Measuring the Performance of Islamic Banks in Saudi Arabia

MEHBOOB-UL HASSAN[A*], MUHAMMAD NAUMAN KHAN[B], MD FOUAD BIN AMIN[A] AND IMRAN KHOKHAR[B]

[A]*Islamic Banking Centre, King Saud University, Saudi Arabia.*
[B]*College of Business Administration, King Saud University, Saudi Arabia.*

ABSTRACT

The study examines the comparative efficiency of Saudi Islamic banking industry which is growing at phenomenal rate, therefor the industry is important to study. We use deposits, assets and capital as inputs to measure investments, advances and income by applying Data Envelop Analysis (DEA) for this measurement. Significance of study lies in the largest set of data ranging from 2008-20016. The study is limited to the full-fledged Islamic banks only and economic indicators such as GDP, inflation and interest rate are not included in this study since all the banks are operating in the same economic system. Key findings reveal that in terms of technical and pure technical efficiency, Al-Rajhi is the most efficient bank followed by bank Al-Jazira, while, Al-Inma and Al-Bilad are on third and fourth positions respectively. A further analysis in this particular aspect reveals that the technical and scale efficiency of bank Al-Rajhi starts declining after the year 2012. This low performance in both of these respective terms suggests the room for improvement in management as well as administration bank Al-Rajhi. On the other hand, the bank Al-Bilad, relatively a small bank as compared to Al-Rajhi, showed excellent results in term of scale efficiency.

* Corresponding author: E-mail: mehassan@ksu.edu.sa

INTRODUCTION

Islamic, or *Shari'ah* compliant banking is an alternative banking system that provides banking services in compliance of Islamic teachings. Islamic banking transactions are structured differently from the conventional banking and are backed-up by a physical or tangible asset. The banking operations of Islamic banks are governed by an independent team of *Shari'ah* scholars, referred as *Shari'ah* Board that indemnify the compliance of *Shari'ah* rulings in the banking operations. *Shari'ah* compliant banking has got significant integration into the global finance and now is being practiced in parallel to conventional banking in many countries. At present there are more than 600 Islamic banking and financial institutions working all around the world and catering the needs of individuals to the governments levels. There are several multinational banks offering Islamic banking services to a wider range of population, not only to Muslims but also to the non-Muslims around the globe. With concentration in GCC, MENA, Indonesia, Malaysia, Turkey and Pakistan, an ample growth of Islamic banking is on the way in Africa, Europe and US, while China and Russia too are keen in Islamic banking to come in their countries.

Having the largest Islamic bank of the world on its credit, Islamic and conventional banking operate side by side in Saudi Arabia under a single regulatory authority SAMA, i.e. Saudi Arabian Monetary Authority. This study analyzes the performance of Islamic banking industry of Saudi Arabia from efficiency perspective. It examines the relationship between the inputs and outputs in this industry.

While, the banking sector of Saudi Arabia is among the largest in the GCC and fast growing, but it is relatively small in terms of number of institutions and its share in GDP. With an assets share of ~ 68 percent of GDP, the banking sector is consisted of 12 local and 14 licensed foreign banking branches of international banks. Out of these 12 local banks, three largest banks collectively account for the 45 percent share of total banking industry assets. And the largest seven banks have combined share of 85 percent of total banking industry. Public ownership (including quasi government) is fairly high and the government is among the main shareholders of the largest three banks while the fourth largest belongs to a family business group. The banking sector has cross the number of 2000 in term of its branch network all over the kingdom.

In recent years, Saudi banking industry has witnessed visible improvements in size, financial health, outreach and the utilization of modern technology into business. The following table is a representation of the growth of Saudi banking industry in several aspects.

Table 1 Growth of Saudi Banking Industry (SAR in million)

| Year	Deposits	Liabilities	Bank Reserves	Total Assets	Branches	No. of ATMs
2016	1,617,010	2,256,333	236,704	2,256,334	2,038	17,887
2015	1,604,768	2,208,768	146,238	2,208,768	1989	17,223
2014	1,575,579	2,132,577	213,073	2,132,577	1912	15,516
2013	1,401,980	1,893,282	200,366	1,893,283	1768	13,883
2012	1,260,608	1,734,141	217,455	1,734,141	1696	12,712
2011	1,103,634	1,544,434	179,174	1,544,434	1,646	11,766
2010	984,850	1,415,267	159,313	1,415,267	1,591	10,885
2009	940,548	1,370,258	160,118	1,370,258	1,519	9,950
2008	846,118	1,302,271	97,171	1,302,271	1,410	8,893

Source: Annual Report SAMA (2016)

The following figures the represent of the above statistical data into graphical form. The graph shows the steady growth of the banking industry of Saudi Arabia. Banks attract bulk of deposits and banks loans also increase at high rate and same performance was noticed in Total Assets/Liabilities. Despite the fact of financial crises in most of the parts of the world, Saudi banking industry continued to flourish.

As Islamic banking industry of Saudi Arabia has significant share in the financial sector and has good outreach and financial depth, it is important to study this industry from various aspects including the cost and benefit, i.e. efficiency perspective. We examine the technical efficiency, pure technical and scale efficiencies of all the Islamic banks. Technical Efficiency means ability of a firm to obtain maximal output from a given set of inputs. Pure Technical Efficiency is a measurement approach that examine the inefficiency due to only managerial underperformance. While, Scale Efficiency provides the insight to the management to choose the optimum quantity of the resources to be allocated to the bank size or to choose the scale of production that attains the expected production level.

For measuring these efficiencies, present study uses Data Envelop Analysis approach. This approach is the most appropriate in measuring the efficiency in any intermediary firm or industry. As, Islamic banks like other conventional banks, are intermediary industry that transform inputs into output. Present study uses deposits, assets and capital as input variables and investments, advances and income as outputs for our study. Present study is an attempt to examine this industry from technical (pure technical and scale efficiency.

Though a number of researchers have examined the banking industry from efficiency perspective, but most of these studies, as we will see in the literature review section too, focused on technical and allocative efficiencies only. Present study covers not only the technical but also the pure and scale efficiency. Moreover, the study incorporates the whole Islamic banking industry of Saudi Arabia with the largest available data.

In addition to cover the gap in the existing literate, it is hoped that this study will provide an overall insight of Saudi Arabian banking industry.
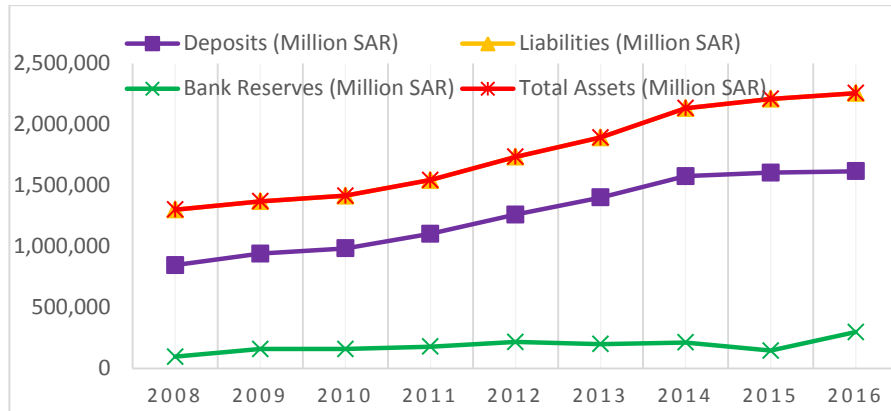
Source: Calculated from annual reports of banks and SAMA

Figure 1 Growth in Saudi Banking Industry

Saudi Islamic Banking Industry

As compared to conventional banking, the Islamic banking industry of Saudi Arabia is relatively small, there are only four banking institutions, namely Al-Bilad, Al-Inma, Al-Jazira Bank, and Al-Rajhi, offering banking and investment services according to Islamic teachings. But the trend in banking sector for offering *Shari'ah* compliant services in Saudi Arabia is increasing along-with the demand of this banking system. Bank Al-Rajhi, established during the second half of 1950s, is the oldest and largest bank in terms of assets. The second oldest bank is Al-Jazira, established in 1975/6. While Al-Bilad and Al-Inma banks were established in 2004 and 2007 respectively. The total assets and capital for the Al-Rajhi bank are SAR 201,878, SAR 250,179 and SAR 37,349 million respectively. On the other hand, bank Al-Bilad can be considered the smallest Islamic bank in financial volume as the averages of its total deposit, assets and capital are SAR 26,413 million, SAR 33,195 million and SAR 4,874 million respectively.

As the Islamic banks were established in different time frame, eventually they have different market share and size. Despite the new entrant and small numbers, as compared to conventional banks, Saudi Islamic banks captures more than half, i.e. 51.3% of the total assets of banking sector. In study we will examine the performance of these four banks in terms of technical, pure technical and scales efficiencies. As this study covers the whole Saudi Islamic banking industry, we use the data starting from 2008 when the fourth bank started its operation in 2007.

LITERATURE REVIEW

An increasing amount of literatures has been observed that evaluate the efficiency of Islamic banks by adopting different methods, such as profit efficiency, output efficiency and cost efficiency. There are mainly two components of efficiency analysis i.e., technical efficiency and allocative efficiency where the former maximize output with a given level of input and the latter minimize input for achieving a given level of output (Fare et al., 1985). The existing literature in efficiency analysis can be divided into few categories that measure the efficiency of merely Islamic banks or comparing with conventional banks by focusing on single country or multiple countries.

Comparative studies that measure bank efficiency exhibit mix results (for instance, Muharrami, 2008; Johnes et al., 2013 and Ferhi and Chkoundali, 2015 have observed that Islamic banks are more efficient compared to conventional banks). While, some studies (such as, Hassan, 2006; Srairi, 2010 and Saeed et al., 2013) found that Islamic banks are less efficient than conventional banks). In mean ways, Bader et al. (2008), Abdelkader and Salem (2013), Rozzani and Rahman, (2013), and Sillah et al. (2014) observed no significant differences between Islamic and conventional banks. Moreover, Mokhtar, (2008), Kamaruddin et al. (2008) and Siddique and Rahim, (2013) compared the efficiency of full-fledged Islamic banks and Islamic branches of conventional banks in different countries, where Mokhtar, (2008) found that the efficiency of Islamic banks has increased from 1997 to 2003 in Malaysia, and most importantly the efficiency of full-fledged Islamic banks is observed more than Islamic windows, but lesser than conventional banks. The study also reveals that Islamic windows under foreign banks achieved higher efficiency than that of Islamic windows under domestic banks. While, Kamaruddin et al. (2008) show that Islamic banks are more efficient in managing cost than earning profit, and this cost efficiency result in achieving both allocative efficiency and economies of scale. Siddique and Rahim (2013) examine that Islamic branches of conventional banks have gained higher technical efficiency rather than cost and allocative efficiency compared to full-fledged Islamic banks.

Al-Faraj et al. (2006) examines the performance of the Saudi commercial banks for the year 2002. Applying DEA, the study focuses on the technical efficiency of Saudi banks and compared it with world mean efficiency scores. The results indicate that the mean efficiency score of Saudi commercial banks are very much higher as compared to the world which suggests for adaptation of modern technologies with improved services in the Saudi banking industry.

Al-Jarrah (2007) investigates the cost efficiency levels of banks in Jordan, Egypt, Saudi Arabia and Bahrain from 1992-2000. The study decomposes cost efficiency into allocative and technical efficiency at both variable and constant return to scale. It further decomposes the technical efficiency into pure technical and scale efficiency. The obtained cost efficiency scores are found to be varied across banks based on their geographic location and their relative size, for instance, the Saudi banks are found more efficient whereas Jordanian banks are found least efficient, and the largest banks are observed to be relatively more cost efficient than the smallest banks. The

obtained allocative efficiency scores suggest that the Saudi banks are identified to be the most allocative efficient whereas the Egyptian banks are found to be the least. In term of bank's size, the study reveals that the larger banks have highest allocative efficiency scores.

Ajlouni and Hmedat (2011) evaluate the relative efficiency of banks in Jordan from period 2005-2008. It considers a few efficiency determinants such as, bank size and capitalization. The study finds that the average efficiency score of banks under study is quite high and stable. Also, it indicates that the relative efficiency of larger banks is significantly higher than that of smaller and medium size banks which signifies the bank size as an important determinant of efficiency. The study also verifies the fact that banks with higher capital adequacy ratio are less efficient.

Akhtar and Sadaqat (2011) highlight on the Islamic banks of Pakistan from period 2006 to 2009 to examine the relationship of bank-specific factors of profitability and the performance of Islamic banks. The result shows that the gearing ratio and capital adequacy ratio are observed significant and positively related. Also, the capital adequacy is found a key factor that affect the performance of Islamic banks.

Noor and Ahmad (2012) applied the DEA to examines the efficiency of 78 Islamic banks in 25 countries from 1992 to 2009. The outcomes reveal that Islamic banks achieved quite high pure technical efficiency that also impact positively on the total technical inefficiency. Besides, the study confirms the positive association between Islamic bank efficiency and size and profitability, but it finds a negative association between Islamic bank efficiency and loans intensity and capitalization.

Almazari, and Almumani, (2012) measure the profitability efficiency of the Saudi National Banks for the period 2006-2010 based on financial variables and ratios i.e., total assets, net income, operating income, operating expenses, operational efficiency, asset management, return on assets. The study reveals significant relationship of operational efficiency, asset management, and total assets bank size on profitability efficiency characterized by ROA.

Zainal and Ismail (2012) conduct a study on Malaysia that measure the efficiency of Islamic banks from 2006 to 2010. They measured on the technical efficiency, pure technical efficiency and scale efficiency between local and foreign Islamic banks. The study measures the efficiency scores among the Islamic banks using input orientation method. It adopts inputs and outputs based intermediation method and finds that the efficiency scores of local Islamic banks are higher in terms of technical efficiency and scale efficiency compared to foreign Islamic banks, however, foreign Islamic banks are observed to be ahead of local Islamic banks in case of pure technical efficiency.

Almumani, (2013) evaluates the relative efficiency of banks in Saudi Arabia from the period 2007-2011. They apply basic DEA models i.e., CCR and BCR to measure the determinants of relative efficiency such as, bank size and capitalization. The results show that the Saudi banks are efficiently able to manage of its financial resources on a relative scale. Moreover, the relative efficiency scores of smaller banks are much higher than that of medium and larger size banks. But, Saudi banks with higher capital adequacy ratio are found less efficient which suggests that Saudi banks with higher

capital adequacy ratio are less risky, and good for managing safer and lower-earning portfolios.

In a comparative study between Islamic banks and conventional banks in MENA region, Afifa and Ridha (2015) compare the banks' efficiency and stability over the period 1990-2010. They adopt both static frontier analysis (SFA) and DEA approaches and find mix results which show that Islamic banks are little ahead of conventional banks with constant returns to scale whereas for conventional banks achieves slightly higher scores than Islamic banks for the variable return to scale based on the DEA approach. On the other hand, the results from SFA method suggest that Islamic banks are more stable in terms of cost and profit efficiency scores comparted to the conventional banks during 2007-2010.

Bukhari and Nizar (2015) measures the efficiency of Islamic banks and conventional banks in the GCC countries from 2006 to 2012. A total of 28 conventional banks and 20 Islamic banks, and a total of six variables i.e., two output variables (total loans and investments), and four input variables (total deposit, equity, fixed assets and general expenses) are considered for the comparative analysis. In the case of constant return to scale, there is no difference in efficiency of the two bank types whereas the conventional banks are observed to be more efficient than Islamic banks particularly in 2009 and 2010 for the variable return to scale. The study also reveals the efficiency comparisons within country which indicates that the two bank types are found the same in Kuwait, Saudi Arabia, and Qatar. Besides, the conventional banks are observed to be more efficient than Islamic banks in Bahrain and UAE.

In a recent study, Bahrini (2017) shows the technical efficiency of Islamic banks in the MENA region by adopting bootstrap Data Envelopment Analysis (DEA) approach. It finds that GCC Islamic banks have more stable efficiency compared to MENA Islamic banks particularly throughout the global financial crisis period (2007–2008) and even in the early post-crisis period (2009–2010).

Table 2 A glimpse of literature assessing the efficiency of Islamic banks

Studies	Sample Courtiers	Research Method
Non-Comparative studies-Islamic Banks		
Noor and Ahmad (2012)	25 countries	DEA
Zainal and Ismail (2012)	Malaysia	DEA
Akhtar and Sadaqat (2011)	Pakistan	DEA
Non-Comparative studies- Conventional		
Ajlouni and Hmedat (2011)	Jordan	DEA
AlKhathlan and Malik (2010)	Saudi Arabia	DEA
Almazari and Almumani (2012)	Saudi Arabia	Regression, ANOVA
Al-Jarrah (2007)	Jordan, Egypt, Saudi Arabia and Bahrain	DEA
Comparative studies-Islamic banks and conventional banks-Mixed Results		
Bukhari *et al.* (2015)	GCC Countries	DEA

Table 2 (Cont.)

Islamic banks are more efficient than conventional banks		
Ferhi and Chkoundali (2015)	MENA	SFA & DEA
Muharrami (2008)	GCC; Saudi Arabia, UAE, Kuwait, Qatar, Oman, Bahrain	DEA
Johnes *et al.* (2013)	Bahrain, Bangladesh, Yemen, Bahrain, UAE, Turkey, Egypt, Sudan, Palestine, Indonesia, Tunisia, Jordan, Saudi Arabia, Kuwait, Qatar, Malaysia, Pakistan	MFA DEA
Local Islamic banks are more efficient than foreign Islamic banks		
Zainal and Ismail (2012)	Malaysia	DEA
Islamic banks are less efficient than conventional banks		
Srairi (2010)	GCC: Saudi Arabia, UAE, Kuwait, Qatar, Oman, Bahrain	SFA
Saeed *et al.* (2013)	Pakistan	DEA FRA
Hassan (2006)	World	DEA
No significant difference between efficiency of Islamic and conventional banks		
Bader *et al.* (2008)	Africa; Algeria, Tunisia, Senegal, Gambia and Sudan Asia; Malaysia, Bangladesh, Brunei, Pakistan and Indonesia Middle East; UAE, Bahrain, Kuwait, Lebanon, Iran, Jordan, Turkey, Saudi Arabia and Yamen	DEA
Abdelkader and Salem (2013)	MENA countries	DEA
Sillah *et al.* (2014)	Saudi Arabia	SFA
Rozzani and Rahman (2013)	Malaysia	SFA
Comparing efficiency at full-fledged Islamic banks and Islamic branches of conventional banks		
Mokhtar (2008)	Malaysia	DEA
Siddique and Rahim (2013)	Pakistan	DEA
Kamaruddin *et al.* (2008)	Malaysia	DEA
Studies measuring efficiency of Islamic banks only		
Bahrini (2017)	MENA	DEA
Rosman *et al.* (2014)	Bahrain, Yemen, Iraq, Iran, Lebanon, Philippine, Indonesia, Palestine, Malaysia, Jordan, Turkey, Kuwait, Sudan, Brunei Darussalam, Saudi Arabia, Pakistan, United Arab Emirates, Singapore, Syria and Qatar	DEA
Rahim *et al.* (2013)	MENA and Asian countries	DEA
Ahmad and Noor (2011)	World	DEA
Rahim *et al.* (2013)	Malaysia	DEA

Table 2 (Cont.)

Sufian (2009)	Sixteen countries: Bahrain; Bangladesh; Egypt; Pakistan; Saudi Arabia; Turkey; UAE; Gambia; Indonesia; Iran; Kuwait; Malaysia; Qatar; South Africa; Sudan; Yemen	
Viverita *et al.* (2007)	Thirteen countries: Algeria; UAE; Yemen; Bahrain; Bangladesh; Brunei; Egypt; Indonesia; Jordan; Kuwait; Malaysia; Qatar; Sudan;	
Yusdistira (2004)	World	DEA
Hassan (2005 & 2006)	Twenty one countries: Brunei; Egypt; Gambia; Algeria; Bahamas; Bahrain; Bangladesh; Indonesia; Iran; Jordan; Kuwait; Lebanon; Malaysia; Mauritania; Qatar; Saudi Arabia; Sudan; Tunisia; UAE; UK; Yemen	DEA

Notes: DEA= data envelopment analysis; SFA= stochastic frontier approach; MFA= meta frontier analysis, FRA=Financial Ratio Analysis

Even though only a few studies have been conducted to evaluate the Saudi banks' efficiency, no single study has been identified which focuses merely on its full-fledge Islamic banks. There is a need for study that could guide policy makers of Islamic banks in improving their resources allocation and management system. The present study intends not only to fill the gap in the existing literature but it also contributes to the policy makers toward an efficient *Shari'ah* compliant banking system in Saudi Arabia.

DATA AND METHODOLOGY

This study focuses on Saudi Arabia where *Shari'ah* compliant banks operate in parallel to conventional banks under a single regulatory authority called Saudi Arabian Monetary Authority (SAMA). The banking sector is consisted of 12 local and 14 licensed foreign banking branches of international banks. Out of these 12 local banks, three largest banks collectively account for the 45 percent share of total banking industry assets. And the largest seven banks have combined share of 85 percent of total banking industry. Four local banks namely Al-Rajhi, Al-Jazira, Al-Bilad and Al-Inma offer *Shari'ah* compliant banking services in Saudi Arabia. The sample of the study covers all these four banks and the data gathered from the financial statements, profit-loss accounts of each bank for the period from 2008 to 2016. We select this period because the data of some banks was not available due to their late entry into Islamic banking market. Thus, selecting this time period provides an opportunity to investigate all the Islamic banks of Saudi Arabia.

Data Envelop Analysis (DEA): a non-parametric method

Data Envelop Analysis (DEA) first introduced by Charnes et al. (1978), is a linear programming procedure that assumes variable return to scale for measuring efficiency of an individual decision-making unit (DMU) where higher efficiency of production is measured by maximum level of output with given level of input. There can be two approaches of DEA. First, an output orientation approach that shows maximization output with a given level of input. Second, an input orientation approach that gives a given level of output with minimum number of input. A non-parametric method like DEA does not require any specific optimization objective with respect to the firm or organization, and this approach is most widely used for measuring the efficiency level of firms. The present study applies DEA for the comparative analysis of the input-oriented efficiency of four Islamic banks in Saudi Arabia.

DEA assumes both constant return to scale (CRS) and variable return to scale (VRS) to measure the scale effects. Usually, the obtained score of scale efficiency from VRS model falls between 0 and 1 model which is higher than CRS because of the nature of close-fitting envelopment of data points. Moreover, the estimated score from VRS model helps determine whether the bank is operating at increasing or decreasing or constant return to scale. On the contrary, CRS is appropriate only at a point where the slope of efficiency and the ratio of inputs to outputs are similar (Cooper et al., 2000).

It is suggested that a precise and accurate results can be obtained from a single-year analysis rather than multi-year efficiency analysis for any individual decision-making unit (DMU) or the target Islamic banks as mentioned by Isik and Hassan (2002). That is why the present study focuses on estimating the efficiency of each Islamic bank separately on yearly basis. The adaptation of this approach justifies the volatility of banking environment over the years.

Based on the above, let's assume there are "n" number of decision making units (DMU) to be evaluated under following model specification.

$$\max z = \sum_{i=1}^{n} u_i \, y_i \qquad (1)$$

Subject to

$$\sum_{j=1}^{m} v_j \, x_j = 1 \qquad (2)$$

$$\sum_{i=1}^{n} u_i \, y_{i-} \sum_{j=1}^{m} v_j \, x_j - \le 0 \qquad (3)$$

$$u_i, v_j \ge 0$$

Where,

z = Efficiency of DMU under consideration

u_i = n output coefficients of DMU under consideration

y_i = n output weighting coefficients for DMU under consideration

v_j = m input coefficients for DMU under consideration

$x_j = m$ input weighting coefficients for DMU under consideration

Equation (1) generates the efficiency score for DMU *I,* equation (2) forces the weighted inputs of DMU *i* equal to 1, and equation (3) confirm that the weighted outputs cannot be more than the weighted inputs for all DMU's (capping efficiency to 1).

Input and Output Specification

The present study uses input and output variables followed by intermediation method as recommended by Aly et al. (1990) and Mester (1997). In this method, the entire bank is considered as an intermediator as it mobilizes deposits through lending and investment (Sealey and Lindley, 1977; Favero and Papi, 1995, and Kwan, 2002). It is the appropriate method for our study in measuring Islamic bank's efficiency because Islamic banks like other conventional banks transform inputs i.e., deposits, assets and capital into output i.e., investment, advances and net income. As mentioned in the following table, we used deposits, assets and capital as inputs variable and investment, advances and income as outputs for our study.

Table 3 Description of the Variables

Variables	Notation	Description
Deposits	X1	Deposits of customers
Assets	X2	Total assets include cash and balance with treasury and other banks, due from financial institutions, investment, financing and other related assets, operating fixed assets, deferred taxed
Capital	X3	Share capital is the summation of all funds that banks used to raise by issuing shares.
Investment	Y1	Investment
Advances	Y2	Financing and other related assets
Income	Y3	Total bank revenues and subtracting the costs of doing business such as depreciation, interest, taxes and other expenses.

ANALYSIS AND RESULT DISCUSSION

Technical efficiency, pure technical efficiency and scale efficiency of four full-fledged Islamic banks in Saudi Arabia is elaborated by using the DEA approach. As the Islamic banks were established in different time frame so they are different in size and volume. Over the period 2008-2016, the average means of total deposit, assets and capital for the Al-Rajhi bank are SAR 201,878, SAR 250,179 and SAR 37,349 million respectively. On the other hand, bank Al-Bilad can be considered the smallest Islamic

bank in financial volume as the averages of its total deposit, assets and capital are SAR 26,413 million, SAR 33,195 million and SAR 4,874 million respectively.

Table 4 Input Output Variables Descriptive Statistics

Variables	Input			Output		
	Deposits (X_1)	Assets (X_2)	Capital (X_3)	Investment (Y_1)	Advances (Y_2)	Income (Y_3)
BANK AL-RAJHI						
Mean	201,878	250,179	37,349	28,630	159,554	7,206
SD	54,324	62,802	7,726	15,167	26,252	514
BANK AL-INMA						
Mean	32,901	54,183	16,831	3,849	28,870	824
SD	27,639	30,640	1,291	2,547	16,554	490
BANK AL-JAZIRA						
Mean	38,877	48,498	6,418	8,088	26,779	496
SD	11,809	15,327	1,629	4,555	9,176	387
BANK AL-BILAD						
Mean	26,413	33,195	4,874	1,950	16.441	492
SD	10,716	13,492	1,977	816	6,510	402

Source: Author's own compilation

Table 5 Banks Efficiency Scores

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	Mean	SD	Rank
AL AL-RAJHI BANK												
Technical efficiency	1	1	1	1	1	0.97	0.95	0.88	0.84	0.961	0.06	1
Pure technical efficiency	1	1	1	1	1	1	1	0.97	1	0.996	0.011	1
Scale efficiency	1	1	1	1	1	0.97	0.95	0.91	0.84	0.964	0.055	2
AL-INMA BANK												
Technical efficiency	1	1	1	0.84	0.91	0.83	0.73	0.62	0.66	0.844	0.148	3
Pure technical efficiency	1	1	1	0.85	0.93	0.84	0.74	0.64	0.68	0.853	0.142	4
Scale efficiency	1	1	1	0.99	0.98	0.99	0.99	0.97	0.98	0.987	0.011	1
BANK AL JAZIRA												
Technical efficiency	0.84	0.63	0.8	0.72	0.98	1	1	1	1	0.886	0.143	2
Pure technical efficiency	0.96	0.71	0.9	0.8	1	1	1	1	1	0.931	0.107	2
Scale efficiency	0.87	0.89	0.89	0.9	0.98	1	1	1	1	0.948	0.059	3
BANK AL-BILAD												
Technical efficiency	0.75	0.67	0.82	0.45	0.95	0.69	0.68	0.81	0.71	0.726	0.136	4
Pure technical efficiency	1	0.8	1	1	1	0.91	0.86	0.87	0.77	0.911	0.093	3
Scale efficiency	0.75	0.83	0.82	0.78	0.95	0.76	0.8	0.94	0.92	0.846	0.079	4

Source: Author's own compilation

Similarly, the output variables in the study like investment, Advances and income are much higher for Al-Rajhi in comparison with its counterparts. It is because of number of branches of Al-Rajhi is much higher as compare to other Islamic banks jointly, working inside the Kingdom. According to the bank's annual reports the total number of branches of Al-Inma, Al-Jazira and Al-Bilad are 119, 99 and 120 respectively that are significantly smaller than 584 branches of Al-Rajhi bank.

Efficiency Analysis

Above table describes the efficiency results of four full-fledged Islamic banks operating in Saudi Arabia. During the research study period, it is unveiled that Bank Al-Bilad has the lower mean technical efficiency of 72.6% as compared to 96.1%, 88.6% and 84.4% for the Al-Rajhi, Al-Jazira and Al-Inma respectively. It connotes that at the given input Al-Rajhi Bank performs well in maximizing output as compare to its counterparts.

While measuring the total technical inefficiency, the above table also clearly points out that pure technical inefficiency is higher than the scale inefficiency for the Bank Al-Inma and Bank Al-Jazira but on the other hand, opposite situation is found in the case of Al-Rajhi Bank and Bank Al-Bilad. The empirical results unveil the fact that although the Bank Al-Jazira and Al-Inma Bank are operating at the optimal scale of operation yet these banks are managerially looks in efficient in controlling their cost and utilization of their resources in full capacity. However, Al-Rajhi and Al-Bilad banks are found relatively more efficient, that means these two banks have decreasing cost due to the economies of scale.

The empirical results reveal the that Al-Rajhi has the highest technical efficiency only during 2008 to 2012 likewise Al-Inma has maximum technical efficiency during the period 2008 to 2010. It is interesting to note that Al-Jazira achieves its maximum technical efficiency during 2013 to 2016. It is also observed that the above banks overcome pure technical inefficiencies and scale inefficiencies during the same time span when they have highest technical efficiency.

While measuring the scale efficiency, the banks may operate at constant return of scale (CRS) or Variable return of scale (VRS). CRS denotes that output changes with the same proportion as input change. In contrast VRS represents that output may be change with increasing or decreasing trend disproportionally as input change. When the bank operates at VRS then bank may have decreasing return of scale (DRS) or increasing return of scale (IRS). DRS intend that output increase less proportionate than the increase in input. IRS signifies that output increase with more proportionate than the input increase.

Table 6 Estimation of Efficiency Frontier

Bank / Year	2008	2009	2010	2011	2012	2013	2014	2015	2016
AL AL-RAJHI	CRS	CRS	CRS	CRS	CRS	DRS	DRS	DRS	DRS
AL-INMA	CRS	CRS	CRS	IRS	IRS	IRS	IRS	IRS	IRS
AL-JAZIRA	IRS	IRS	IRS	IRS	IRS	CRS	CRS	CRS	CRS
AL-BILAD	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS

Note: CRS constant return to scale; DRS decreasing return to scale; IRS increasing return to scale

The above table exhibits the fact that during the study period 2008 to 2016, Al-Rajhi operates at CRS from 2008 to 2012 and after that it operates at DRS during 2013 to 2016. In fact, when bank increase its operation at larger scale, the increase in input lead to increase in output with low proportionate that leads to DRS. On the other side Al-Inma operates mostly at IRS from 2011 to 2016 that shows that it minimizes its cost by improving its banking operations. In contrast, Al-Jazira operates at IRS during in earlier period, 2008 to 2012 then it tends to stables on CRS. It is interesting to know that Al-Bilad is relatively the smallest bank in the *Shari'ah* compliant banking industry and it operates at IRS during the whole study period 2008 to 2016.

Overall results summarize that Al-Rajhi is most efficient in Saudi *Shari'ah* compliant banking industry as commemorating a mean efficiency score of 97% followed by Al-Jazira and Al-Inma with mean efficiency score of 92% and 89% respectively. In contrast, it is observed that Al-Bilad is the least efficient bank with mean efficiency score of 81%. In short it implies that Al-Rajhi is the most efficient and bank Al-Bilad is found least efficient in decreasing cost by decreasing input for achieving a certain output level. The findings of the present study are consistent with Almumani (2013) where it appears that bank Al Bilad is relatively less efficient in terms of technical efficiency.

CONCLUSION

Present study examined the performance of Saudi Islamic banking industry for the period 2008-2016 in terms of efficiency. The empirical analysis demonstrates many interesting results about the Saudi Arabian Islamic banking industry. The outcomes reveal that, in overall, bank Al-Rajhi bank stands on the top position followed by bank Al-Jazira, while Al-Inma and Al-Bilad are on third and fourth positions respectively. However, it must be pertinent to note that because Bank Al-Rajhi has the longest history and have strong presence in the Islamic banking industry of Saudi Arabia, while bank Al-Bilad and Al-Inma enter in the market in 2004/5 and 2007/8 respectively, therefore, the results are inclined to some extent. In technical and pure technical efficiencies, Al-Rajhi again seems the most efficient bank followed by Al-Jazira. While, Al-Inma and Al-Bilad are on the third and fourth positions respectively. However, further analysis in this particular aspect reveals that technical efficiency of Al-Rajhi bank start declining after the year 2012. A similar result was noticed also notices in scale efficiency too; after a constant return to scale, the performance in scale efficiency of the bank al-Rajhi starts declining after the year 2012. This tendency indicates that there is a room for the improvements in the managerial operations as well as in the allocation of resources in bank Al-Rajhi. Some of the bank branches, perhaps, are not operating on full scale and there is need to restructuring in those areas. This results also shows that there is a correlative relationship among the technical efficiency and scale efficiency; when the technical efficiency of a bank declines, the scale efficiency too declines. On the other hand, even with a relatively small share of deposit and investments as compared to other banks, the bank Al-Bilad has

excellent results in scale efficiency during the whole period of study. Following the Al-Bilad, bank Al-Inma too has good performance in the scale efficiency. Except the first three years of decreasing return to scale, the performance of bank Al-Inma in scale efficiency is notably good. This shows that both banks are operating on the optimal scale of operations.

To conclude, the finding of this study provides many interesting insights of Islamic banking industry of Saudi Arabia and suggest the policy implications. At bank level there is room for all the banks, especially the largest banks to enhance its efficiency in scale and from current level by being more cost effective in its resources allocation and operations, and to increase its product innovation in line with the other banks. While for the regulator, a dedicated legal framework is essential for the growth and development of Islamic banking in the kingdom. Moreover, more conducive banking environment and incentives to local banks should be develop for promoting the Islamic banking industry at the regional level and in order to strengthen the Kingdoms position in the global Islamic banking industry.

Further the study suggests to make a comparative analysis of Islamic banking with the conventional banking industry of Saudi Arabia, and the Islamic banking industry of GCC countries. Furthermore, the resilience factors and risk exposures can also be interesting factor to take into account while analyzing the Islamic banking industry of Saudi Arabia.

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REFERENCES

Afifa and Ridha (2015), "Islamic and conventional banks: Efficiency and stability during the current crises", *Journal of Research in Economics and International Finance*, Vol. 4 No. 2, pp. 27-33.

Ajlouni, M., & Hmedat, M. (2011), "The Relative Efficiency of Jordanian Banks and its Determinants Using Data Envelopment Analysis", *Journal of Applied Finance & Banking*, Vol. 1 No. 3, pp. 33-58.

Akhtar, M. A., & Sadaqat, S. (2011), "Factors Influencing the Profitability of Islamic Banks of Pakistan", *International Research Journal of Finance and Economics*, Vol. 66, pp. 125-132.

Al-Faraj, T., Bu-Bshait, K. & Al-Muhammad, W. (2006), "Evaluating the efficiency of Saudi commercial banks using data envelopment analysis", *International Journal of Financial Services Management*, Vol. 1 No. 4, pp. 466-477.

Almazari, A. A. and Almumani, M. A. (2012), "Measuring Profitability Efficiency of the Saudi National Banks", *International Journal of Business and Social Science*, Vol. 3 No. 14, pp. 176-185

Almumani, M. A. (2013) "The Relative Efficiency of Saudi Banks: Data Envelopment Analysis Models", *International Journal of Academic Research in Accounting, Finance and Management Sciences*, Vol. 3 No. 3, pp. 152-161.

Aly, H., Grabowski, R., Pasurka, C. and Rangan, N. (1990), "Technical, scale, allocative efficiency in US banking: an empirical investigation", *The Review of Economics and Statistics*, Vol. 72, pp. 211-218.

Bahrini, R. (2017), "Efficiency Analysis of Islamic Banks in the Middle East and North Africa Region: A Bootstrap DEA Approach", *International Journal of Financial Studies*, Vol. 5 No. 7, pp. 1-13.

Bukhari M. S., Sillah and Nizar Harrathi (2015), "Bank Efficiency Analysis: Islamic Banks versus Conventional Banks in the Gulf Cooperation Council Countries 2006-2012", *International Journal of Financial Research*, Vol. 6 No. 4, pp. 143-150

Charnes, A., Cooper, W. W. and Rhodes, E. (1978), "Measuring the efficiency of decision making units", *European Journal of Operational Research*, Vol. 2 No. 6, pp. 429-444.

Cooper, W., Seiford, L. M. and Tone, K. (2000), Data Envelopment Analysis, Kluwer Academic Publishers, Boston, MA.

Favero, C. and Papi, L. (1995), "Technical efficiency and scale efficiency in the Italian banking sector: a nonparametric approach", *Applied Economics*, Vol. 27 No. 4, pp. 385-395.

Isik, I. and Hassan, M. (2002), "Technical, scale and allocative efficiencies of Turkish banking industry", *Journal of Banking and Finance*, Vol. 26 No. 4, pp. 719-766.

Jarrah, I. M. (2007), "The Use of DEA in measuring efficiency in Arabian Banking", *Banks and Bank Systems*, Vol. 2 No. 4, pp. 21-30.

Johnes, J., Izzeldin, M. and Pappas, V. (2013), "A comparison of performance of Islamic and conventional banks 2004-2009", *Journal of Economic Behavior & Organization*, Vol. 103 [Supplement], pp. s93-s107.

Kamaruddin, B. H., Safa, M. S. and Mohd, R. (2008), "Assessing production efficiency of Islamic banks and conventional bank Islamic windows in Malaysia", *International Journal of Business and Management Research*, Vol. 1 No. 1, pp. 31-48.

Kwan, S. (2002), "The X-efficiency of commercial banks in Hong Kong", Working Paper Series No. 2002-14, pp. 1-30. Federal Reserve Bank of San Francisco.

Mester, L. (1997), "Measuring efficiency at US banks: accounting for heterogeneity is important", European Journal of Operational Research, Vol. 98, pp. 23-242.

Noor, M., & Ahmad, N. (2012), "The determinants of efficiency of Islamic banks", *The IUP Journal of Bank Management*, Vol. 11 No. 2, pp. 32-70.

Saeed, S., Ali, F., Adeeb, B. and Hamid, M. (2013), "Examining efficiency of Islamic and conventional banks in Pakistan: using data envelopment analysis", *Global Journal of Management and Business Research Finance*, Vol. 13 No. 10, pp. 1-11.

Sealey, C. and Lindley, J. (1977), "Inputs, outputs and a theory of production and cost at depository financial institutions", *Journal of Finance*, Vol. 32 No. 4, pp. 1251-1266.

Sillah, B. M., Khokhar, I. and Khan, M. N. (2014), "The performance of Saudi Banking industry 2000-2011: have the banks distinguished themselves from one another?", *International Journal of Financial Research*, Vol. 5 No. 2, pp. 1-12.

Zainal, S. and Ismail, M. (2012), *Shari'ah* compliant banking efficiency: A DEA approach. Paper presented at 3rd International Conference on Business and Economic Research (3rd ICBER). Malaysia, available at: http://www.internationalconference.com.my/ (accessed 20 July 2017).