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"THIRTY YEARS OF ISLAMIC BANKING: HISTORY, PERFORMANCE AND PROSPECTS"

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CHAPTER 6

EFFICIENCY IN ISLAMIC BANKING

This chapter provides an overview of the literature that deals with measuring bank efficiency and shows recent empirical evidence that has sought to compare bank cost and profit efficiencies of Islamic and conventional banks. The first part of the chapter deals with the main methodological issues associated with estimating bank efficiency and outlines the main parametric and non-parametric approaches currently used in the literature. It then goes on to discuss features of the bank production process and finish off with a review of recent studies that compare banking sector efficiency of Islamic banks in GCC countries, Egypt, Jordan Turkey and Sudan. Other studies that solely focus on Islamic banks are also briefly discussed. The main finding from this, albeit recent and limited literature, is that Islamic banking as a production process is almost always found to be more cost and profit efficient than conventional banking. This is perhaps due to the lower funding costs and loan-loss levels in Islamic banking as compared with other types of banking operations. This phenomenon, among others may explain why we continue to see high growth rates of Islamic banking practice internationally.

6.1 WHY STUDY ISLAMIC BANK EFFICIENCY?

The question that might be asked is why the concept of efficiency is important in understanding the performance of Islamic banks? The following may provide an answer to this question:

> For financial institutions, efficiency would imply improved profitability, greater amounts of funds intermediated, better prices and service quality for consumers, and greater safety and soundness if some of the efficiency savings are applied towards improving capital buffers that absorb risk. Of course, the opposite is the case if structural changes result in less efficient intermediaries, with the additional danger of taxpayer-financed bailouts if substantial losses are sustained (Berger et al. 1993, p. 221).

In general, the study of the efficiency of Islamic banks is important for three reasons. Firstly, an improvement in cost efficiency means achieving higher profits and increasing the chance of survival in deregulated and

competitive markets. This is particularly relevant for Islamic banks as they compete head-on with conventional commercial banks in many jurisdictions. Secondly, customers are interested in knowing the prices and the quality of bank services as well as new services that banks could offer and these are strongly influenced by a banks overall efficiency of operations . Thirdly, an awareness of efficiency features is important to help policy makers formulate policies that affect the banking industry as a whole.

Moreover, for competition and mergers analysis it is important to know the effects of market concentration and past mergers on banking efficiency; whether one type of organisational form (such as Islamic banking) is more efficient than another; and whether inefficiency manifests itself in the form of poor production decisions, risk management decisions, or both. From a public policy perspective, concern about the economic efficiency of banks is also rationalised on the grounds that the efficiency of individual banks may affect the stability of the banking industry and, in turn, the effectiveness of the whole monetary system. The information obtained from the evaluation of Islamic banks' performance can also be used to improve managerial performance by identifying best and worst practice firms.

6.2 MEASURING BANK EFFICIENCY

Before we discuss recent empirical evidence on the efficiency of Islamic banks it is important to outline the way in which bank efficiency has been measured in the literature. Several approaches have been developed in the banking literature for measuring bank (firm) level efficiency, ranging from simple financial ratios to complex econometric models. Berger and Humphrey (1997) note that efficiency estimation techniques can be broadly categorized into parametric and non-parametric methods. However, no consensus exists as to the preferred method for determining the best-practice frontier against which relative efficiencies are measured. The most commonly used non-parametric methods are known as Data Envelopment Analysis (DEA) and the Free Disposable Hull (FDH). On the other hand, the most commonly used parametric methods are the Stochastic Frontier Approach (SFA), the Thick Frontier Approach (TFA) and the Distribution Free Approach (DFA). These approaches differ primarily in the assumptions imposed on the data in terms of the functional form of the best-practice frontier.

Frontier approaches are considered to be superior to standard financial ratio analysis because they use programming or statistical techniques that remove the effects of differences in input prices and other exogenous market factors affecting the standard performance of firms. This provides more accurate estimates of the underlying performance of firms and their managers. Therefore, frontier efficiency has been used extensively in the extant banking literature to measure the effects of mergers and acquisitions, capital regulation, deregulation of deposit rates, removal of geographic restrictions on branching and holding company acquisitions, and on financial institution performance in general.

In addition, frontier efficiency models are preferred by researchers over other performance indicators primarily because these models result in an objectively determined quantified measure of relative performance that removes many exogenous factors. This permits the researcher to focus on quantified measures of costs, inputs, outputs, revenues, profits, etc. to impute efficiency relative to the best practice institutions in the population.

Overall, the use of frontier efficiency techniques yields useful comparative and benchmarking information that can provide impetus for significant improvements and can alert institutions to new business practices. Simple ratio-based analysis that is used for benchmarking can provide important insights but may be limited in scope because they take a one-dimensional view of a service, product, or process and ignore any interactions, substitutions, or trade-offs between key variables. Thus, a more inclusive multiple-input, multiple-output framework for evaluating productive efficiency, that provides benchmarking information on how to become a well-managed bank, seems essential to improve decision making processes (especially at poorly managed banks).

6.2.1 Parametric versus non-parametric approaches to measuring efficiency

The choice of bank efficiency estimation method has been debated for some time with some researchers preferring the parametric approach (e.g., Berger et al, 1993) and others the non-parametric approach (e.g., Seiford and Thrall, 1990). Despite dispute over the preferred methodology an emerging view suggests that it is not necessary to have a consensus as to one single (best) frontier approach for measuring bank efficiency. Instead, there should be a set of consistency conditions for the efficiency measures derived from various approaches to meet. If efficiency estimates are

consistent across different methodologies then these measures will be convincing and therefore valid (or believable) estimates (Bauer et al.,1998).

Efficiency estimates derived from different approaches should be consistent by generating analogous efficiency levels and rankings concerning the identification of best and worst firms. These should also be consistent over time and in line with the competitive conditions of the market, and also with standard non-frontier measures of performance. These consistency conditions measure the degree to which different approaches are mutually consistent and the degree to which the efficiencies generated by the different approaches are consistent with reality.

In brief, both parametric and non-parametric approaches to estimating bank efficiency have advantages and disadvantages. While, the parametric approach has the virtue of allowing for noise in the measurement of inefficiency, this method requires assumptions about the particular form of the cost or profit function being estimated and the distribution of efficiency. The non-parametric linear programming approach requires no such specification of the functional form. However, the non-parametric approach suffers from the drawback that all deviations from the frontier are attributed to inefficiency with no allowance made for noise in the standard models.

6.2.2 The Stochastic Frontier Approach (SFA) and other parametric methods

This section outlines the main features of the most widely used parametric approach that has been used to estimate bank efficiency. The stochastic frontier approach (SFA) was independently proposed by Aigner et al. (1977), and Meeusen and Van den Broeck (1977) and postulates that firms face various technical inefficiencies in producing a particular level of output. For a given combination of input levels, it is assumed that the realized production of a firm is bounded by the sum of a parametric function of known inputs, involving unknown parameters, and a random error, associated with measurement error of the level of production or other factors. The greater the realized production falls below the production frontier, the greater the level of inefficiency.

The frontier approach labels a bank as inefficient if its costs (profits) are higher (lower) than those predicted for an efficient bank producing the same input/output combination and the difference cannot be explained by statistical noise. The cost frontier is obtained by estimating a cost function with a composite error term, the sum of a two-sided error term representing

random fluctuations in cost and a one-sided positive error term representing inefficiency. The single-equation stochastic cost function model can be given as:

$$TC = TC(y_i, w_i) + \varepsilon_i$$

where TC is observed total cost, y_i is a vector of outputs, and w_i is an input-price vector. Note the cost (or profit) function can take various forms, the most common being the translog specification, although recent studies tend to use the more flexible Fourier functional form. An example of a standard translog cost function using a two output (loans and securities) three input (wages, interest costs and other operating costs) specification is shown as:

$$lnTC = \alpha_0 + \tau_1 t + \frac{1}{2}\tau_1 t^2 + \sum_{i=1}^{2}\left(\alpha_i + \varphi_i t\right)\ln Q_i + \sum_{h=1}^{3}\left(\beta_h + \theta_h t\right)\ln P_h +$$
$$\frac{1}{2}\left[\sum_{i=1}^{2}\sum_{j=1}^{2}\delta_{ij}\ln Q_i \ln Q_j + \sum_{h=1}^{3}\sum_{m=1}^{3}\gamma_{hm}\ln P_h \ln P_m\right] +$$
$$\sum_{i=1}^{2}\sum_{m=1}^{3}\rho_{im}\ln Q_i \ln P_m + \varepsilon$$

Where:

lnTC = the natural logarithm of total costs (Operating and Financial cost);

lnQ_i = the natural logarithm of bank outputs, total loans and total securities ;

lnP_h = the natural logarithm of *i*th input prices (*i.e.* wage rate, interest cost and physical capital price);

Following Aigner et al. (1977), the error of the cost function is:

$$\varepsilon = u + v$$

where *u* and *v* are independently distributed; u is assumed to be distributed as half-normal; $u = N(0, \sigma_u^2)$, that is, a positive disturbance capturing the effects of inefficiency, and *v* is assumed to be distributed as two-sided normal with zero mean and variance, σ_v^2, capturing the effects of the statistical noise.

Observation-specific estimates of the inefficiencies, *u*, can be estimated by using the conditional mean of the inefficiency term, given the

composed error term, as proposed by Jondrow et al. (1982). The mean of this conditional distribution for the half-normal model is shown as:

$$E(u_i / \varepsilon_i) = \frac{\sigma\lambda}{1+\lambda^2}\left[\frac{f(\varepsilon_i\lambda/\sigma)}{1-F(\varepsilon_i\lambda/\sigma)} + \left(\frac{\varepsilon_i\lambda}{\sigma}\right)\right]$$

where $\lambda = \sigma_u / \sigma_v$ and total variance, $\sigma^2 = \sigma_u^2 + \sigma_v^2$; F(.) and *f*(.) are the standard normal distribution and the standard normal density function, respectively. (u_i / ε_i) is an unbiased but inconsistent estimator of u_i since regardless of the number of observations, *N*, and the variance of the estimator remains nonzero (see Greene, 1993, p. 80-82). Jondrow et al. (1982) have shown that the ratio of the variability (standard deviation, σ) for *u* and *v* can be used to measure a bank's relative inefficiency, where $\lambda = \sigma_u / \sigma_v$, is a measure of the amount of variation stemming from inefficiency relative to noise for the sample. Estimates of this model can be computed utilising maximum likelihood procedures.

Bauer et al. (1998) refer to Greene's (1990) argument that alternative distributions for inefficiency may be more appropriate than the half-normal, and the application of different distributions sometimes 'do matter' to the average efficiencies for financial institutions. If panel data are available, however, some distributional assumptions can be relaxed, and the distribution-free approach (DFA) may be used. The distribution-free method assumes that there is a core efficiency or average efficiency for each firm over time. The core inefficiency is distinguished from random error (and any temporary fluctuations in efficiency) by assuming core inefficiency as persistent over time, while random errors tend to average out over time. In particular, a cost or profit function is estimated for each period of a panel data set. The residual in each separate regression is composed of both inefficiency (ln *u*) and random error (ln *v*) but the random component is assumed to average out over time. Furthermore, an adjustment (called truncation) is assigned to the average of a bank's residuals from all of the regressions (ln $\hat{u}$). This is done so as to assign less extreme values of ln $\hat{u}$ to these banks, since extreme values may indicate that random error has not been completely purged by averaging. The resulting ln $\hat{u}$ for each bank is used to compute its core efficiency.

Other parametric approaches used to measure efficiency in banking markets include the thick frontier approach (TFA) and the distribution free approach (DFA). The TFA divides banks in a sample into four quartiles

based on the total cost per unit of assets. The estimated cost function for banks in the lowest average cost quartile is used to construct the cost frontier (the banks in this quartile are assumed to be the most cost efficient) while the estimated cost function for banks in the highest average cost quartile are assumed to have less than average efficiency. The difference between the cost functions estimated for banks in the least average cost quartile and banks in the highest average cost quartile are assumed to reflect differences in efficiency alone.

The DFA specifies a functional form for the cost function but it does not impose a specific shape on the distribution of efficiencies. It assumes that there is a core efficiency or average efficiency for each firm that is constant over time, while random error tends to average out overtime (Bauer et al., 1998). Unlike the other approaches, a panel data set is required, and therefore only panel estimates of efficiency over the entire time interval are available.

6.2.3 Data Envelopment Analysis (DEA) and other non-parametric approaches to measuring bank efficiency

The DEA nonparametric or mathematical programming approach is an alternative method to estimate productive efficiency in the financial sector. DEA is non-parametric in the sense that it simply constructs the frontier of the observed input-output ratios by linear programming techniques. This procedure is not based on an explicit model of the frontier, or the relationship of the observations to the frontier, other than the fact that observations cannot lie below the frontier. This approach shows how a particular bank operates relative to other banks in the sample and so it provides a benchmark for best practice technology based on the experience of the banks in the sample.

DEA can estimate efficiency under the assumption of constant returns to scale (CRS) and variable returns to scale (VRS). The CRS assumption is only appropriate when all DMUs (banks) are operating at optimal scale. However, factors like imperfect competition and constraints in finance may cause banks not to operate at optimal scale. As a result, the established bank literature that uses linear programming techniques to estimate efficiency tend to use the VRS approach as suggested by Banker et al (1984) where they propose a variable returns to scale measure using an output-oriented model.

Bauer et al.(1998) note that the DEA estimates are based on technological efficiency where efficient firms are those for which no other firm or linear combination of firms produces as much or more of every output (given inputs) or uses as little or less of every input (given outputs). The efficient frontier is composed of these undominated firms and the piecewise linear segments that connect the set of input/output combinations of these firms yield a convex production possibility set.

To match firms in so many dimensions, other constraints are often imposed on DEA linear programming problems. Other constraints that may be specified in banking studies can include such factors like quality controls (such as the number of branches or average bank account size) or environmental variables (such as bank ownership or state regulatory controls). However, matching firms in so many dimensions can result in firms being measured as highly efficient solely because no other firms or few other firms have comparable values of inputs, outputs or other constrained variables. That is, some firms may be self-identified as 100% efficient not because they dominate other firms, but because there are only a few other observations with which they are comparable. The problem of self-identifiers or near self-identifiers most often arises when there are a small number of observations relative to the number of inputs, outputs, and other constraints, so that a large proportion of the observations are difficult to match in all dimensions.

Other non-parametric approaches that have been used to estimate bank efficiency include the Free Disposal Hull approach (FDH), developed by Deprins et al. (1984), that is a special case of DEA. Here the hypothesis of convexity of the production possibility set (PPS) is abandoned, and the PPS is composed only of the DEA vertices and the free disposal hull points interior to these vertices. Because the FDH frontier is either congruent or interior to the DEA frontier, FDH will typically generate larger efficiency estimates than DEA. DEA is a more efficient estimator than FDH, but only if the assumption of convexity is correct.

A major drawback of the nonparametric approach is that it considers any deviations from the efficient frontier as inefficiencies given the absence of random error. In addition, this approach also suffers from the difficulty of drawing statistical inference and the lack of a definite functional form encapsulating the production technology.

6.2.4 Specification of bank's inputs and outputs

So far we have discussed different ways in which bank efficiency can be estimated but have said little about the actual bank production process. This involves the choice of bank inputs and outputs. Banks are entities engaged in the intermediation of services between borrowers and lenders. These services are related directly or indirectly to the financial assets and liabilities held by this firm such as loans and deposits. In addition, financial institutions such as banks are naturally multi-product firms, many of their services are jointly produced and so certain kinds of costs are jointly related to production of a variety of services. Furthermore, financial firms provide services rather than readily identifiable physical products, and there is no consensus as to the precise definition of what banks produce and how service output can be measured.

Intermediation theories do not provide a clear-cut view regarding banks' output and input and therefore do not present precise indication as to how to define banks' costs. Allen and Santomero (1998) argue that many current theories of intermediation are too narrow and focus on functions of institutions that are no longer crucial in many developed financial systems. Bhattacharya and Thakor (1993) provides a review of the relevant literature where such theories are often unable to account for those activities that have become more central to many institutions such as risk management and cost-reduction oriented activities.

Casu and Molyneux (2001) note that the earliest cost studies in banking applied a variety of different banking output indicators. Some early studies proxied bank services by a single index that combined all services into a uni-dimensional measure; others measured each bank service separately. In addition, some researchers chose to measure output in terms of bank assets and liabilities by focussing either on only one side of the balance sheet, or on both sides at the same time. Others have used bank revenues to measure bank output. Greenbaum (1967), for example, used the dollar market value of services rendered to measure output in an attempt to estimate the real social value of banking services.

While the multi-product nature of the banking firm is recognised, there is still no agreement as to the definition and measurement of bank inputs and outputs. The banking literature is divided concerning the issue of bank cost and there is no agreement concerning the variables that provide good proxy for bank costs. Benston, Hanweck, and Humphrey (1982) have summarized the issue into three viewpoints: economists tend to view bank’s output as dollars of deposits or loans, monetary economists see banks as producers of money-demand deposits, while others see banks as producing

loans, with demand and time deposits being analogous to raw materials. In general, researchers take one of two approaches labelled the 'intermediation approach' and the 'production approach'.

The intermediation approach views bank as an intermediator of financial services. This approach was suggested by Sealey and Lindley (1977) and assumes that banks collect funds (deposits and purchased funds with the assistance of labour and capital) and transform these into loans and other assets. The deposits are treated as inputs along with capital and labour and the volumes of earning assets are defined as measures of output. Consistent with this approach, costs are defined to include both interest expense and total costs of production. Some authors support the exclusion of interest expense from total costs, reasoning that interest costs are purely financial and not pertinent in measuring efficiency. Others have argued that excluding interest costs disregards the process of financial technology by which deposits are transformed into loans.

The production approach views banks as producers of loan and deposit services using capital and labour. The number of accounts of each type is the appropriate definition of outputs. The total costs under this approach are exclusive of interest expense, thus considering only operating but not interest costs and outputs are measured by the number of accounts serviced as opposed to dollar values.

In addition, there are three other forms of the intermediation approach suggested by Berger and Humphrey (1992). These forms define bank inputs and outputs according to bank activities. The first is the assets approach which considers banks as financial intermediaries between liability holders and those who receive funds. The outputs are defined as various types of assets while inputs include deposits and other liabilities. The main shortcoming of this approach is that it does not take into account the other services, such as fee-based off-balance sheet services provided by banks. The second alternative is known as the value-added approach where both assets and liabilities are considered to have some output characteristics and bank inputs and outputs are defined based on their share of value added. Outputs are classified from activities that create high value-added such as loans, demand deposits and time and saving deposits. Others outputs may be regarded as unimportant, intermediate products or inputs. The third approach is known as the user-cost approach which determines whether the final product is an input or an output based on its contribution to bank revenue. On this basis, transactions are defined as outputs if the financial return (e.g. return on assets or equity) exceeds the opportunity cost of funds,

or defined as a cost (liability) if the financial cost is less than the opportunity cost of those funds. The drawback of this approach is that it is often difficult to obtain accurate data on prices and revenues associated with different areas of banks' business. Finally, some researchers model bank inputs and outputs according to assumed bank objectives. For example, Leightner and Lovell (1998) specified outputs such as net interest income and non-interest income assuming that banks' main objective is to maximise revenue.

Overall, both the intermediation and production approaches have received significant attention in the banking efficiency literature but there is no consensus as to the 'best' approach to defining the bank production process. Berger and Humphrey (1997) indicate that both approaches are imperfect because neither fully captures the dual role of financial institutions, which includes both the provision of transaction and document processing services, and the transfer of funds from savers to borrowers. The 'production approach' may be somewhat better for evaluating the efficiencies of branches of financial institutions, because branches process primarily customers documents for the institution as a whole, and branch managers typically have little influence over bank funding and investment decisions. On the other hand, the 'intermediation approach' may be more appropriate for evaluating entire financial institutions because this approach is inclusive of interest and/or funding expenses, which often account for between one-half and two-thirds of total costs. Moreover, the 'intermediation approach' may be superior for evaluating the importance of frontier efficiency for the profitability of financial institutions, since the minimisation of total costs (and not just production costs) is needed to maximise profits.

Difficulties associated with defining the production features of Islamic banks is further compounded by the fact that their outputs can be viewed as different to conventional commercial banks. For instance, Hussein (2003) in his study on Islamic banks in Sudan uses investment in *murabahah* and other modes of Islamic finance (leasing, *musharakah* and *istisna*) as two of his main bank outputs (the third being off-balance sheet activity). Of course, if one wishes to compare Islamic banks with conventional banks one has to choose output measures that apply to both types of banks, such as a standard balance sheet measure (like total loans as used by El-Gamal and Inanoglu (2003) in their analysis of Turkish banking). Having said this, however,

studies that investigate Islamic bank efficiency typically use standard definitions for inputs – cost of physical capital, labour and funds.

6.3 EMPIRICAL EVIDENCE ON EFFICIENCY IN ISLAMIC BANKING

While there has been extensive literature examining the efficiency features of US and European banking markets over recent years, the work on Islamic banking is still in its infancy. Typically, studies on Islamic bank efficiency have focused on theoretical issues and the empirical work has relied mainly on the analysis of descriptive statistics rather than rigorous statistical estimation (El-Gamal and Inanoglu, 2003). However, this is gradually changing as a number of recent studies have sought to apply the approaches outlined above to estimate bank efficiency using various frontier techniques. These will now be discussed.

Al-Shammari (2003) uses the translog stochastic cost and alternative profit frontier approaches to estimate bank efficiency in GCC countries and compare Islamic bank efficiency with other types of banks. The cost efficiency estimates are shown in Tables 6.1 and 6.2 below. Cost efficiency estimates for banks in the countries under study averaged 88%. These estimates improved over time from 84% in 1995 to 91% in 1999. This suggests that the same level of output could be produced with approximately 88% of current inputs if banks under study were operating at the most efficient level. This level of technical inefficiency is similar to the range of 10-15% found in the survey of 130 studies undertaken by Berger and Humphrey (1997).The results appear slightly lower than the levels of inefficiency found in European banking including. (see Goddard et al 2001)

Table 6.1

GCC banks' Cost X-efficiency Scores (%) over 5 years

Year	Bahrain		Kuwait		Oman		Qatar		Saudi.A		U.A.E		GCC	
	Cost.X-Eff	No .of Banks	C.X-eff	No. of banks	C.X-Eff	No. of banks	C.X-Eff	No. of banks	C.X-Eff	No. of banks	Cost.X-Eff	No. of banks	C.X-Eff	No. of banks
1995	82	17	84	12	83	7	81	6	88	10	83	20	84	72
1996	82	17	84	12	85	7	83	6	91	10	85	20	86	72
1997	83	17	85	12	85	7	84	6	90	10	87	20	87	72
1998	84	17	88	12	86	7	84	6	92	10	90	20	89	72
1999	86	17	90	12	89	7	85	6	93	10	91	20	91	72
Ave.	84	85	87	60	86	35	83	30	92	50	90	100	88	72

Source: adapted from Al-Shammari (2003) pages 279-286

The efficiency scores based on geographical location, ranged from 83% in Qatar to 92% in Saudi Arabia. Referring to Table 6.2, the average cost efficiency based on bank specialisation ranged from 84% for investment banks to 91% for Islamic banks. It seems that Islamic banks have higher cost efficiency because of their generally lower cost of funds compared to commercial and investment banks.

Table 6.2

Cost X-efficiency (%) and Bank Type organizational form, Commercial, Investment and Islamic

Year	Islamic Banks		Commercial Banks		Investment Banks	
	Cost x-efficiency	N. of observations	Cost X-EFF	No of Obs	Cost X-EFF	No of Obs
1995	90	10	84	47	83	15
1996	91	10	86	47	84	15
1997	91	10	86	47	84	15
1998	92	10	87	47	85	15
1999	92	10	88	47	86	15
Average	91	50	86	235	84	75

Source: Source: adapted from Al-Shammari (2003) pages 279-286

The bank efficiency literature considers the estimation of both cost and profit efficiencies to reveal more accurate information about firm-level performance. Profit inefficiency depends both on the production structure and on the composition of the product portfolio, which has to be updated by banks at the pace required by general macroeconomic and other trends in the economy. In addition, profit efficiency incorporates both the cost and revenue sides of a bank's operations and therefore can be considered a more encompassing measure of firm performance. For instance just looking at cost efficiency may be misleading as one may find cost efficient banks that are highly efficient but they earn low revenues. Profit efficiency estimates therefore encompass bank cost and revenue features in the optimisation process. As such, Al-Shammari (2003) repeats the aforementioned analysis and estimates alternative profit efficiency for the same sample. (This is done by estimating the translog stochastic cost frontier, but replacing profits instead of total costs as the dependent variable). The results of the

alternative profit efficiency estimates are shown in Table 6.3. Here one can see that for different bank types the profit efficiency scores ranged from 64% for investment banks to 73% for the Islamic banks. Al-Shammari concludes that in the GCC countries, Islamic banks are the most cost and profit efficient while investment banks are the least efficient. He suggests that the motives behind the increase in Islamic banking activities over the past few years is due to the fact that Islamic banks appear to have a cheaper source of funds than other types of financial institution.[1]

Table 6.3

Alternative profit efficiency in GCC member states over 1995-1999
Based on geographical location

Country/Year	**1995**	**1996**	**1997**	**1998**	**1999**	***All***
Bahrain	63	66	69	70	71	*69*
Kuwait	64	68	69	71	72	*70*
Oman	62	66	66	67	67	*64*
Saudi Arabia	68	70	70	72	74	*72*
Qatar	63	67	68	69	70	*67*
United Emirates	64	67	69	71	72	*69*
All	64	68	69	70	72	*68*
According to bank's organisational form						
Commercial	64	67	68	68	70	*69*
Investment	62	64	65	66	66	*64*
Islamic	68	72	73	74	75	*73*
All	64	68	69	70	72	*68*

Source: adapted from Al-Shammari (2003) pages 279-286

The finding that Islamic banks are more cost and profit efficient than conventional banks is a finding confirmed in a similar study by Al-Jarrah and Molyneux (2003). They also use the stochastic frontier approach, with the Fourier-flexible functional form, and estimate bank cost and profit efficiency estimates for banks operating in Bahrain, Jordan, Egypt and

[1] Limam (2001) uses data envelopment analysis to investigate the efficiency of 52 GCC banks for 1999 although no distinction between Islamic and conventional banks.

Saudi Arabia. Table 6.4 shows that the average cost efficiency for different types of banks ranged from 93% for investment banks to 98% for Islamic banks.

Table 6.4

Cost efficiency in Jordan, Egypt, Saudi Arabia and Bahrain banking over 1992-2000

	1992	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	***All***
Bahrain	100	100	100	100	100	99	99	99	99	*99*
Egypt	94	94	94	94	94	93	93	93	93	*94*
Jordan	90	89	89	89	89	89	89	88	88	*89*
Saudi Arabia	97	97	97	97	97	97	97	97	96	*97*
Commercial	95	95	95	95	94	94	94	94	94	*94*
Investment	93	93	93	93	93	93	93	93	93	*93*
Islamic	98	98	98	98	99	99	98	98	98	*98*
Other	97	96	96	96	96	96	96	96	96	*96*
All	95	95	95	95	95	94	94	94	94	*95*

Source: Adapted from Al-Jarrah and Molyneux (2003).

Al-Jarrah and Molyneux (2003) extend their analysis by also estimating both standard and alternative profit efficiency for their sample of banks and the results are around 66% and 58% respectively over the period 1992-2000. It should be noted that these levels of efficiency are similar to that found in US studies which is about half of the industry's potential profits, according to Berger and Humphrey (1997). While over the period 1993-99, the efficiency estimates derived from both profit function specifications fluctuated slightly around their average, the year 2000 exhibits falls in profit efficiency across banks under study. This might reflect the response of economic and financial activities to the instability in the oil prices and the political instability aroused from recent conflict in Palestine and the Gulf.

Tables 6.5 and 6.6 report the standard and alternative profit efficiency estimates, respectively. Based on specialisation the results show that the standard profit efficiency scores ranged from 56% for investment banks to 75% for the Islamic banks. Similar results are found from the alternative

profit function estimates where Islamic banks are again the most profit efficient.

Table 6.5

Standard profit efficiency in Jordan, Egypt, Saudi Arabia and Bahrain banking over 1992-2000

	1992	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	***All***
Bahrain	69	78	67	71	66	72	67	68	57	*68*
Egypt	66	64	66	70	66	64	65	73	63	*66*
Jordan	84	60	61	61	63	56	56	59	50	*61*
Saudi Arabia	67	68	66	69	69	65	59	63	63	*65*
Commercial	70	67	68	72	69	65	62	68	62	*67*
Investment	65	69	55	55	48	51	57	60	43	*56*
Islamic	83	73	78	79	75	80	67	67	76	*75*
Other	64	58	57	61	64	73	74	78	55	*65*
All	70	67	65	68	66	65	63	68	59	*66*

Source: Adapted from Al-Jarrah and Molyneux (2003)

Table 6.6

Alternative profit efficiency in Jordan, Egypt, Saudi Arabia and Bahrain banking over 1992-2000

	1992	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	***All***
Bahrain	58	72	60	66	58	64	51	61	58	*61*
Egypt	65	58	60	62	59	60	56	68	55	*60*
Jordan	59	51	54	53	49	39	42	52	46	*49*
Saudi Arabia	56	56	54	51	61	59	51	61	61	*57*
Commercial	60	59	61	63	63	58	53	62	56	*60*
Investment	55	61	52	50	43	46	46	62	44	*51*
Islamic	76	57	60	64	54	63	51	55	78	*62*
Other	69	62	47	53	48	63	56	67	47	*57*
All	61	60	58	60	58	57	52	62	55	*58*

Asset Size (US$ million)

Source: Adapted from Al-Jarrah and Molyneux (2003)

Abdul Majid et al. (2003) used the stochastic cost frontier approach to estimate the cost efficiency of Malaysian banks over the period 1993 to 2000. Their data set included 34 banks (24 local and 10 foreign) from a total of 55 commercial banks in operation during the period of study. They used translog cost fuction to arrive at inefficiency measures. Their results are reported in Table 6.7.

Table 6.7

Descriptive Statistics for Inefficiency Measures for Various Bank Categories

	Mean	**Std. Dev.**	**Minimum**	**Maximum**
Conventional	0.302	0.240	0.030	1.230
Islamic	0.280	0.162	0.090	0.600
Local	0.321	0.248	0.050	1.230
Foreign	0.254	0.199	0.030	1.080
Asset Size > RM12 billion	0.319	0.209	0.110	0.860
Asset Size RM6-12 billion	0.290	0.269	0.090	1.200
Asset Size RM3-6 billion	0.409	0.338	0.120	1.230
Asset Size < RM3 billion	0.226	0.206	0.030	0.810

The results show that Islamic banks did marginally better than conventional banks in terms of efficiency although both produce at a cost that is respectively 30.2% and 28% higher than necessary. The slight edge achieved by the Islamic banks over conventional banks is not however statistically significant. However, at least it can be safely concluded that Islamic banks are at least as efficient as their conventional counterparts despite a more restrictive business environment.

It is also interesting to note that foreign banks are generally more efficient than local banks. Further test suggests that the difference is statistically significant at the 5% level.

El-Gamal and Inanoglu (2002) used the stochastic cost frontier approach to estimate the cost efficiency of Turkish banks over the period 1990 to 2000. The study compared the cost efficiencies of 49 conventional

banks with four Islamic special finance houses (SFH's). The Islamic firms comprised around 3% of the Turkish banking market. Overall, the authors found these firms to be the most efficient and this was explained by their emphasis on Islamic asset-based financing which led to lower non-performing loan ratios. It should also be noted that the SFH's achieved high levels of efficiency despite being subject to branching restrictions and other self-imposed constraints such as the inability to hold government bonds. El-Gamal and Inanoglu (2004) substantially extend their earlier study by providing an alternative method for evaluating bank efficiency scores. Again they examine the cost efficiency of Turkish banks throughout the 1990s. They distinguish between groups of banks that have different production technologies. They find that the Islamic financial firms have the same production technology as conventional (mainly domestic) banks, and using standard stochastic cost frontier estimates they show that the Islamic firm are among the most efficient. In addition, they use a new labour efficiency measure – and again Turkish Islamic special finance houses are found to be among the most efficient.

Hussein (2003) provides an analysis of the cost efficiency features of Islamic banks in Sudan between 1990 and 2000. Using the stochastic cost frontier approach, he estimates cost efficiency for a sample of 17 banks over the period. The interesting contribution of this paper, as noted earlier, is that specific definitions of Islamic financial products are used as outputs. In addition, the analysis is also novel as Sudan has a banking system based entirely on Islamic banking principles. (Of course, the drawback is that we cannot compare the efficiency of Islamic with conventional banks). Nevertheless, the results show large variations in the cost efficiency of Sudanese banks with the foreign owned banks being the most efficient. State owned banks are the most cost inefficient. The analysis is extended to examine the determinants of bank efficiency. Here, Hussain finds that smaller banks are more efficient than their larger counterparts. In addition, banks that have a higher proportion of *musharakah* and *mudarabah* finance relative to total assets also have efficiency advantages. Overall, the substantial variability in efficiency estimates is put down to various factors, not least the highly volatile economic environment under which Sudanese banks have had to operate over the last decade or so.

While the above outlines the literature that uses advanced modeling techniques to evaluate bank efficiency one should also note that there is also a substantial body of literature that covers the general performance features of Islamic banks. Such studies include those by Hassan and Bashir (2003)

who look at the determinants of Islamic bank performance and show Islamic banks to be just as efficient as conventional banks if one uses standard accounting measures such as cost-to-income ratios. Other studies that take a similar approach are those by Sarker (1999) who looks at the performance and operational efficiency of Bangladeshi Islamic banks, Bashir (2000) who examines the performance of Islamic banks across eight countries between 1993 and 1998, Bashir (1999) who examines the risk and profitability features of two Sudanese banks, Samad (1999) who compares the performance of one Malaysian Islamic bank to seven conventional banks and Iqbal (2001) who analyses the performance of various groups of conventional and Islamic banks within various countries. Overall, the general finding from this literature is that Islamic banks are at least as efficient as their conventional bank competitors and in most cases are more efficient.

6.4 Conclusions

The review of the extant literature that compares the efficiency of Islamic with conventional banks strongly suggests that the former is a more cost and profit efficient form of banking organisation. Evidence from the GCC countries, Egypt, Jordan and Turkey that uses cost frontier approaches to model bank efficiency all suggest that Islamic banking is a more efficient organisation form than other types of banking organisation. Other evidence where ratio analysis is used also tends to find the same result – particularly in the case of cost efficiency. While the consensus of opinion seems to reveal substantial efficiency advantages, it is not absolutely clear why these exist – some put it down to lower funding costs and others to lower loan-losses. This area deserves further investigation. Nevertheless, the broad findings do strongly suggest that Islamic banks can act as effective competitors to conventional banks and operate with at least the same (if not better) technology. We suggest that the identified efficiency advantages of Islamic banking are another reason that have helped the development of this type of banking business over recent years.