risk, which measures the risks unique to the bank. It illustrates how much bank specific risks weigh in on the bank. The bank has control on its specific risks; the higher the unsystematic risk, the higher the inability of the bank to manage its resources efficiently. The unsystematic risk is derived from the relation that (Ross et al., 2012) $\sigma_i^2 - \beta_i^2\sigma_m^2 = \sigma_{ie}^2$, where σ_i^2 is return variance (the total risk for the returns of bank i), σ_m^2 is the return variance of the market, and σ_{ie}^2 represents the unsystematic risks (risks not counted by the market)

C = Credit risk, which relates to probability of the bank partners not fulfilling their responsibilities towards the bank in the financial contracts. Italso means the probability of the bank not being able to execute its responsibilities towards its creditors. We assume the bank leverage, or debt to equity ratio to measure the latter type of the credit risk, and the bad loans to total loans ratio to measure the former type of the credit risk. But due to data limitations on bank bad loans, we use the bank leverage as a measure of credit risk.

M = Monetary policy risk. It is calculated as the co-efficient of variation of the recent ten year observation of money supply, M1. Banks are the conduit of the monetary policy. Banks channel and translate the monetary policy changes to the general economic activities. The unstable and risky behaviour of the monetary authorities is expected to impair the performance of the banks. The banks' efforts in mobilizing deposits with some promised returns will be weakened in the face of unstable and risky monetary policy that will work to disrupt the consistency and stability of deposit mobilization. The disruption and un-stability of resources mobilization of the banks will expectedly impair the creation of loans and investments by the banks. Thus, risky monetary policy can lead to having inefficient banks.

To investigate the effects of risk factors on the inefficiency scores, we employ log-linear model, which is derived from the behaviour of the dependent variable - inefficiency score. This variable takes values from zero meaning the decision making unit is least inefficient, and to one meaning the decision making unit is most inefficient. This behaviour of the dependent variable can be described by an exponential function as,

$$ie = f(B, U, M, C) = 1 - e^{-(b0+b1B+b2U+b3M+b4C+eit)}$$

After taking the natural logarithm of both sides, we get

$$lnie_{it} = a0 + a1B_{it} + a2U_{it} + a3M_{it} + a4C_{it} + e_{it} \quad (2)$$

and this produces a model with the dependent variable in log form and the right side variables in linear form.

4 Results and Analysis

The technical efficiency study of the banking industry of the gulf cooperation council countries companies 52 banks. The table 1 presents the representative banks in each country. As shown by the table the total assets of the sample banks selected in the study represent an average of 90% the banking industry. Thus, relevant and valid inferential analyses can be based on the study.

Table 1: Sample size of the study

Country	Numbers of Banks	Asset percentage of the banking industry
KSA	9	75.71
UAE	14	88.52
QATAR	7	97.08
BAHRAIN	7	97.09
OMAN	6	93.10
KUWAIT	9	92.96

Source: Authors own compilation

The study is of two folds. It first analyses the technical efficiency of the banks in a cross sectional pooled data. In the second fold, the study assumes that the technical efficiency of the banks is influenced by both internal and external risk factors, and this assumption is investigated. The technical efficiency analysis aims at ranking the banks on the basis of decision making of the bank in employing labour and capital resources to generate profit. That is, it attempts to ascertain which banks generate better profits from the given labour and capital resources, and which banks generate worse profits from their given labour and capital resources, in the GCC as a whole and within each member country. Table 2 presents the overall efficiency of GCC banks. It shows out of the 52 banks, the top 10 banks and the bottom 10 banks. Kuwait has four banks in the top ten best GCC banks, with Commercial Bank of Kuwait coming on the top followed by Kuwait finance house. United Arab Emirates has four banks in the top ten performing GCC banks with Abu

Dhabi Islamic Bank coming as the third top performing GCC bank. Qatar has two banks in the top ten GCC performing banks, with Qatar National Bank in the sixth position. No bank from Oman, Bahrain and Saudi Arabia, has appeared in the top ten GCC performing banks. The bottom ten includes one bank from United Arab Emirates, one bank from Qatar, one bank from Oman; Saudi has four banks and Bahrain has three banks in the bottom ten GCC performing banks.

Table 2: Technical efficiency ranking and efficiency gap percentages

Rank	Top Ten Banks	Efficiency Gape %	Rank	Bottom Ten Banks	Efficiency Gape %
1	Commercial Bank of Kuwait	0	43	Al Khalij Commercial Bank	205.59
2	Kuwait Finance House	5.00	44	Arab National Bank	208.30
3	Abu Dhabi Islamic Bank	5.42	45	Bahrain Islamic Bank	220.65
4	National Bank of Kuwait	8.93	46	The Saudi Investment Bank	227.42
5	Dubai Islamic Bank	15.30	47	Riyad Bank	228.34
6	Qatar National Bank	31.33	48	Sharjah Islamic Bank	229.30
7	First Gulf Bank	31.86	49	HSBC BANK OMAN	309.93
8	Kuwait International Bank	35.67	50	Bank Al-Jazira	321.81
9	Union National Bank	48.77	51	Al Salam Bank	351.85
10	Qatar International Islamic Bank	50.63	52	Ithmaar Bank	506.05

Source: Authors own compilation

The efficiency gap percentage in table 2 is calculated as the percentage difference of efficiency score between a bank and the top performing bank in the GCC. The top ten banks are not far apart from one another in term of efficiency as the efficiency gap percentage fall within 50%. On the other hand, the bottom ten banks are significantly different from the top ten banks as the efficiency gap widened to more than 200%.

Appendix (a) presents the country bank ranking and inefficiency gap percentages from the top bank in the country and from the top bank in the GCC. That is, it illustrates the within-country bank technical efficiency disparities, and between-country bank technical efficiency disparities. Within-country bank performance shows that Saudi Arabian banks are closely knitted and their performances are not so substantially far apart from one another. An average of 31% efficiency gap exists from one bank to another in Saudi Arabia. But between-country efficiency disparity, Saudi banking Industry performs poorly in the GCC, as its banking industry scores on average of 198% efficiency gap from the top GCC bank.

Kuwait banking industry follows the Saudi banking industry in terms of within-country bank efficiency. Its banks are on average 49% efficiency gap from one another. The Kuwait banking industry also tops all other member country banking industries in terms of between-country bank performance, as its banking industry is on average 49% efficiency gap from the top GCC bank.

Bahrain banking industry performs the worst in terms of between-country bank efficiency as its banking industry scores an average of 214 % efficiency gap from the top GCC bank. Its within-country efficiency gap is the second highest after that of United Arab Emirates.

The implications of these within-country and between-country efficiency gaps are two folds.

A low within-country efficiency gap implies that banks in that particular country are par with one another in the terms of performance, and hence the competition will be high in that banking industry. On the other hand, when a high between-country efficiency gap is observed for a country, it implies that its banking industry is relatively low and poor on regional competition. That is, the banking industry with high between country efficiency gaps has a lot to do in order to catch up with the rest of the regional industry. As the results illustrate, Bahrain, Oman, Qatar and Saudi Arabia banking sectors have to increase their efforts towards regional competitiveness and efficiency; whereas, the banks in United Arab Emirates, Bahrain and Oman have to increase their efforts in closing up the domestic efficiency gaps.

The estimation results for the factors influencing bank technical efficiency are presented in table3. It is estimated in two models. In model 1, no squared values of unsystematic risk, monetary risk and leverage risk are included, and model 2 includes them. Model 1 performs poorer than model 2 in identifying the relevant risk factors that impact on banks' technical efficiency. The F-statistic that diagnoses the overall reliability of the model shows that model 1 fails to produce explanation for the changes in bank technical inefficiency. Though, model 1 has two significant coefficients, its F-statistic is insignificant. Model 2's F-statistic is significant at 1%. In model 2, three risk factors are found to significantly impact on the bank technical inefficiency. They are unsystematic risk, squared unsystematic risk and squared monetary risk. Bank leverage and market risk (systematic risk) are found to be insignificant in both model 1 and model 2. Low level of unsystematic risk appears to improve the bank efficiency, as unsystematic risk is found to be significantly and negatively associated with bank technical inefficiency. It implies that banks need to assume some low level of unsystematic risk to improve its decision making in using Labor and capital resources to produce profit. But excessive risk taking behaviour represented here in model 2 by squared unsystematic risk significantly and substantially increases the bank technical inefficiency. This result is consistent with the portfolio theory that those who want to have a return beyond the risk-free return;they must accept some level of risk commensurate with the risky portfolio. Leveraging or excessive risk taking behaviour can multiply the profits, but italso multiplies the losses when they occur. Thus, given the fact that banks are trust institutions, excessive risk taking behaviour in their decision making will seriously multiply their inefficiencies and substantially reduce the trust the people have in them.

Table 3: Factors explaining technical inefficiency in the banking industry

Sample: 52 Banks		
Variable	Model 1	Model 2
Constant	0.364406** (0.136262) [0.0103]	0.031116 (0.072341) [0.9427]
Leverage	-0.00615 (0.00834) [0.4644]	-0.00023 (-0.00959) [0.9924]
Monetary risk	-0.083546 (0.08531) [0.3324]	1.163245 (1.53585) [0.1317]
Variable	Model 1	Model 2
Beta	0.011404 (0.03216) [0.7245]	0.034531 (1.23974) [0.2216]
Unsystematic risk	2.385917*** (1.26772) [0.0660]	-14.78408* (-3.83794) [0.0004]
Squared Unsystematic risk		191.1647* (4.38214) [0.0001]
Squared monetary risk		-0.566261*** (-1.6982) [0.0965]
Squared leverage		-0.001373 (-0.6833) [0.4980]
R^2	0.129022	0.456435
Adj - R^2	054896	0.369959
F-statistic	1.740584	5.278157*
Prob(F-statistic)	0.156924	0.000199
Variable	Model 1	Model 2
D – W T-statistics in ( ) and p-values of T-statistics in [ ], * => significant at 1%, ** => significant at 5%, and *** => significant at 10%	1.749448	1.876800

The monetary policy risk (uncertainty about the monetary policy directions) has also two different impacts on the bank technical inefficiency. Low monetary policy risk worsens the technical inefficiency and high monetary policy risk (squared monetary risk as proxy) is found to significantly improve the bank efficiency. This result confirms the rational

expectations theory. That is, the expected monetary policy change would have little or no significant effects on the behaviours of the economic agents because they would have already incorporated the changes in their current behaviour. But unexpected monetary policy changes will affect the behaviours of the economic agents. Similarly, low monetary risk will not cause the banks to make adjustments in their decision making in order to improve their performance; and consequently their technical inefficiency increases. On the other hand, high monetary risk (high uncertainty about the monetary policy directions and magnitudes) will eventually force banks to change their complacent behaviours and work to improve the way they combine Labor and capital recourses to generate profits.

5 Conclusions and Limitations

The paper investigates and analyses the technical efficiency of 52 banks across the Gulf Cooperation Council Countries. The selected banks from each country have significantly represented the banking industry of that country in terms of assets, as the assets of the sample banks constitute from 76% to 97% of the total assets of banking industries across the countries. The efficiency of the banks analysed between the countries and within the country. Between countries, it is found that banks from United Arab Emirates and Kuwait dominate the top performers, with each country having 4 banks in the top ten performing banks, and Qatar has two banks in the top ten performing banks in terms of technical efficiency. The top banks in terms of technical efficiency are found not widely different from one another, as the technical efficiency gap from one bank to another average 50%. On the other hands, the ten bottom banks in terms of technical efficiency are substantially far apart. The efficiency gap among these bottom banks averages 200%. The efficiency performance within a specific banking industry shows that Saudi banks are not substantially different from one another. They have the lowest within-country efficiency gap averaging 31%. Banks in United Arab Emirates show the highest within-country efficiency disparity followed by banks in Bahrain. The implications from between and within-country technical efficiency are that the lower the between-country efficiency gap, the better the regional performance of the banking industry. In this case Kuwait banking industry is a benchmark for regional banking performance. On the other hand, the lower the within-country efficiency gap is, the higher competition of the banking industry is; and the banking industry of Saudi Arabia is a benchmark for domestic banking competition followed by Kuwaiti banking industry. In analyzing the factors that are hypothesized to determine and influence the efficiency variable of the banks, the paper finds unsystematic factors and monetary policy risks to be primary determinants of the banking technical efficiency. High monetary policy uncertainty forces banks to be highly efficient in mobilizing input resources to generate income, whereas high unsystematic risks are found to be associated with high levels of bank inefficiency. It implies that banks need some moderate levels, both monetary policy uncertainty and unsystematic risks to boost their technical efficiency. These risks work as pressure sources that force the bank arrangement to optimize their decision making processes and not to be complacent with unsystemic and monetary policy risks.

ACKNOWLEDGEMENTS: The researchers would like to thank the Deanship of Scientific Research at King Saud University represented by the Research Centre at CBA for supporting this research.

References

[1] W. Akhter, A. Raza, O. zab, M. Akram, Efficiency and Performance of Islamic Banking: The Case of Pakistan. *Far East Journal of Psychology and Business*, **2**(2), (2011).

[2] I. M. Al-Jarrah, Evaluating the Riskiness of the Banking Sector of Jordan. *European Journal of Economics, Finance and Administrative Sciences*, **48**. (2012), 86-95.

[3] A. M.Al-Obaidan, Monetary Stability and Performance in the Commercial Banking Industry of Emerging Markets. *International Research Journal of Finance and Economics*, **26,** (2009).

[4] N. K. Avkiran, Association of DEA super-efficiency estimates with financial ratios: Investigating the case for Chinese banks. *Omega* **39**, (2011), 323–334.

[5] S. H. Chen, C. C.Liao, Are foreign banks more profitable than domestic banks? Home- and host-country effects of banking market structure, governance, and supervision. *Journal of Banking & Finance,* **35**(4), (2011), 819–839.

[6] G. E. Chortareas, C. Girardone, A.Ventouri, Financial freedom and bank efficiency: Evidence from the European Union. *Journal of Banking & Finance,* **37** (2013) 1223–1231.

[7] L. Drake, M. J. B. Hall, Efficiency in Japanese banking: An empirical analysis. *Journal of Banking & Finance,***27** (2003), 891–917.

[8] J. M.Frimpong Investigating Efficiency of Ghana Banks: A Non Parametric Approach. *American Journal of Scientific Research,* **7**(2010), 64-76.

[9] H. P. Gray, The effects on monetary policy of rising Costs in commercial banks. *The Journal of Finance,* **18**(1), (2012), 29–48.

[10] A. Hadi, M. Saad, An Analysis on the Efficiency of the Malaysian Islamic Banking Industry: Domestic vs. Foreign. *International association for Islamic economics Review of Islamic Economics,* **14**(2010), 27–47.

[11] M. R. Jonas, S. K. King, Bank efficiency and the effectiveness of Monetary policy. *Contemporary Economic Policy,* **26**(4), (2008), 579-589.

[12] M. Knaup, W. B. Wagner, A market-based measure of credit quality and bank performance during the subprime crisis. *Management Science,* **58**(8), (2012), 1423-1437.

[13] S. Lu, M. Wang, How to Measure the Credit Risk of Housing Loans: Evidence from a Taiwanese Bank. *Emerging Markets Finance & Trade,* **48**(2),(2012), 122–138.

[14] R. Matousek, A. Taci, Efficiency in Banking: Empirical Evidence from the Czech Republic. *Economics of Planning,* **37**(2004), 225–244.

[15] K. Matthews, N. Zhang, Bank productivity in China 1997–2007: Measurement and convergence. *China Economic Review,* **21**(2010), 617–628.

[16] J. Maudos, J. M. Pastor,Cost and profit efficiency in banking: an international comparison of Europe, Japan and USA. *Instituto Valenciano de Investigaciones Económicas,* **22**(2), (1999).

[17] H. S. A.Mokhtar, N. Abdullah, S. M. Alhabshi, Efficiency and Competition of Islamic Banking in Malaysia. *Humanomics,* **24**(2008), 28-48.

[18] S.A. Rosly, M. A. Abu-Bakar, Performance of Islamic and mainstream banks in Malaysia. *International Journal of Social Economics*, **30**(2003), 1249-1265.

[19] S.A. Ross, R.W. Wasterfield, B.D. Jordan, J. Bley, Fundamentals of Corporate Finance, *Middle East Edition,*(2012), 438 – 445

[20] A. Said, Comparing the Change in Efficiency of the Western and Islamic Banking Systems. *Journal of Money, Investment and Banking*, **23**(2012), 149-180

[21] A. Said, Efficiency in Islamic Banking during a Financial Crisis-an Empirical Analysis of Forty-Seven Banks. *Journal of Applied Finance & Banking*, **2**(2012), 163-197.

[22] A. Samad, Credit Risk Determinants of Bank Failure: Evidence from US Bank Failure. *International Business Research*, **5**(9), (2012).

[23] H. Shahid, R. Rehman, G. S. K. Niazi, A. Raoof, Efficiencies Comparison of Islamic and Conventional Banks of Pakistan. *International Research Journal of Finance and Economics*, **49**(2010), 24-42.

[24] L. Sun, T. P. Chang, A comprehensive analysis of the effects of risk measures on bank efficiency: Evidence from emerging Asian countries" *Journal of Banking & Finance*,**35**(2011), 1727–1735.

[25] C.R. Wu, H.Y. Tsai, Y. M. Wang, Efficiency Comparison of Operational and Profitability: A Case of Hong Kong Commercial Banks. *Journal of Social Sciences*, **4**(2008), 280-287.

[26] M. Zreika, N. Elkanj, Banking Efficiency in Lebanon: An Empirical Investigation. *Journal of Social Sciences*, **7** (2), (2011), 199-208.

Appendix

No	Saudi Arabia	Efficiency Gape % within Country	Efficiency Gape % by Top Bank
1	Al Rajhi Bank	0	127.2546897
2	Samba Financial Group	9.094473518	147.9223073
3	Banque Saudi Fransi	14.72746711	160.7235494
4	SAAB	18.98670516	170.4028676
5	Saudi Holandi Bank	26.60594361	187.7179443
6	Arab National Bank	35.66324604	208.3010888
7	The Saudi Investment Bank	44.07561166	227.4185842
8	Riyad Bank	44.48230159	228.3428061
9	Bank Al-Jazira	85.61287675	321.8139671
No	**United Arab Emirates**	**Efficiency Gape % within Country**	**Efficiency Gape % by Top Bank**
1	Abu Dhabi Islamic Bank	0	5.415464879
2	Dubai Islamic Bank	9.375611483	15.29880931
3	First Gulf Bank	25.08648953	31.86050444
4	Union National Bank	41.13068006	48.77356247
5	National Bank Of Ras Al Khaimah	48.40072573	56.43731491
6	Abu Dhabi Commercial Bank	56.90538531	65.40254135
7	National Bank of Umm Al Qaiwain	57.21360618	65.7274538
8	National Bank of Abu Dhabi	103.5715284	114.595873
9	Commercial Bank of Dubai	105.6500059	116.7869098
10	National Bank of Fujairah	120.2364202	132.1632462
11	Ajman Bank	130.7258465	143.2207237
12	Emirates NBD	139.8199261	152.8072899
13	Bank of Sharjah	147.2614866	160.6518455
14	Sharjah Islamic Bank	212.3864055	229.3035816
No	**QATER**	**Efficiency Gape % within Country**	**Efficiency Gape % by Top Bank**
1	Qatar National Bank	0	31.3321972
2	Qatar International Islamic Bank	14.6953315	50.63189895
3	Masraf Al Rayan	16.73573245	53.31160234
4	Qatar Islamic Bank	57.18940299	106.4402967
5	Commercial Bank of Qatar	59.18786764	109.0649243
6	Doha Bank	80.24533532	136.7201592
7	Al Khalij Commercial Bank	132.6884582	205.5948648
No	**BAHRAIN**	**Efficiency Gape % within Country**	**Efficiency Gape % by Top Bank**
1	Al Ahli United Bank	0	73.40018677
2	National Bank of Bahrain	9.124150056	89.22148
3	BBK	16.20721955	101.5035357
4	Khaleeji Comercial Bank	46.9865688	154.8749848
5	Bahrain Islamic Bank	84.91761026	220.6474816
6	Al Salam Bank	160.5850329	351.8549337
7	Ithmaar Bank	249.5070373	506.0458554

No	OMAN	Efficiency Gape % within Country	Efficiency Gape % by Top Bank
1	Ahli Bank	0	58.55271882
2	National Bank Of Oman	33.27732699	111.3148255
3	Bank Muscat	53.36119933	143.1583511
4	Sohar Bank	70.27355198	169.9733461
5	Bank Dhofar	74.41601548	176.5413346
6	HSBC BANK OMAN	158.5471332	309.9335091
No	**KUWAIT**	**Efficiency Gape % within Country**	**Efficiency Gape % by Top Bank**
1	Commercial Bank of Kuwait	0	0
2	Kuwait Finance House	5.005307628	5.005307628
3	National Bank of Kuwait	8.926147139	8.926147139
4	Kuwait International Bank	35.67420914	35.67420914
5	Burgan Bank	50.83578485	50.83578485
6	Al Ahli United Bank	73.30708402	73.30708402
7	Al Ahli Bank of Kuwait	77.57205991	77.57205991
8	Gulf Bank	93.31568567	93.31568567
9	Ahli United Bank	96.04415049	96.04415049

Source: Authors own compilation