International Research Journal of Finance and Economics
ISSN 1450-2887 Issue 50 (2010)

http://www.eurojournals.com/finance.htm

Impact of Market Power and Efficiency on Performance of Banks in the Gulf Cooperation Council Countries

Belaid Rettab
Director, Data Management &Business Research, Dubai Chamber
Dubai, United Arab Emirates
E-mail: belaid.rettab@dubaichamber.ae

Hossein Kashani
Assistant Professor & Chair, Department of Economics and Statistics
College of Business Administration, University of Dubai
Dubai, United Arab Emirates
E-mail: hkashani@ud.ac.ae

Lamia Obay
Assistant Professor & Chair, Department of Finance and Banking
College of Business Administration, University of Dubai
Dubai, United Arab Emirates
E-mail: lobay@ud.ac.ae

Ananth Rao
Associate Professor & Dean, College of Business Administration
University of Dubai, Dubai, United Arab Emirates
E-mail: arao@ud.ac.ae
Tel: + 971 4 2072618; Fax: + 971 4 2242670

1. Introduction

The financial sector in the Gulf Cooperation Council Countries[1] (GCC) experiences currently serious reforms. It anticipates more liberalization, financial deepening, and consolidation. Recent reforms are supported by successful sectoral diversification which has resulted in a competitive market and double digit economic growth. Bank services encounter product diversification of which the Islamic finance has become a new challenge for the market.

In order to cope with new demand structure, a few banks in GCC have either converted to Islamic banking or opened Islamic windows. However, Research on the GCC financial sector is very limited and a lot more efforts are required. Only few studies have been dedicated to the region and only scattered insights about the sector are available. For Bahrain for example, banks were found to suffer from pure technical inefficiency over the period 1998-2000 and foreign banks were found to perform better than local ones but only when it comes to scale efficiency (Hassan et al., 2003). Another study by Hussein (2004) compared conventional banks and Islamic banks in Bahrain in terms of profit efficiency and found out that there are no differences between the two groups, but one single Islamic bank was dominating the market.

[1] Gulf Cooperation Council countries comprise of Kingdom of Saudi Arabia, UAE, Kuwait, Bahrain, Oman and Qatar.

The economic and financial transition in the GCC calls for more economic insights to support further monitoring the development and the anticipated financial sector's growth (see also EIU, 2004 a, b, c).

At international level, previous research which tested the paradigm structure-conduct-performance (SCP) was merely devoted to US banking sector. For the US, data to define local and regional markets is available, whereby concentration ratios and market shares are easy to compute for distinguished markets. Out of the 44 studies on the banking industry reviewed by Gilbert, 32 studies were found to support the SCP hypothesis (Gilbert, 1984). For other countries, data limitations formed serious constraints.

To circumvent the data problem for other countries, various studies used cross country data, but results were mixed and inconclusive about SCP hypothesis (See also Bourke 1989, Molyneux and Thorton 1992, Milind 2005). For example, Lloyd-Williams et al. (1994) for Spain and Molyneux and Teppet (1993) for five EFTA countries found results consistent with the SCP hypothesis, while Goldberg and Rai's (1996) for 11 European countries failed to find ground for the hypothesis. Finally, Maudos (1996) results seemed to be inconclusive.

The alternative paradigm of Efficiency-Performance (EFS) hypothesis proposed by Demsetz (1973) found strong support and produced relevant insights (Brozen 1982, Evanoff and Portier 1988, Smirlock 1985, Jackson 1992, and Berger 1995). The exercise led to the construction of the so-called Modified Efficient Structure Hypothesis which caters for the double impact of both efficiency and market power on performance.

This paper evaluates the validity of the two competing alternative hypotheses SCP and EFS in GCC banking system and thereby puts the case of this region in an international perspective. It assesses the impact of market structure on banks performance, and cross checks for the efficiency impact on performance whereby firm specific characteristics such as risk attitude and the product diversification of conventional versus Islamic banking are controlled for. The paper is organized in six sections. The next section lays down the analytical framework and formulates the hypotheses. Section 3 describes the methodology and data used for the analysis. Section 4 discusses the results and section summarizes and concludes the study.

2. The analytical framework

SCP models are based on Chamberlin's monopolistic competition theory (Chamberlin, 1933). They seek to explain firm performance through market structure. Market concentration reflects collusive behavior and suggests firm's power to extract higher profits due to oligopolistic behavior and collusive arrangements.

The basic SCP model can be formulated as follows:

$$P_t = f(M_t, D_t, C_t)$$

where t is time, P_t is performance measure, M_t *is* a (set of) market structure variable(s), D_t *is* a (set of) demand variable(s) and C_t *is* a set of firm-specific control variables.

A number of traditional concentration ratios have been used as measures of market structure. Many of them assume that the relationship between market power and market structure is linear. The common way to control for this problem is by using the Hirschman- Herfindahl index (HHI), where the market share is given by $MS_i = HHI = (MS_i)^2$. This measure is less arbitrary, and gives extra weight to those banks that dominate the market.

Many studies we reviewed earlier tested the SCP and EFS hypotheses making use of the following general model:

$$\Pi_{ij} = a_0 + a_1 CR_j + a_2 MS_{ij} + \Sigma a_n X_{nj} + u \quad (1)$$

where, Π is a measure of profitability of individual bank i in jth country in GCC, CR is a market concentration measure (CR_3 or CR_5), MS_i measures market share of the individual banks i, and

X is a vector of n control variables, which account for bank-specific and market-specific characteristics such as risks, capitalization and costs.

The SCP hypothesis is accepted if $a_1 > 0$ and $a_2 = 0$. If $a_1 = 0$ and $a_2 > 0$, the EFS hypothesis is not rejected since it is assumed that market share is a variable capable of representing efficiency, in so far as more efficient firms gain market share relative to less efficient firms.

Weiss (1974) asserted that the correct test for the competing hypotheses is one that takes both market share and concentration into account at the same time:

$$\Pi_{ij} = a_0 + a_1 CR_j + a_2 MS_{ij} + a_3 MSCR_{ij} + \Sigma a_n X_{nj} \quad (2)$$

Equation (2) is similar to equation 1 except for the inclusion of a new interaction variable MSCR denoting the interaction between market share and concentration ratio.

We opt in this paper for equation (3) below which will be modified to equations 5 and 8 to test the two competing hypotheses for the GCC:

$$ROAE_{ij} = a_0 + a_1(HHI_{ij}) + a_2(MS_{ij}) + a_3(MS_{ij} * HHI_i) + a_4(RISK_{ij}) + a_5(ER_{ij}) \quad (3)$$

where, subscript j represents jth country in GCC and subscript i denotes individual bank; $ROAE_i$ is bank i's rate of return on average equity (bank i's net income after taxes divided by its average equity capital over the last two years);

HHI_i is bank i's HHI (or $MS_i)^2$ taken as a measure of market concentration (we use HHI as a measure of market structure since it accounts for all firms in the market, while the CR_k ratio does not) and we use three measures of HHI viz., HHI-Deposits computed as $(TD_i/TD)^2$, where TD_i is bank i's real total deposits and TD is real total bank deposits in the banking system; HHI-Loans computed as $(Loan_i/Loan)^2$, where $Loan_i$ is bank i's real total loans and Loan is real total bank loans in the banking system; HHI-Asset computed as $(TA_i/TA)^2$, where TA_i is bank i's real total assets and TA is real total bank assets in the banking system.

MS_i –Deposit, is bank i's market share of deposits computed as (TD_i/TD), where TD_i is bank i's real total deposits and TD is real total bank deposits in the banking system; MS_i –Loan is computed as $(Loan_i/Loan)$, where $Loan_i$ is bank i's real total loans and Loan is real total bank loans in the banking system; MS_i-Asset, is computed as (TA_i/TA), where TA_i is bank i's real total assets and TA is real total bank assets in the banking system;

$MSHHI_i$ is the interaction between market share (MS_i) and concentration (HHI_i) for bank i.

$RISK_i$ is specified as two measures: leverage risk and capital risk: leverage risk is the ratio of bank i's real loans to its real total assets; capital risk is the ratio of bank i's real equity capital to its real total assets;

ER_i is the expense ratio and is specified as two measures: $SETA_i$ of bank i's real staff expenses to real total assets; $COSINCR_i$ is bank i's real cost expenses to real income;

$ROAE_i$, $RISK_i$ and ER_i are functions of total assets (TA_i) and thus they adequately account for the different asset sizes across $bank_i$. Regardless of the choice of specific market structure indices, all tests of the SCP hypothesis may suffer from identification problems.

Several broad class identification problems can be found in the literature. We discuss here two; *First*, the minimum number of competitors (and the maximum level of concentration) necessary for having perfect competition is highly debatable. An example may be the behavior of fringe competitors in reaction to a high concentration. If fringe competitors merge in order to more effectively compete with large players, then competition may actually increase with increasing concentration. As a result, the coefficient for M_t *could* be negative, even though this is inconsistent with the SCP model. *Second*, banks in a highly concentrated market may behave according to the *Quiet Life hypothesis* market power to lower the variance of returns (Berger and Hannan, 1998). In this case, an increase in M_t is most likely to have no effect on performance, although the effect could again be negative.

Furthermore, according to Berger (1995) the market share variable may capture effects not related to efficiency and therefore should not be interpreted as a direct measure of productive efficiency. Hence to test the above-mentioned hypothesis, a direct measure of firm's efficiency can be added to equation (3) resulting in model (4):

$$ROAE_{ij} = a_0 + a_1((MS_{ij})^2 + a_2(MS_{ij}) + a_3(MS_{ij}*HHI_{ij}) + a_4(RISK_{ij}) + a_5(ER_{ij}) + a_6(EFF_{ij}) \quad (4)$$

where, EFF represents x-efficiency and all other variables are already defined. The inclusion of EFF will enable us to test the SCP and the EFS hypotheses

Traditional market structure measures used in pervious studies assumes all banks benefit equally from a high degree of market concentration, contradicting thereby the concept of strategic group behavior and asymmetric market structures. We apply here the revised Cournot model (Bos, 2004) which accounts for the relationship between *firm* performance and market share. This modification will accommodate for the asymmetric market structures, differences in cost structures and explain collusive behavior if any in the GCC banking markets.

The basic equation (without control variables) is then:

$$\text{Log } \Pi_{ijt} = ß_o + ß_1 \text{ Log } (MS_{i,jt}) + \varepsilon \quad (5)$$

where, subscript t represents time period. In two extreme cases, interpretation of the coefficient $ß_1$ is straightforward. The Cournot oligopoly prediction is $ß_1 = 1$, and impact of MS_{ijt} *is* exactly proportional. If collusive behavior exists, market share is more than proportional, then the prediction is $ß_1 > 1$. Finally, in case of perfect competition an increase in market share has no impact on performance and $ß_1 = 0$. Therefore, in interpreting the coefficient $ß_1$, we will focus on its sign and significance rather than its magnitude[2].

Market structure variable is an aggregate measure that only changes over time, while market share variable differs from firm to firm and over time. This results in an identification problem. In an attempt to overcoming this problem, Berger and Hannan (1993) and Molyneux (2000) use both market share and efficiency as explanatory variables for bank profit. In these studies, however, a multi-collinearity problem exists *if* the Efficiency hypothesis holds. As a solution, we propose to include in this paper the market share that is *not* explained by efficiency, using firm-specific efficiency measures in log-linear form. First, we regress $MS_{i,t}$ on an efficiency measure. As evidenced by the discussion in Berger and Humprey (1991), X-efficiency is generally found to dominate scale efficiency in banking. As such, we consider a two-step approach. In the first step we regress cost efficiency (CE) on MS and retain errors (ω) estimated through equation (6)

$$\text{Log } MS_{i,t} = \gamma_{ot} + \gamma_1 \text{ log } CE_{it} + \omega \quad (6)$$

We then estimate equation (7), but replace $MS_{i,t}$ with ω_{it} – the residuals from the equation (6). This efficiency measure ω_{it} is by definition orthogonal on *CE*. The modified Cournot equation then reads:

$$\text{Log } \Pi_{ijt} = ß_o + ß_{1t} \text{Log } \omega_{i,t} + ß_2 \text{ Log } CE_{i,t} + \upsilon \quad (7)$$

All other variables used in equation (4) are suppressed in equation (7) to keep the main discussion clear. Now, we can test both the SCP hypothesis and the Efficiency hypothesis without identification problems. We can test both hypotheses by comparing the results from estimating equation (4) with those of estimating equation (7). If the market power hypothesis holds, $ß_1$ is significant and positive in both specifications. On the other hand, if $ß_1 > 0$ and significant when estimating equation (4) but ≥ 0 and significant when estimating equation (7), this is counted then as an evidence in favor of the Efficiency hypothesis. In light of the above discussion, the following hypotheses are constructed:

a. There is a positive relationship between Performance (profit measure) and market structure (market concentration).

[2] Of course, this modified Cournot model does not measure exactly the same relationship as the SCP model. Whereas the latter concentrates on the impact of market structure, the former focuses on individual bank's market share. However, in doing so it more accurately captures asymmetric market structures, differences in cost structures and collusive behavior in the banking markets across GCC countries.

b. There is a positive relationship between Performance (profit measure) and Efficiency.
c. There is a positive relationship between Performance (profit measure) and market structure (market share).
d. There is a positive relationship between firm specific risk attributes and Performance (profit measure)
e. There is a relationship between firm specific inter-bank cost differences and performance (profitability).
f. There are characteristics which differentiate UAE and non-UAE GCC banks.

3. Methodology and Data

According to U.S. guidelines (that are considered standard in this regard), the banking industry is considered not concentrated if HHI is less than 1,000; moderately concentrated if HHI lies between 1,000 and 1,800; and concentrated if HHI is more than 1,800 (US Department of Justice, 2006). Each firm's market share of total assets or deposits or loans is squared and the sum thereof is HHI. We also use HHI and Market share as alternative measures of market structure to assess the degrees of concentration in the GCC banking markets. We use detailed balance sheet and income and expenses data of the banks available from BankScope for the period 2001-05 for the SCP analysis. The bank data has been deflated by using GDP deflators to remove the impact of inflation on the SCP variables.

Traditionally there have been two main types of measures of bank performance used as dependent variables, namely, (1) the *price measures* such as the interest on loans (IOL), the interest on deposits (IOD) and the service charges on demand deposits (SCD), and (2) The *profitability measure* such as returns on assets (ROA) and interest margin (IM) (Evanoff and Fortier, 1988). The variable net interest (NIM) is a proxy for the pricing ability of banks. Berger and Hannan (1997) have argued that if the SCP hypothesis reflects anti-competitive pricing, then banks will be able to charge lower deposit rates and/or charge higher loan rates. However, examining either deposit rates or loan rates separately may not present the full picture because banks are able to operate competitively with one rate and behave non-competitively with the other. Thus, NIM captures the pricing ability of banks for services, deposits and loans (Goldberg and Rai 1996). If banks are able to price their products anti-competitively, then net interest margin will be higher because it indicates an ability to charge lower deposit rates and higher loan rates. Thus, NIM provides a measure of their pricing ability while ROA includes the ability to generate fees through other services (Goldberg and Rai, 1996). We use alternative profit measure return on average equity (ROAE) as profit performance measures as it includes both NIM and ROA as components in DuPont framework.

X-efficiency is represented by the variable EFF, which is derived using non-parametric method of data envelopment analysis (DEA) (see Charnes et al. 1978, Banker et al. 1989, Bauer 1990, Seiford and Thrall 1990, and Ali and Seiford 1993). For deriving EFF, we used capital and labor as inputs while outputs were loans, deposits and number of branches. This direct measure of efficiency is expected to have a positive and significant coefficient since higher efficiency means lower costs and thus higher profits. Further, a significant positive coefficient will provide support for the EFS hypothesis[3]. Given the strength and weaknesses of the two approaches we use both approaches to have a more robust analyses and results.

To control for different risks associated with individual banks we use here the capital to assets ratio (CAR), which is widely referred in Basel's capital norms. In order to control for bank size, the log of total assets of each bank were included in the sample. This takes into account the possibility of economy of scale which could arise from size and the possibility that larger banks have greater loan

[3] Alternatively, stochastic frontier analysis (SFA) estimates inefficiencies. This is an econometric technique based on a specified stochastic production/cost function and seeks to estimate the average production/cost frontier. This technique assumes a parametric representation of technology along with a random disturbance term, assumed to be identically and independently distributed.

and product diversification potential. As pointed out by Smirlock (1985) and Evanoff and Portier (1988), diversification reduces risks and therefore the required rate of return. Hence, the sign of this coefficient cannot be determined. Loan to deposit ratio (LDR) captures other firm-specific factors.

The structure of GCC banks in terms of branch network, level of real assets, real loans and real deposits, share of credit and deposit in the balance sheet of GCC banks are shown is tables 1, 2 and 3 respectively, while productivity and average efficiency estimates derived from DEA are shown in tables 4 and 5 in appendix .

4. The Model Results

Data on all GCC banks is pooled together. Some banks had full information for all the 5 years from 2001 and 2005, while some had only 2-3 years information from 2003 onwards. This resulted in an unbalanced pool with total of 272 observations. Since the study was also to benchmark and evaluate conventional and Islamic banking markets in the UAE vis-à-vis GCC, all non-UAE banks were coded as dummy 0 while UAE banks were coded as dummy 1. This also improved the robustness of the study results.

4.1. Testing SCP and EFS paradigms of GCC banks

Table 6 presents the model results of GCC banks. Model 1 uses market – asset and Model 2 uses HHI as alternative market structure variables. Further, models 1 & 2 use inefficiency estimates from SFA methodology. Models 3 & 4 use efficiency estimates from DEA methodology. All the four models were free from the problem of Mutlicollinearity[4]. The criteria for testing the hypotheses are shown in the first set of rows in Table 6. The regression diagnostics in terms of high adjusted R^2, and high F-values suggest that, models 1-4 are reasonably robust for testing the hypotheses.

There are statistically insignificant differences in the ROAE between banks in UAE and outside UAE in GCC in SFA specification. There are statistically insignificant differences in the ROAE between conventional banks and Islamic banks (Type variable) in the GCC under both SFA and DEA specifications. Overall, the ROAE of the GCC banks is likely to show significant upward trend (around 0.028-0.034% growth each year) in the coming years (Year variable). This result is highly significant in both SFA and DEA specifications. The concentration ratio measured in terms of market share or HHI are not statistically significant factors to explain the ROAE of the UAE banks in both SFA and DEA specifications. Thus, there is no evidence of market power in GCC banks.

The DEA efficiency estimates impacted the ROAE of GCC banks positively and the results are statistically highly significant. These results are not significant in SFA specification. A one percent increase in efficiency in bank operations is expected to improve the ROAE of GCC banks by 0.169% in the short-term. Thus, there is evidence of market efficiency in the GCC banking market. EFS paradigm is therefore valid in this market.

As regards bank specific control variables, the bank risk measure had the expected negative sign. The lower the risks of the GCC banks through higher capitalization are the lower is their expected profitability. This implies cautious behavior of the GCC banks in their lending activities. A one percent decrease in GCC bank's capitalization (but still maintaining over and above 10% required under Basel 2 norms) is expected to increase the ROAE of these banks by 0.756 to 0.765 percent. This result is statistically highly significant in both SFA and DEA specifications.

Expense to income ratio had the expected negative sign and was statistically highly significant in both SFA and DEA specifications. A one percent decrease in the GCC bank's share of expenses in income is expected to increase the ROAE of these banks by about 1.37 to 1.39%. Lower the share of

[4] The SPSS case-wise diagnostics did not reveal any outliers. Examination of VIF statistics showed that for all the data, the values were less than 10. Neter et al. (1990) note that a "VIF value in excess of 10 is often taken as an indication that multi-collinearity may be unduly influencing the least square estimates".

expenses in income generation, the higher is the expected ROAE of such banks. Similarly, staff expenses to total assets are expected to significantly influence the ROAE positively. 1% increase in staff expenses as a share in total assets is expected to result in 0.61-0.69% increase in ROAE of the GCC banks in the next 1-2 years. This is consistent with "expense preference" behavior of banks on the grounds that, banks distribute high profit earned as remuneration to their employees (see Edward 1977). Surprisingly, asset quality and liquidity measures were not significant explanatory factors to explain the ROAE performance of GCC banks in both specifications.

In summary, the results in Table 6 confirm that there is no evidence of market power or coullisve behavior across banks in the GCC. The performance of GCC banks is driven by efficiency considerations. Probably this is the main reason to rationally explain the recent merger of Emirates Bank International (EBI) and National Bank of Dubai (NBD) in Dubai, which brings synergies of both the banks' efficient operations. Central banks in the GCC could advocate many more such mergers on efficiency consideration for equipping the banking sector to face more effectively international competition.

4.2. Performance of UAE conventional and Islamic banks in a GCC perspective

The question to be dealt with here is whether these the groups viz., UAE and non-UAE Conventional and Islamic banks show significant differences in terms of performance.

To explore simultaneously the relationship between one (or more) categorical independent variable and two or more metric dependent variables we use MANOVA. The main objective is to see whether the combination of several dependent variables vary with respect to the explanatory variables. Accordingly, a new dependent variable is created to maximize the differences between groups, which is a linear combination of the other dependent variables[5].

Furthermore, the same set of performance indicators as defined earlier are used, viz: Market Structure Variables (Market share (MS) of Asset and Concentration –HHI Asset), Cost Inefficiency estimate (SFA), Asset Quality (Loan loss reserves to gross loan – LLRGL), Risk Measure (equity to total asset), Expense Ratio (cost to income ratio), Staff expense to total assets (SETA), and Liquidity (liquid asset to short-term liability) and profitability (ROAE). Table A in pppendix-3 provides descriptive statistics about the set of indicators into the analysis.

Using MANOVA terminology, we use a two-factor effect: a 'UAE' effect (GCC Code) and Specialization effect (Type). Both GCC Code and Type have been defined in section 3.b above. Through this procedure we investigate whether there is a 'UAE' effect, that is, whether the performance of banks operating in the UAE is significantly different from that of banks operating in the rest of the GCC countries. We also look for the specialization (Type) effect: that is, whether Islamic banks and conventional banks exhibit a significant difference in their performance. We further test for the interaction between these two effects (GCC Code*Type effect) to see whether it significantly affects bank performance.

In table 7 all the effects are significant including the interaction effect. UAE banks significantly differ in their performance from non-UAE-GCC banks. Islamic banks also differ in their performance from conventional banks, and Islamic banks in the UAE differ in their performance from other non UAE banks.

Table 8 tells us which of the performance indicators is significantly affected by Type, GCC code, or the interaction of both. Looking at the Type effect, Islamic and Conventional banks significantly differ from one another in terms of: Market structure (MSASST and HHIASST), asset quality (LLRGL), Expense ratio (CIR), liquidity ratio (LIQ), and profitability (ROAE).

[5] The main advantage of MANOVA over a series of ANOVAs is protection against type1 error due to multiple comparisons, for only 'one' DV is tested. Another advantage is its ability to show overall differences even if individual ANOVAs do not. See also appendix 3.

Looking at the UAE effect, market structure, asset quality, and profitability were again found to be significant differentiating characteristics between UAE and non-UAE-GCC banks. In this case, however, Risk measure (EQTA) and efficiency were also found to be significantly different between the two groups of banks. When looking at the interaction effect, we find that only three ratios are significant: cost, profitability and liquidity.

5. Summary and Conclusion

This study assessed the structure, conduct and performance; and also evaluates the efficiency of the banking sector (conventional and Islamic) in the GCC countries. The study findings reveal that, the UAE conventional banking market is not a concentrated market. While Saudi conventional banking market is moderately concentrated, banking markets in Oman and Qatar are concentrated.

UAE conventional banks outperformed the GCC banks performance in terms of growth in real assets, real loans, and real deposits. The potential strengths in these key performance areas imply that, the UAE banks have clear competitive edge amongst GCC banks to prudently expand from the deposits mobilized from the private sector in the UAE.

While the market share in key business areas (real assets, real loans and real deposits) declined in conventional banks (except UAE and Bahrain), the market share increased in Islamic banks in UAE and Kuwait with general decline in other Islamic banking markets in the GCC. All key business figures in Kuwait and Qatar Islamic banking market showed an increasing trend during 2001 and 2005. In case of Saudi Arabia, Islamic banks' real assets and real deposits markets declined significantly, while real loan markets increased significantly in 2005 compared to 2001. Interestingly, Islamic banking market in Bahrain followed the similar trend as that of Saudi Arabia during 2001-2005.

In the UAE, only three banks ADCB, NBAD, and NBD were among the efficient conventional banks throughout the 2001 – 2005 periods. Ten UAE banks experienced increasing returns to scale (IRS) production possibility in 2001. Although the young age of these banks could justify this position, without government protection these banks could have been the prime target of take over by multinational companies. However, none of the UAE banks in 2005 enjoyed the desired constant returns to scale (CRS) production possibility. Comparatively, the conventional banks in the UAE enjoyed a higher average efficiency score than other GCC countries as a whole in 2001. However, country-wise, Kuwait is the most efficient country, significantly higher than that of the other countries, including the UAE.

Islamic banks in Saudi Arabia have the highest numerical average efficiency in 2001, while the UAE Islamic banks come fourth in the ranking. However, statistical test do not verify significance between 5 GCC countries (Oman does not have any Islamic representation in this study).

The study also examines the validity of the positive relationship frequently found between performance and market concentration, which is often explained by two competing hypotheses. The first is the structure-conduct-performance (SCP) hypothesis and the second is the efficient structure (EFS) hypothesis. The study results does not support SCP paradigm and no evidence of market power is found in the GCC banking market. On the other hand, the performance of these banks is driven by efficiency considerations. Probably this is the main reason to rationally explain the recent merger of EBI and NBD in Dubai, which brings synergies of both the banks' efficient operations. Central banks in UAE and GCC could advocate many more such mergers on efficiency consideration for equipping the banking sector to face more effectively international competition.

With regard to bank specific control variables, the bank risk measure indicated that, lower the risks of the GCC banks through higher capitalization, lower is their expected profitability. This implies cautious behavior of the GCC banks in their lending activities.

Another control variable expense to income ratio was also statistically highly significant. A decrease in the GCC bank's share of expenses in income is expected to increase the ROAE of these banks.

Similarly, staff expenses to total assets are expected to significantly influence the ROAE positively. This is consistent with "expense preference" behavior of banks on the grounds that, banks distribute high profit earned as remuneration to their employees.

Surprisingly, asset quality and liquidity measures were not significant explanatory factors to explain the ROAE performance of GCC banks.

References

[1] Aly, A.I., and L.M. Seiford, 1993, The Mathematical Programming Approach to Efficiency Analysis in "The Measurement of Productive Efficiency: Techniques and Applications" edited by H.O. Fried, CAK Lovell, and SS Schmidt, Offord University press, Oxford, pp 120-159.

[2] Banker, R. D., and A. Charnes, W.W. Cooper, J. Swarts, and D.A. Thomas. 1989. "An Introduction to Data Envelopment Analysis with Some of its Models and Their Uses" in Research in Governmental and Non-profit Accounting, edited by J.L. Chan and J. M. Patton, Greenwich: Jai Press, 125-63.

[3] Bauer, P.W, 1990, Recent Developments in the Econometric Estimation of Frontiers, Journal of Econometrics, 46, pp 39-56.

[4] Berger, A. N. 1995. "The Profit-structure Relationship in Banking - Tests of Market power and Efficient-structure Hypothesis". Journal of Money, Credit and Banking 27,404-31.

[5] Berger, A. N., and T.H. Hannan. 1998. "The Efficiency Cost of Market Power in the Banking Industry: A Test of the 'Quiet Life' and Related Hypotheses". The Review of Economics and Statistics, August, 454-65.

[6] Berger, A. N., and T.H. Hannan. 1997. "Using Measures of Firm Efficiency to Distinguish among Alternative Explanations of the Structure-Performance Relationships in Banking". Managerial Finance 23, 6-31.

[7] Berger, A.N. and T.H. Hannan (1993), 'Using Efficacy Measures to Distinguish Among Alternative Explanations of the Structure-Performance Relationship in Banking,' *Board of Government of the Federal Reserve System Finance and Discussion Series*, May, 93–118.

[8] Berger, A.N. and D.B. Humprey (1991), 'The Dominance of Inefficiencies over Scale and Product Mix Economies in Banking,' *Journal of Monetary Economics*, 28, pp. 117–148.

[9] Bourke, P. 1989. "Concentration and other Determinants of Bank Profitability in Europe North America and Australia". Journal of Banking and Finance, 13,635-45.

[10] Bos J.W.B ., 2004., Does Market Power Affect Performance in the Dutch banking Market? A comparison of Reduced Form Market Structure Models, De Economist, 152, No.4, pp 491-512.

[11] Brozen, Y. 1982. Concentration, Mergers and Public Policy, Macmillan, New York

[12] Chamberlin, E. (1933), *The Theory of Monopolistic Competition*, Cambridge, MA, Harvard University Press.

[13] Charnes, A., W. W. Cooper, and E. Rhodes. 1978. "Measuring the Efficiency of Decision Making Units". European Journal of Operations Research 6, 429-44.

[14] Demsetz, H., 1973. "lndustrial Structure, Market Rivalry and Public Policy". Journal of Law and Economics 16 (April), 1-9.

[15] Economic Intelligence Unit (EIU). 2004a. Country Profile: Kuwait. London: EIU

[16] Economic Intelligence Unit (EIU). 2004b. Country Profile: Saudi Arabia. London:EIU

[17] Economic Intelligence Unit (EIU). 2004c. Country Profile: United Arab Emirates. London: EIU

[18] Evanoff, D. D., and D.L. Portier. 1988. "Reevaluation of the Structure conduct performance Paradigm in Banking". Journal of Financial Services Research 1, Kluwer, New York, 277-94.

[19] Gilbert, R. 1984. "Bank Market Structure and Competition - A Survey". Journal of Money, Credit and Banking, 16, 617-45.

[20] Goldberg, L. G., and A. Rai. 1996. "The Structure-Performance Relationship for European Banking". Journal of Banking and Finance 20, 745-71.

[21] Jackson, W. E. 1992. "The Price-concentration Relationship in Banking: A Comment". Review of Economics and Statistics 74, 373-6.

[22] Hassan, K., A. Samad, and A. Al Sharaks (2003) An empirical study of relative efficiency of the Banking Industry in Bahrain. Studies in Economics and Finance

[23] Hussein, K. (2004). Bank efficiency in Bahrain: Islamic vs Conventional Banking. Islamic Development Bank, Jeddah, KSA

[24] Llyod-Williams, D.M., Phil Molyneux, and John Thornton, 1994, Market Structure and Performance in Spanish Banking, Journal of Banking and Finance, 18, pp 433-443.

[25] Maudos, J, 1996. Market Structure and Performance in Spanish Banking Using Direct Measure of Efficiency, Working Paper WP_EC 96-12, Instituto Valenciano de Investigaciones Economicas, S.A.

[26] Milind.S. 2005., Market Structure and Performance in Australian Banking. Review of Accounting and finance; 2005; 4, 2

[27] Molyneux, P. (2000), "Does Size Matter?' Financial Restructuring under EMU,' *Working Paper*, Part of this paper has appeared in European Investment Bank Papers 4, 1 (1999).

[28] Molyneux, P., and J.L. Teppett, 1993. "Structure-conduct-performance in EFTA Banking Markets". Bank-enFinanciewezen, 3, 37.

[29] Molyneux, P., and J. Thorton. 1992. "Determinants of European Bank Profitability; A Note". Journal of Banking and Finance 16, 1173-78.Molyneux, P., Y. Altunhas, and E. Gardner. 1996. Efficiency in European Banking. John Wiley and Sons, Chichester.

[30] Neter, J., W. Wasserman, and M. Kutner. 1990. Applied Linear Statistical Models, Boston: Irwin, Boston, p.409.

[31] Samad, Abdus (2004) Bahrain's Commercial Bank Performances During 1994-2001, Credit & Financial Management Review

[32] Seiford, L.M and R.M. Thrall, 1990, Recent Development in DEA: The Mathematical Programming Approach to Frontier Analysis, Journal of Econometrics, 46, pp 7-38.

[33] Smirlock, M. (1985), 'Evidence on the (Non-)Relationship Between Concentration and Profitability in Banking,' *Journal of Money, Credit and Banking*, 17(1), pp. 69–83.

[34] United States Government, Department of Justice. 2006. Merger Guidelines. Washington DC: US Government.

[35] Weiss, L. 1974. "The Concentration-Profit Relationship and Antitrust", in Industrial Concentration: The New Learning, Goldschmid, H., Mann, H.M. and J.F. Weston (eds.). Brown and Company: Boston, MA

Appendix

Table 1: Branching in the GCC Banking Sector: 2005

Country	Number of Banks (No. of foreign banks)	Bank Branches per 100,000 person (2005)
Bahrain	114(na)	53
Kuwait	15(5)	8
Oman	14 (8)	15
Qatar	15(8)	9
Saudi Arabia	22 (10)	5
UAE	46(25)	12

(**Source:** Websites of GCC Central Banks)

Table 2: GCC Bank Performance Indicators

$ (Mn) Real Assets	2005	2004	2003	2002	2001	CAGR(%)
Bahrain	33,432	30,681	27,758	25,932	25,285	**7**
Kuwait	23,681	22,649	27,312	28,375	25,027	**-1**
Oman	6,299	6,065	6,282	6,521	6,398	**0**
Qatar	8,084	6,516	6,490	6,398	6,507	**6**
Saudi	121,518	98,339	87,756	83,680	82,656	**10**
UAE	63,734	47,250	40,395	40,658	37,302	**14**
GCC	**256,749**	**211,499**	**195,993**	**191,564**	**183,174**	**9**
$(Mn) Real Loans						
Bahrain	5,316	4,688	4,093	3,950	3,555	**11**
Kuwait	13,339	12,878	13,615	12,842	11,220	**4**
Oman	4,360	4,349	4,628	4,889	4,931	**-3**
Qatar	4,335	3,512	3,746	3,712	4,042	**2**
Saudi	61,039	55,943	53,115	52,695	49,001	**6**
UAE	36,988	26,976	22,634	21,350	19,227	**18**
GCC	**125,375**	**108,346**	**101,831**	**99,437**	**91,976**	**8**
$ (Mn) Real Deposits						
Bahrain	8,191	7,579	7,345	6,884	6,672	**5**
Kuwait	19,661	19,915	24,396	25,432	22,498	**-3**
Oman	4,524	4,283	4,652	4,997	4,963	**-2**
Qatar	6,074	4,985	5,012	5,011	5,146	**4**
Saudi	56,761	56,671	54,742	57,719	51,816	**2**
UAE	49,323	35,669	29,569	29,256	26,739	**17**
GCC	**144,534**	**129,102**	**125,715**	**129,298**	**117,834**	**5**

(**Source:** Annual Report of Central Banks of GCC Countries)

Table 3: Loan and Deposit Mix of GCC Banks

Share of Loans in TA (%)	**2005**	**2004**	**2003**	**2002**	**2001**	**CAGR(%)**
Bahrain	15.9	15.3	14.7	15.2	14.1	**3**
Kuwait	56.3	56.9	49.9	45.3	44.8	**6**
Oman	69.2	71.7	73.7	75.0	77.1	**-3**
Qatar	53.6	53.9	57.7	58.0	62.1	**-4**
Saudi	50.2	56.9	60.5	63.0	59.3	**-4**
UAE	58.0	57.1	56.0	52.5	51.5	**3**
GCC	**48.8**	**51.2**	**52.0**	**51.9**	**50.2**	**-1**
Share of Deposits in Total Liabilities & Equity (%)						
Bahrain	24.5	24.7	26.5	26.5	26.4	**-2**
Kuwait	83.0	87.9	89.3	89.6	89.9	**-2**
Oman	71.8	70.6	74.1	76.6	77.6	**-2**
Qatar	75.1	76.5	77.2	78.3	79.1	**-1**
Saudi	46.7	57.6	62.4	69.0	62.7	**-7**
UAE	77.4	75.5	73.2	72.0	71.7	**2**
GCC	**56.3**	**61.0**	**64.1**	**67.5**	**64.3**	**-3**
Loan to Deposit ratio (%)						
Bahrain	64.9	61.8	55.7	57.4	53.3	**5**
Kuwait	67.8	64.7	55.8	50.5	49.9	**8**
Oman	96.4	101.5	99.5	97.8	99.4	**-1**
Qatar	71.4	70.4	74.7	74.1	78.5	**-2**
Saudi	107.5	98.7	97.0	91.3	94.6	**3**
UAE	75.0	75.6	76.5	73.0	71.9	**1**
GCC	**86.7**	**83.9**	**81.0**	**76.9**	**78.1**	**3**

(**Source:** Annual Report of Central Banks of GCC Countries)

Table 4: Average Productivity Estimates of GCC Banks

Year 2005	**Average CRS (σ)**	**Significant difference?**	**Range**	**Banks on Frontier**
Conventional Banks (46)	0.611 (0.194)	No	0.146 – 1.000	5
Islamic Banks (20)	0.635 (0.277)	No	0.038 – 1.000	4
Year 2004				
Conventional Banks (45)	0.395 (0.189)	No	0.043 – 1.000	2
Islamic Banks (20)	0.463 (0.311)	No	0.025 – 1.000	2
Year 2003				
Conventional Banks (43)	0.637 (0.223)	Yes, α=0.06	0.063 – 1.000	5
Islamic Banks (19)	0.694 (0.315)	No	0.027 – 1.000	6
Year 2002				
Conventional Banks (42)	0.764 (0.218)	No	0.079 – 1.000	6
Islamic Banks (17)	0.816 (0.295)	No	0.013 – 1.000	8
Year 2001				
Conventional Banks (42)	0.697 (0.191)	No	0.176 – 1.000	5
Islamic Banks (16)	0.815 (0.291)	No	0.038 – 1.000	8

Table 5: Average Efficiency Estimates of GCC Banks

Year 2005	Average VRS (σ)	Significant difference?	Range	Banks on Frontier	Average Scale Efficiency	No. of Banks with IRS	No. of Banks with DRS
Conventional Banks (46)	0.712 (0.206)	No	0.360 – 1.0	9	0.876	10	31
Islamic Banks (20)	0.741 (0.260)	No	0.168 – 1.0	7	0.843	10	6
Year 2004							
Conventional Banks (45)	0.665 (0.266)	No	0.044 – 1.0	7	0.661	6	35
Islamic Banks (20)	0.627 (0.353)	No	0.081 – 1.0	6	0.763	6	10
Year 2003							
Conventional Banks (43)	0.750 (0.224)	No	0.063 – 1.0	11	0.863	7	30
Islamic Banks (19)	0.849 (0.234)	No	0.202 – 1.0	11	0.813	5	7
Year 2002							
Conventional Banks (42)	0.784 (0.211)	No	0.192 – 1.0	8	0.965	14	16
Islamic Banks (17)	0.857 (0.280)	No	0.140 – 1.0	10	0.912	2	6
Year 2001							
Conventional Banks (42)	0.748 (0.181)	No	0.237 – 1.0	9	0.938	25	11
Islamic Banks (16)	0.889 (0.188)	No	0.355 – 1.0	10	0.888	5	3

Table 6: Regression Results

Dependent Variable (ROAE)	Coefficients	Model-1	Model-2	Model-3	Model-4
		Cournot (MS)	Cournot (HHI)	Cournot (MS)	Cournot (HHI)
		Equation 7	Equation 7	Equation 7	Equation 7
Null Hypothesis -H_o **Alternative Hypothesis-H_A**		$a_{2=0}$ & $a_{9=0}$ $a_{2>0}$ & $a_{9>0}$	$a_{1=0}$ & $a_{9=0}$ $a_{1>0}$ & $a_{9>0}$	$a_{2=0}$ & $a_{9=0}$ $a_{2>0}$ & $a_{9>0}$	$a_{1=0}$ & $a_{9=0}$ $a_{1>0}$ & $a_{9>0}$
Independent Variables ↓					
Constant	a_0	-51.11*** (-4.29)	-51.11*** (-4.29)	-63.24*** (-5.15)	-63.24*** (-5.15)
GCC Code(UAE=1; Non-UAE-GCC =0)		-0.026 (-1.43)	-0.026 (-1.43)	-0.031* (-1.75)	-0.031* (-1.75)
Type (CB=1; IB=0)		-0.018 (-0.89)	-0.018 (-0.89)	0.003 (0.14)	0.003 (0.14)
Year (Coded as 2001=1; 2002=2; 2003=3; 2004=4; 2005=5)		0.028**** (4.67)	0.028**** (4.67)	0.034**** (5.52)	0.034**** (5.52)
Market Structure Variables					
Market share (MS)	a_2	0.004 (0.16)		-0.014 (-0.71)	
Concentration –HHI Asset	a_1		0.002 (0.16)		-0.007 (-0.71)
SFA inefficiency estimates	a_9	-0.014 (-0.78)			
DEA efficiency estimates	a_9		-0.014 (-0.78)	0.169*** (2.55)	0.169*** (2.55)
Control Variables					
Asset Quality (Loan loss reserves to gross loan – LLRGL)	a_6	-0.011 (-0.43)	-0.011 (-0.43)	0.003 (0.12)	0.003 (0.12)
Risk Measure (equity to total asset)	a_4	-0.765**** (-12.72)	-0.765**** (-12.72)	-0.756**** (-13.61)	-0.756**** (-13.61)
Expense Ratio (cost to income ratio)	a_5	-1.394**** (-18.08)	-1.394**** (-18.08)	-1.366**** (-18.56)	-1.366**** (-18.56)
Staff expense to total assets (SETA)	a_7	0.608**** (9.33)	0.608**** (9.33)	0.693**** (9.86)	0.693**** (9.86)
Liquidity (liquid asset to short-term liability)	a_8	-0.013 (-0.83)	-0.013 (-0.83)	-0.004 (-0.24)	-0.004 (-0.24)
Adjusted R^2		0.72	0.72	0.75	0.75
F Value		65.41***	65.41***	75.49***	75.49***
N (11 banks in GCC were excluded from the SFA cost models analysis since they did not have full information required for inefficiency estimates)		253	253	264	264

Figures in parenthesis are t-values.

**** Extremely significant; *** Significant at 1%; ** Significant at 5% and * Significant at 10%

Table 7: MANOVA Tests

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.999	32522.415(a)	8.000	236.000	.000
	Wilks' Lambda	.001	32522.415(a)	8.000	236.000	.000
	Hotelling's Trace	1102.455	32522.415(a)	8.000	236.000	.000
	Roy's Largest Root	1102.455	32522.415(a)	8.000	236.000	.000
Type	Pillai's Trace	.213	7.984(a)	8.000	236.000	.000
	Wilks' Lambda	.787	7.984(a)	8.000	236.000	.000
	Hotelling's Trace	.271	7.984(a)	8.000	236.000	.000
	Roy's Largest Root	.271	7.984(a)	8.000	236.000	.000
GCC Code	Pillai's Trace	.221	8.387(a)	8.000	236.000	.000
	Wilks' Lambda	.779	8.387(a)	8.000	236.000	.000
	Hotelling's Trace	.284	8.387(a)	8.000	236.000	.000
	Roy's Largest Root	.284	8.387(a)	8.000	236.000	.000
Type * GCC Code	Pillai's Trace	.145	4.993(a)	8.000	236.000	.000
	Wilks' Lambda	.855	4.993(a)	8.000	236.000	.000
	Hotelling's Trace	.169	4.993(a)	8.000	236.000	.000
	Roy's Largest Root	.169	4.993(a)	8.000	236.000	.000

a Exact statistic
b Design: Intercept + Type+ GCC Code +Type * GCC Code

Table 8: Tests of "Between-Subjects" Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	SETA	0.264	1	0.264	9.784	0.002
	MSASST	48.305	1	48.305	254.542	0.000****
	LLREGL	53.041	1	53.041	482.062	0.000****
	EQTA	185.078	1	185.078	8,220.224	0.000****
	CIR	360.709	1	360.709	20,753.041	0.000****
	LIQ	83.265	1	83.265	331.951	0.000****
	ROAE	213.607	1	213.607	4,816.987	0.000***
	SFA-INEF	0.000	1	0.000	0.000	0.986
	HHIASST	193.220	1	193.220	254.542	0.000****
Type	SETA	0.007	1	0.007	0.256	0.613
	MSASST	0.607	1	0.607	3.198	0.075*
	LLREGL	1.341	1	1.341	12.185	0.001***
	EQTA	0.014	1	0.014	0.609	0.436
	CIR	0.249	1	0.249	14.300	0.000****
	LIQ	1.774	1	1.774	7.072	0.008***
	ROAE	0.221	1	0.221	4.977	0.027**
	SFA-INEF	0.003	1	0.003	0.012	0.914
	HHIASST	2.427	1	2.427	3.198	0.075*
GCC Code	SETA	0.026	1	0.026	0.948	0.331
	MSASST	7.712	1	7.712	40.640	0.000****
	LLREGL	0.487	1	0.487	4.428	0.036**
	EQTA	0.697	1	0.697	30.936	0.000****
	CIR	0.022	1	0.022	1.290	0.257
	LIQ	0.072	1	0.072	0.288	0.592
	ROAE	0.915	1	0.915	20.626	0.000****
	SFA-INEF	4.776	1	4.776	17.115	0.000****
	HHIASST	30.849	1	30.849	40.640	0.000
Type * GCC Code	SETA	0.019	1	0.019	0.700	0.404
	MSASST	0.000	1	0.000	0.000	0.986
	LLREGL	0.041	1	0.041	0.375	0.541
	EQTA	0.006	1	0.006	0.272	0.603
	CIR	0.185	1	0.185	10.616	0.001***
	LIQ	1.546	1	1.546	6.164	0.014**
	ROAE	0.789	1	0.789	17.790	0.000****
	SFA-INEF	0.001	1	0.001	0.002	0.964
	HHIASST	0.000	1	0.000	0.000	0.986

**** Extremely significant; *** Significant at 1%; ** Significant at 5% and * Significant at 10%