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BANKING EFFICIENCY: A COMPARATIVE STUDY BETWEEN ISLAMIC AND CONVENTIONAL BANKS IN GCC COUNTRIES

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Abstract: This research aims at comparing the efficiency of Islamic and conventional banks operating in the GCC countries from 2006 to 2015 for a sample of 51 conventional and 48 Islamic banks using stochastic frontier analysis and the CIR ratio. The results show that Islamic banks are less efficient in terms of cost than conventional banks, and that this result remains valid even during the 2008 crisis period and even after controlling for bank-specific variables. Regarding the determinants of bank efficiency, empirical results show that capital adequacy and size positively affect bank efficiency as measured by the stochastic frontier analysis. Results also indicate that productive assets are negatively related to efficiency as measured by the CIR ratio. This study provides new insights in terms of financial efficiency of the banking system. Findings could help Islamic and conventional banks to increase their efficiency and their performance and improve the service provided to customers.

■■■ INTRODUCTION

Nowadays, Islamic finance started to attract the attention of scholars and economists. Many studies have focused on making the comparison between Islamic and conventional banks, especially after the crisis (Asmild, Kronborg & Matthews, 2019; Yusuf, Santi & Rismaya, 2021; Izzeldin, Johnes, Ongena Pappas & Tsionas, 2021). Researchers are more concerned with the analysis of Islamic finance efficiency as a means of assessing bank performance (Isnurhadi, Adam, Sulastri, Andriana & Muizzuddin, 2021).

The assessment of supervision institutions efficiency is focused on the ability of adequate current and future evaluation of the supervised entities operations, based on the available information and making proper (correct) decisions on this basis (Kurek, 2014).

The concept of banking efficiency, based among other things on the relationship between the “inputs” and “outputs” of banks, has been the subject of several previous studies. An established production function, in its most general form, is a relationship between “inputs” and “outputs”. An output unit is said to be efficient if, from a basket of inputs that it owns or uses, it produces the maximum possible output or if, to produce a given quantity of output, it uses the smallest possible quantities of inputs (Isnurhadi et al., 2021; Octrina & Mariam, 2021).

Banking efficiency is a performance measure that represents the ability of banks to manage their inputs to achieve optimal results. It corresponds, therefore, to an optimal allocation of resources to achieve pre-determined goals.

Regarding the efficiency of Islamic banks, Ebrahim and Joo (2001) assumed that an Islamic financial system can be efficient if it can allocate limited capital resources to the most profitable projects and contribute to wealth creation. Several studies dealt with the efficiency of Islamic banks (Darrat, Topuz & Yousef, 2002; Hassan, 2006; Yusuf et al., 2021). Other studies compared the efficiency between Islamic and conventional banks (Bader, Mohamad, Ariff & Shah, 2008; Sakti & Mohamad, 2018; Asmild et al., 2019; Izzeldin et al., 2021).

According to several previous studies, Islamic banks did not benefit from economies of scale due to the small size of their assets compared to those of conventional banks and are therefore not yet ready to compete with them; Islamic banks are still young, do not have enough customers to achieve economies of scale, and therefore, are less efficient than conventional banks (Abdul-Majid, Falahaty & Jusoh, 2017; Haque, Tausif & Ali, 2020).

On the other hand, Sakti and Mohamad (2018), Shawtari, Salem and Bakhit (2018), Asmild et al. (2019) considered that the costs of credit monitoring and control of Islamic banks are lower than those of conventional banks due to the absence of agency problems related to Sharia compliance; Islamic banks therefore assume lower costs and are therefore more efficient than conventional banks. In addition, it turns out that the Islamic financial system is less affected by the financial crisis.

Some recent studies (Yusuf et al., 2021) assumed that despite the operations of Islamic banks are constrained by Islamic principles, the efficiency of these banks is not different from that of conventional banks.

The conclusion of these studies, however, varies. Besides contradictory evidence, most of these studies have focused on international samples. However, a targeted analysis of banks in GCC countries is apparently absent except for a few studies.

This current study contributes to the range of previous studies first by being conducted in many samples from the GCC region during the financial crisis to study the effect of the crisis on banks' efficiency. Second, it uses both an accounting ratio and a financial technique (stochastic frontier analysis) to evaluate the effectiveness, then make a comparison between Islamic banks and conventional considering the various determinants. Third, this research offers

policy prescriptions and recommendations useful for bankers, investors and public authorities.

The paper is structured as follows: Section 2 presents the literature review. Section 3 describes the data and methodology. Finally, section 4 presents the empirical results.

THE RESEARCH METHODOLOGY AND THE COURSE OF THE RESEARCH PROCESS

Literature Review

Several previous studies analyzed banking efficiency by comparing the efficiency between Islamic and conventional banks. The difference between Islamic and conventional banks in terms of efficiency is due to the nature of their business practices. In Islamic banks, it is forbidden to collect or pay interest at a predetermined rate, contrary to the business practices of conventional banks. In addition, Islamic banks offer different financial products based on Sharia principles which are characterized by profit and loss sharing (PLS) based on financing instead of fixed rate loans.

Jensen and Meckling (1976) postulate that organizational performance is influenced by conflicts of interest between principal and agent. In this sense, information asymmetry and agency conflicts will be more important in conventional banks than in Islamic banks. Consequently, and with the intervention of the Sharia Advisory Council Islamic banking operations monitoring committee, conflicts between the principal and the agent can be removed and agency costs will be reduced. In a different manner, the opposite can happen since the effect of the different determinants of productivity is significantly different in Islamic banks with respect to conventional banks such as complexity, level of development.

In the previous financial literature, there was not a general consensus between studies dealing with the efficiency of Islamic banks and that of conventional banks as to the superiority of the efficiency of one or the other category of banks. Some studies show that Islamic banks are more efficient. In this context, Yudistira (2004) found that, in most cases, Islamic banks are more efficient than conventional banks, and that small and medium-sized Islamic banks are less efficient than large ones and should be encouraged to merge to take advantage of economies of scale. Sufian, Mohamad and Muhamed-Zulkhi-

bri (2008) studied the efficiency of 18 banks in MENA and Asia for 2001–2006 using the DEA method, they found that Islamic banks in the MENA region are more efficient than Islamic banks in Asian countries.

Arslan and Ergec (2010) studied the efficiency of 26 conventional banks and 4 Islamic banks in Turkey over the period 2006–2009 using the DEA method and found that Islamic banks are more efficient. Abdul-Majid, Saal and Battisti (2010) found that Islamic banks are relatively more efficient than conventional banks in terms of cost control rather than profit realization. Shawtari, Saiti, Razak and Ariff (2015) showed that Islamic banks in Yemen are more efficient than conventional banks between 1996 and 2011. Batir, Volkman and Gungor (2017) studied the technical, allocative and the economic efficiency of conventional and Islamic banks in Turkey using DEA method and the intermediation approach. Tobit regression analysis is also used to determine factors affecting efficiency. The results show that the average annual efficiency of Islamic banks is higher than that of conventional banks. Sakti et al. (2018) studied the differences between Islamic and conventional Indonesian banks in terms of business model, asset quality, stability, and efficiency between 2008 and 2012 and concluded that Islamic banks are relatively more efficient than conventional banks.

Shawtari et al. (2018) empirically examined the efficiency of Islamic and conventional banks using the DEA method in its Windows version. They studied the factors that influence each type of efficiency for the period 1996–2011. The results show that pure technical efficiency is higher in conventional banks. However, Islamic banks are more efficient in terms of efficiency of scale. Asmild et al. (2019) applied a multidirectional efficiency analysis (MEA) that facilitates understanding of differences in inefficiency models for a set of banks in Bangladesh from 2001 to 2015. They confirmed the consensus that Islamic banks outperformed conventional commercial banks during the GFC period but also identify inefficiency differences based on specific variables.

Contrary to the studies mentioned above, other works found that conventional banks are more efficient than Islamic banks. Hassan (2006) compared the cost and profit efficiency of 37 conventional and 43 Islamic banks in 21 OIC countries over the period 1995–2001 and found that the Islamic banking industry is relatively less efficient than its conventional counterpart. using a non-parametric technique (DEA method) and an intermediation approach in Malaysia from 1997 to 2003, Mokhtar, Abdullah and Alhabshi (2008) showed that fully fledged Islamic banks are more efficient than banks with Islamic win-

dows and that the two types of Islamic banks are even less efficient than conventional banks. They also showed an improvement in the efficiency of the entire Islamic banking sector during the study period. Ismail, Abdul-Majid and Rahim (2013) compared the efficiency of Islamic systems and conventional banks in Malaysia during the period 2006–2009 and showed that conventional banks are more efficient than Islamic banks. Abbas, Azid and Besar (2016) studied bank efficiency in Pakistan through a comparative analysis between Islamic and conventional banks and examine their determinants using the DEA approach. They found that the efficiency of Islamic and conventional banks is different; the performance of Islamic banks is lower than that of conventional banks in Pakistan in terms of TE and pure technical efficiency (PTE), although they had the same level of scale efficiency. Haque et al. (2020) combined traditional financial ratios, Return on Equity (ROE) and Return on Assets (ROA), with Data Envelopment Analysis (DEA) for the period 2014–2018 to compare Islamic and conventional banks. DEA results show that conventional banks are more efficient than Islamic banks.

Although most previous studies conclude that one of these two banking systems is superior in terms of efficiency, other previous studies assume that they have the same level of efficiency. In this context, Abdul-Majid et al. (2010) used an output distance function to examine the efficiency and returns to scale of Islamic banks compared to conventional banks in ten Islamic countries for the period 1996–2002 and found no significant differences. Yahya, Muhammad and Hadi (2012) studied the difference between the level of efficiency of Islamic and conventional banking operations in Malaysia using the DEA method. The results indicate that there is no significant difference in the level of efficiency between Islamic and conventional banks.

Beck, Demirgüç-Kunt and Merrouche (2013) compared the efficiency of Islamic and conventional banks based on a sample of 22 countries. They found no significant difference between these two banking systems. Tek Wei Saw, Kamarudin and Latiff (2020) used a sample of 18 countries with 70 Islamic and 374 conventional banks spanning from year 2009 to 2017 across the Middle East, South Asia and Southeast Asia regions. The empirical results indicate that there is no significant difference between both types of banks. Yusuf et al. (2021) found, by using Stochastic Frontier Analysis (SFA) in Indonesia for the 2014–2019 period, no significant difference in the efficiency of conventional banks and Islamic banks.

In the context of GCC countries, Srairi (2010) used the stochastic frontier approach to examine the cost and profit efficiency levels of 71 commercial banks for the period 1999–2007. He compared efficiency between conventional and Islamic banks and examines bank-specific variables that may explain sources of inefficiency. The results indicate that banks in the Gulf region are relatively more efficient at generating profits than at controlling costs. He concludes that conventional banks are on average more efficient than Islamic banks in terms of cost and profit. Srairi, Kouki and Harrathi (2012) used the DEA method to assess the efficiency of 25 Islamic banks between 2003 and 2009. Their results show that efficiency measures have increased over the period but remain weak compared to conventional banks, and that the inefficiency of Islamic banks may be due to sheer technical inefficiency rather than inefficiency of scale. They also found that in terms of overall technical efficiency, small and large banks are more efficient than medium-sized banks. Belanès, Ftiti and Regaieg (2015) studied the pure, technical, and scale efficiency of 30 Islamic banks for the period 2005–2011. Results show a slight decrease in the efficiency of Islamic banks with a notable drop in 2009. Aghimien, Kamarudin, Hamid and Noordin (2016) attest that the inefficiency of Islamic banks in the GCC country is due to inefficient management in the use of resources. Miah and Uddin (2017) examined the differences between Islamic and conventional banks in terms of commercial orientation, stability, and efficiency based on a sample of 48 conventional and 28 Islamic banks for the period 2005–2014. Their results from the Stochastic frontier Analysis (SFA) show that conventional banks are more efficient in terms of cost management than their Islamic counterparts.

According to several previous studies, Islamic banks do not benefit from an economy of scale due to the small size of their assets compared to conventional banks and therefore they are not yet ready to compete with them (Srairi, 2010). In the same framework, Islamic banks are still young and do not have enough customers to achieve economies of scale and, therefore, are less efficient than conventional banks. Kamarudin et al. (2008) show that the cost of funds and labor in Islamic banks is higher than in conventional banks. Hassan (2006) assumes that Islamic banks operate in a global regulatory environment that is unfavorable to their operations and is characterized by the complexity of the contracts used. All these arguments lead us to propose the following hypothesis:

H_1 : Conventional banks are more efficient than Islamic banks.

Data and Methodology

Our empirical study is based on annual data, for a 10-year period (2006–2015), of 99 commercial banks operating in 6 countries of the Gulf Cooperation Council region (Saudi Arabia, United Arab Emirates, Oman, Qatar, Kuwait, and Bahrain). The sample consists of 51 conventional banks and 48 Islamic banks. The total number of observations is 990. The data are extracted from the Bankscope database with an annual frequency and are expressed in millions of US dollars. The distribution of the banks in the study sample by country and by nature is given in table 1.

Table 1. Samples by country

Country	Banks		
	All Banks	Islamic banks	Conventional banks
Saudi Arabia	13	5	8
Kuwait	15	10	5
Oman	8	2	6
Qatar	9	4	5
United Arab Emirates	24	8	16
Bahrain	30	19	11
Total	99	48	51

Source: own elaboration.

In this study, the relationship between Islamic finance and cost efficiency is examined. In fact, cost efficiency takes into consideration the pricing of inputs. It is a concept that compares the costs of one bank to the costs of another best practice bank with the objective of producing the same level of return under the same conditions.

Banking efficiency has been measured in most previous studies either by the cost/income ratio or by an efficiency score calculated using either the parametric or non-parametric approach. In this study, two measures of the efficiency of Islamic and conventional banks are used, namely the cost-to-income ratio (CIR) and the efficiency score calculated according to the parametric ap-

proach of stochastic frontier analysis (SFA) (Horrace & Wright, 2020; Octrina & Mariam, 2021).

The cost-to-income ratio (CIR) is expressed as the ratio between the total cost incurred by a bank and its revenue. The efficiency score as defined by the stochastic frontier analysis (SFA) is calculated, for each bank, based on the translog function described by the equation (1):

$$\begin{aligned}
 \ln TC = & \theta + \sum_{j=1}^2 \delta_j \ln Q_{jt} + \sum_{m=1}^2 \beta_m \ln P_{mit} + \frac{1}{2} \sum_{j=1}^2 \sum_{k=1}^2 \delta_{jk} \ln Q_{kit} + \frac{1}{2} \sum_{m=1}^2 \sum_{n=1}^2 \gamma_{mn} \ln P_{mit} \\
 & + \ln P_{nit} + \sum_{j=1}^2 \sum_{m=1}^2 \rho_{jm} Q_{jit} P_{mit} + v_{it}
 \end{aligned} \tag{1}$$

Where:

Ln TC: The natural logarithm of total cost;

Q_j, Q_k : Output quantities;

P_m, P_n : Input prices.

Stochastic frontier analysis (SFA) imposes certain restrictions such as symmetry of coefficients α_{12}, α_{21} et β_{12}, β_{21} , error normality and homogeneity of input price coefficients ($\sum_{m=1}^2 \beta_m = 1$).

The empirical analysis of the efficiency of Islamic and conventional banks follows a two-step approach. The first step consists in testing whether conventional banks are more efficient than Islamic banks or vice versa by estimating, in panel data, the following model:

$$Bank_{it} = \alpha + \beta_1 I_i + \varepsilon_{it} \tag{2}$$

Where, I is a dummy variable that takes 1 for Islamic banks and 0 for conventional banks. Bank is a measure of efficiency which is either the efficiency score calculated according to equation (1) or the cost-to-income ratio. Considering the efficiency score measure, a significantly positive (negative) β_1 would indicate that Islamic banks are more (less) efficient than conventional banks. This reasoning is reversed by considering the cost-to-income ratio as a measure of efficiency.

In the second step and to examine the differences in efficiency between Islamic banks and conventional banks considering some bank-specific variables, the following model is estimated, in panel data,

$$Bank_{it} = \alpha + \beta_1 I_i + \beta_2 X_{it} + \varepsilon_{it} \quad (3)$$

Where, $Bank_{it}$ represents the efficiency score or the Cost/Revenue ratio. I_i takes 1 for Islamic banks and 0 otherwise. X_{it} is a vector of three bank specific variables which are: Earning assets, Equity Buffer, and the size of the bank. ε_{it} is an error term.

Table 2 details the measurements of the bank specific variables

Table 2. Bank specific variables' measurements

Variables	Measurements
Size	Log of Total Assets
Earning assets	Net loans + Other performing assets
Equity buffer	Equity/ Total assets

Source: own elaboration.

THE OUTCOME OF THE RESEARCH PROCESS AND CONCLUSION

Empirical results and comments

Cost efficiency of islamic and conventional banks: A comparative analysis

The comparative analysis of cost efficiency between Islamic and conventional banks is done first on the basis of descriptive statistics of two considered efficiency measures and then by estimating model (2) above.

Table 3 below provides a summary of the main descriptive statistics of the efficiency measures, efficiency score (SFA) and cost-to-income ratio (CIR), for each category of banks during the study period.

Table 3. Descriptive statistics of efficiency measures

Variables	Conventional banks				Islamic banks			
	Mean	Standard deviation	Min	Max	Mean	Standard deviation	Min	Max
SFA	2.395	0.620	-0.398	3.433	2.022	0.829	-0.358	4.864
CIR	38.351	28.078	1.74	333.3	103.897	144.896	10.088	950

Source: own elaboration.

Table 3 shows that, on average, the efficiency score (SFA) is slightly higher for conventional banks (an average of 2.395 versus 2.022 for Islamic banks), implying that, overall, they are more efficient than Islamic banks.

The range of variation in this measure of efficiency among Islamic banks is larger (standard deviation = 0.829) than among conventional banks (standard deviation = 0.620), indicating that conventional banks are more consistent in terms of achieving cost efficiency than Islamic banks.

Similarly, the cost/income ratio varies from 1.74 to 333.3 with an average of 38.351 for conventional banks, and from 10.088 to 950 with an average of 103.897 for Islamic banks. Since the lower this ratio, the more efficient the bank is in terms of cost management, so, Islamic banks seem to be less efficient than conventional banks.

To deepen the comparative analysis of the efficiency of Islamic and conventional banks from descriptive statistics of the efficiency score (SFA) and the cost / income ratio (CIR), the average annual values of these two efficiency measures are calculated for each category of banks in order to assess their efficiency during the 2008 crisis period. The results are summarized in table 4 below.

Table 4. Average cost efficiency score and cost/income ratio by year

	Islamic banks		Conventional banks	
	SFA	CIR	SFA	CIR
2006	1.821	80.940	2.260	42.850
2007	1.946	90.321	2.389	42.954

Table 4. Average...

	Islamic banks		Conventional banks	
	SFA	CIR	SFA	CIR
2008	2.026	97.870	2.457	43.230
2009	2.021	115.916	2.431	40.442
2010	1.997	118.130	2.392	37.022
2011	2.013	128.068	2.370	36.554
2012	2.036	140.740	2.396	35.941
2013	2.087	98.204	2.406	37.066
2014	2.137	93.327	2.428	33.435
2015	2.136	75.462	2.428	34.018

Source : own elaboration.

Table 4 shows that conventional banks were more efficient than Islamic banks during the crisis period (2007–2008), given their lower CIR ratio values and higher SFA values in 2007 and 2008 compared to those of Islamic banks. Thus, conventional banks remain relatively more efficient than Islamic banks even in the period of crisis. However, looking at the Efficiency Score (SFA), the results show that Islamic banks were also efficient during the crisis period.

Regression results, considering the two efficiency measures mentioned above, are summarized in table 5 below.

Table 5. Cost efficiency of islamic and conventional banks

	SFA	CIR
DUMMY	-0.407 (0.000) ***	64.156 (0.000) ***
Constant	2.395 (0.000) ***	38.351 (0.000) ***
Adjusted R2	0.0715	0.0878
The figures in brackets are the capital gains. * : Significant at 10% ** : Significant at 5% *** : Significant at 1%		

Source : own elaboration.

Table 5 reports the results of the estimations of model (2). The results are consistent with the findings from the descriptive statistics. Indeed, considering the efficiency score, results show that the coefficient of the Dummy variable is significantly negative in accordance with the predictions of the theorists implying that Islamic banks are less efficient than conventional banks. This result is confirmed by considering the cost-to-income ratio as a measure of banking efficiency, given the positivity of the coefficient of the Dummy variable.

Effect of bank-specific variables on the banking efficiency

To test the differential effects of main determinants of banking activity on the efficiency of Islamic and conventional banks, the coefficients of model (3) by considering first the efficiency score (model 3-1) and then the Cost/Revenue ratio (model 3-2) are estimated. Table 6 summarizes the results of the estimates.

Table 6. Effect of selected determinants on banking efficiency

		Model 3-1	Model 3-2
SIZE		0.595 (0.000) ***	-0.594 (0.941)
Earning asset		-2.78e-08 (0.589)	0.00004 (0.082)*
Equity buffer		-0.003 (0.000) ***	0.2339 (0.295)
DUMMY		-0.159 (0.097)*	61.445 (0.000)***
Constant		0.124 (0.344)	33.848 (0.318)
R-square	Within	0.365	0.0002
	Between	0.496	0.216
	Overall	0.486	0.132
The figures in brackets are the capital gains. *: Significant at 10% ** : Significant at 5% *** : Significant at 1 %			

Source : own elaboration.

The results of model (3) estimates considering the efficiency score (model 3-1) show a significant positive relationship between the size of a bank and its level of efficiency. This can be explained by the fact that large banks can reduce costs

by taking advantage of their economies of scale. Considering the Cost/Income ratio, results show that this measure of cost efficiency is negatively related to the size of the bank. This implies that large banks have a lower Cost/Income ratio, and that they manage their costs relative to their revenues better than smaller banks.

Table 5 shows that earning assets have no significant relationship with efficiency as measured by the SFA method, but this relationship becomes positively and statistically significant when considering the cost-to-income ratio as a measure of efficiency. This implies that earning assets generate more costs, which could negatively affect cost efficiency.

Results also show that equity buffer is negatively related to efficiency as measured by the SFA method, and that this relationship is positive but not significant when considering the cost-to-income ratio. This finding indicates that banks with larger capitalization and a higher capital base in GCC countries are less efficient in terms of costs. This supports the idea that leverage is useful for reducing costs or increasing profits.

According to the financial literature, equity is more expensive than debt, implying that financing a bank's assets through deposits is better cost management than equity financing.

The estimated coefficient on the DUMMY variable for Islamic banks confirms the earlier conclusion that Islamic banks are less efficient than their conventional counterparts even after controlling for bank-specific variables.

■■■ CONCLUSION

The paper examines theoretically and empirically the efficiency of Islamic and conventional banks in order to assess the possible contribution of Islamic finance to banking efficiency. The empirical analysis is based on annual data for a sample of 99 banks, of which 48 are Islamic banks and 51 are conventional banks, operating in 6 countries of the Gulf Cooperation Council (GCC) region.

Our empirical results show that Islamic banks are less efficient in terms of cost than conventional banks, and that this differences in efficiency remains valid even during the 2008 crisis period and even after controlling for bank-specific variables. These results can be explained by the fact that the constraints imposed by Sharia law can widen the efficiency gap between the two types of banks, to the detriment of Islamic banks. the empirical results also

show that equity buffer and size positively affect bank efficiency as measured by the efficiency score as defined by the stochastic frontier analysis (SFA), and that earning assets are negatively related to efficiency (measured by the cost-to-income ratio).

The results of the paper are very important for banks' managements, investors, regulators, and policymakers. For banks, the findings help us to better understand how bank-specific variables affect the financial efficiency of the banking system and how to strengthen it to increase their efficiency and their performance and improve the service provided to customers. So, and based on the findings of this research, some recommendations can be proposed. Firstly, Islamic banks have a lot of ways to increase their efficiency. Thus, Islamic banks must identify the elements responsible for the increase in production costs. Secondly, and as the analysis shows, size positively affects the efficiency of banks. Islamic banks are small compared to conventional banks. Mergers and acquisitions among and between small Islamic banks may be a possible strategy to realize the benefits of economies of scale. For the public, clients and investors, this research can help them obtain accurate information in their investment decisions. For other researchers, this discovery may help them expand the search by using large and employing other approaches or input and output variables.

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