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GCC Banking System*

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Market Structure and Competitive Conditions in the Arab GCC Banking System

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Abstract

This paper investigates the market structure of Arab GCC banking industry during the years of 1993 to 2002 using the most frequently applied measures of concentration k-bank concentration ratio (CR*k*) and Herfindahl-Hirschman Index (HHI) and evaluates the monopoly power of banks over the ten years period using the "*H statistic*" by Panzar and Rosse. The results show that Kuwait, Saudi Arabia and UAE have moderately concentrated markets and are moving to less concentrated positions. The measures of concentration also show that Qatar, Bahrain and Oman are highly concentrated markets. The Panzar-Rosse H-statistics suggest that banks in Kuwait, Saudi Arabia and the UAE operate under perfect competition; banks in Bahrain and Qatar operate under conditions of monopolistic competition; and we are unable to reject monopolistic competition for the banking market in Oman.

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1 Introduction

The Gulf Cooperation Council's (GCC)[1] economies share a number of common features. These economies are characterized by large oil producing sectors, dependency on oil exports, stable currencies and stable price levels. Similarities also extend to geography, longstanding cultural and political ties, a common language, high living standards and coordinated policies. These similarities by far outweigh any differences.

The last 30 years have seen significant structural change in the GCC financial markets. In particular, policies of financial liberalization and financial restructuring were implemented with the goal of enhancing competitiveness in the banking sector. These policies beg the following questions: how large are the banking markets in these six countries? What is the structure of the banking market? Is the concentration in these markets increasing or decreasing?

Studies of competitive conditions in the developed economies banking markets are commonplace, there have been relatively few studies conducted for the GCC economies[2] and no empirical work of a specialist nature. This paper investigates the market structure of the GCC banking industry in the decade to 2002 with the aim of evaluating the monopoly power of the banks over this period. The paper aims to test the relationship between the market structure and the competitive conditions of the banks in these six economies using the most frequently applied measures of concentrations; namely the k-bank concentration ratio (CR*k*) and Herfindahl-Hirschman Index (HHI) to measure concentration, and the *H*-statistic of the Panzar-Rosse model to measure monopoly power.

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[1] The Arab GCC countries are Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates (UAE).

The rest of the paper has the following structure: section two provides a background to the banking system in the GCC countries. Section three discusses measures of market structure and concentration. Section four presents the empirical result for the competitive conditions in these markets. The final section concludes.

2 The GCC Banking Sector

The banking industry in the GCC countries is relatively young, with the oldest banks dating back to no earlier than the 1950s. Although the majority are privately owned, the role of the public sector remains substantial. Whether through equity participation in several banks or through a number of governments owned specialized credit institutions that provide financing to public and private sector enterprises at subsidized rates, the public sector continues to have a prominent role in the banking industry of the GCC countries. Private sector ownership of financial institutions also tends to be concentrated in a few shareholders; a matter that reduces the threats (and benefits) of the market for corporate control.

Considering the region's massive oil wealth, the combined Tier One capital of the GCC's Top 50 banks at $31.5 billion is relatively small, amounting to 1.7% of the capital of the Top 1000 world banks. The capital of all 50 GCC banks is considerably less than that of HSBC (Hong Kong Shanghai Banking Corporation) Holdings at $35 billion. While GCC banks have been able to receive the highest rating of any bank in the Arab world or the emerging markets, the GCC has not been able to produce large powerhouse institutions that could be a force in the Arab or international banking arena. For number of reasons, many of them political, the global trend towards consolidation has by-passed the Gulf. However, with World Trade Organisation (WTO) liberalisation planned for the near future, banks will be reconsidering their

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[2] Salem-Ghanem et. al. (2002) examines concentration and equates concentration with lack of

competitive strategies. As a recent report in the Banker stated, "GCC banks need to strengthen their position through consolidation in order to compete effectively with international banks. The current fragmented banking sector will be unable to put up a good fight when markets do eventually open up" (The Banker, 2002).

A key assumption in quantitative analysis of banking is that the banks examined have to be relatively homogenous, provide similar services and use similar resources. Commercial banks operating in GCC are depository institutions that cannot take part in the leasing and trading of real goods for commercial purposes. In contrast, development and investment banks can engage in such activities, but they cannot accept deposits. These non-depository institutions also do not extend small commercial and individual loans, which require a substantial amount of investment in a brick-and-mortar branching network, work force, and regulatory compliance. In fact, they are mostly single branch banks that finance large long-term projects. Because of their small market share in the sector as well as quite different technology, structure and goal, this study excludes development and investment banks and instead concentrates on commercial and Islamic banks.

The data is obtained from financial statements of banks, on their web pages on the internet, annual central bank reports, and from the Fitch-IBCA Ltd Bankscope CD Rom. This study covers 52 banks privately held and domestically owned that are fully licensed commercial. Table 1 below summarises the structural properties of the individual banking sectors of each country. It shows that Saudi Arabia has the largest banking market measured by asset size and asset concentration per bank. It also dominates by having the largest number of branches. In contrast, Oman has a smaller

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competitiveness.

banking market but a higher number of banks per unit of asset and a larger number of branches.

Table 1: The Banking Sector in the GCC in 2002

Country	Banks	Assets $billion	Branches	ΔBranches 1995-2002
Saudi Arabia	10	134	1181	347
UAE	18	62	333	78
Kuwait	7	54	176	53
Qatar	6	15	71	30
Bahrain	6	9	77	16
Oman	5	9	296	115

The sample period covers 1993-2002[3]. The final sample consists of 484 bank-year observations.

3 Measuring market structure

There are a number of measures of concentration that have been used in banking studies. Hall and Tideman (1967) suggested a list of six desirable properties for measures of concentration. These are:

1. A concentration index should be a one-dimensional measure.

2. Concentration in an industry should be independent of the size of that industry.

3. Concentration should increase if the share of any firm is increased at the expense of a smaller firm.

4. If all firms are divided into K equal parts then the concentration index should be reduced by a proportion 1/K.

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[3] The sample period for UAE banks covers from 1995-2002.

5. If all firms are divided into N equal parts then the concentration should be a decreasing function of N.

6. A concentration measure should be between zero and one.

In a review of 73 US Structure-Conduct-Performance studies in banking from 1961 to 1991, Molyneux et al. (1996a) report that in 37 studies, the 3-bank deposit concentration measure was used. The second most frequently used is the Herfindahl-Hirschman Index (HHI – 18 studies) followed by the number of firms in the market. Following the steps of previous researchers and due to the limited number of banks in GCC, this paper will use the highest 2 &3 bank deposits as well as Herfindahl-Hirschman Index (HHI) for deposits as a measure of market structure.

The theoretical links between the measures of concentration used in this paper and market power have been explored by a number of researchers. Cowling and Waterson (1976), Dansby and Wilig (1979) and Novshek (1980) have shown how a Cournot oligopoly will generate equilibrium price-cost margins or Lerner indices as function of measures of market concentration such as the Herfindahl-Hirschman Index. Similarly, a dominant cartel of k firms with a competitive fringe generates equilibrium price-cost margins related to the k-firm concentration index (Saving 1970).

Both simplicity and limited data requirements make the k bank concentration ratio one of the most frequently used measures of concentration in the empirical literature. Summing only the market shares of the k largest banks in the market, it takes the form:

$$\text{CR}_k = \sum_{i=1}^{k} S_i$$

The index gives equal emphasis to the k leading banks, but neglects the many small banks in the market. There is no rule for the determination of the value of k, so that the number of banks included in the concentration index is a somewhat arbitrary decision. The concentration ratio may be considered as one point on the concentration curve, and it is a one-dimensional measure ranging between zero and unity. The index approaches zero for an infinite number of equally sized banks (given that the k chosen for the calculation of the concentration ratio is comparatively small when compared to the total number of banks) and it equals unity if the banks included in the calculation of the concentration ratio make up the entire industry.

Since 1982, the U.S Department of Justice has based its merger guidelines on the HHI. This measure, which is also used by bank regulatory agencies, is calculated by squaring the market share of each firm competing in a defined geographic banking market and then summing the squares. The HHI can range from zero in a market having an infinite number of firms to 10,000 in a market having just one firm (with a 100 per cent market share). The HHI is a static measure and, therefore, gauges market concentration at a single point in time. Algebraically, it is:

$$\text{HHI} = \sum_{i=1}^{n} (\text{MS}_i)^2$$

where MS is the market share of the ith firm and n is number of firms in the market. The index stresses the importance of larger banks by assigning them a greater weight than smaller banks, and it incorporates each bank individually, so that arbitrary cut-offs and insensitivity to the share distribution are avoided.

Based on the number of national banks in each of the six countries, we expect that the 2-bank deposits, 3-bank deposits and HHI value for testing the market structure in GCC markets will give indications that Kuwait, Saudi Arabia and UAE

markets could be described as 'unconcentrated markets', while markets for Bahrain, Oman and Qatar could be described as 'concentrated markets'.

Table 2 presents the HHI and CR*k* for 1995 and 2002, where the total deposits and have been taken as the measure of bank size. In general, the concentration ratio shows the decreasing trend except for Oman. According to the current screening guidelines in U.S.A, these results would indicate that Bahrain, Oman and Qatar markets could be described as 'concentrated markets'[4]. However, Kuwait, Saudi Arabia and UAE markets could be described as 'moderately concentrated markets'.

Table 2 Trends in Concentration in Deposit Market

Country	CR2 1995	CR2 2002	CR3 1995	CR3 2002	HHI 1995	HHI 2002
Saudi Arabia	0.38	0.38	0.54	0.51	1468	1298
UAE	0.39	0.34	0.53	0.44	1299	1064
Kuwait	0.48	0.49	0.61	0.62	1983	1897
Qatar	0.73	0.70	0.81	0.81	3996	3565
Bahrain	0.72	0.66	0.83	0.79	2738	2351
Oman	0.51	0.66	0.77	0.81	2258	2712

Source: Annual Reports

The HHI and CR*k* measures show that the Qatar, Oman and Bahrain banking sectors are heavily concentrated. The natural policy concern is the welfare loss from non-competitive pricing that could more than offset any presumed benefit associated with

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[4] According to the current screening guidelines in USA, the banking industry is regarded to be competitive market if the HHI is less than 1000, somewhat concentrated market if the HHI lies between 1000 and 1800, and very concentrated market if HHI is more than 1800. If the post merger market HHI is lower than 1,800 points and the increase in the index from the pre-merger situation is less than 200 points, the merger is presumed to have no anticompetitive effects and is approved by the regulators. Should those threshold values be exceeded, the regulators will check for the existence of potential mitigating factors. If the mitigating factors are not enough to justify the merger, the regulators may require the divestiture of some branches and offices, in order to bring the concentration ratio to or below the threshold level. If divestiture would not accomplish this goal, the merger application is denied. A more complete discussion of HHI is presented in Stephen A. Rhoades (1993) and Federal Reserve Bank (1998).

mergers or with the existence of large institutions. Other economic concerns about concentrated markets relate to the effectiveness of central bank policy, the increased probability of systemic risk and possible reduction in lending to the small and medium corporations[5]. The view on the relationship between competition and market structure is based on the traditional monopoly power hypothesis. According to this hypothesis, more concentrated markets tend to be more collusive and banks earn monopolistic profits by working with a wider margin of intermediation. These arguments are called 'Structural Models' because they are based on the structure of the banking market[6] and are challenged by other theoretical approaches. In reaction to the theoretical and empirical deficiencies of the structural models, "Non Structural Models" of competitive behaviour have been developed. These "New Empirical Industrial Organization" approaches such as the Panzar and Rosse (P-R) model measure competition and emphasize the analysis of the competitive conduct of banks without using explicit information about the structure of the market.

This study employs the "Non-Structural Model" approach suggested by Rosse and Panzar (1977) and Panzar and Rosse (1982, 1987), so-called "*H statistic*", which has been widely employed in the examination of the competitive structure of the banking industry in various countries. The method developed by Panzar and Rosse (1987) determines the competitive behaviour of banks on the basis of the comparative static properties of reduced-form revenue equations based on cross-section data. Panzar and Rosse (P-R) show that if their method is to yield plausible results, banks must also be in long-term equilibrium (*i.e*. the number of banks needs to be endogenous to the model) while the performance of banks needs to be influenced by the actions of other market participants.

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[5] The increased probability of systemic risk associated with concentrated markets has been formally

De Bandt and Davis (2000) show that the P-R approach require a number of working assumptions. First, banks must be treated as single product firms (an assumption that is more tenable for the GCC countries than for the developed economies). Consistent with the intermediation approach to banking, banks are viewed as producing intermediation services using labour, physical capital, and financial capital as inputs. Second, higher input prices must not be correlated with higher quality services that generate higher revenues, because such a correlation would bias the computed H statistic. This means, however, that if one rejects the hypothesis of a contestable competitive market, this bias cannot be too large (Molyneux et al., 1996b). Third, banks must be in long-run equilibrium.

Studies of the banking industry have seen an increase in the application of the Panzar-Rosse methodology[7]. Table 3 summarises the results of those investigations. Most of them are for European countries and indicate that banks earn revenues as if they are under conditions of monopolistic competition.

Table 3: P-R model results from other studies

Authors	Period	Countries	Results
Shaffer (1982)	1979	New York	monopolistic competition
Nathan and Neave (1989)	1982-84	Canada	1982: perfect comp.; 1983-84: monopolistic comp.
Lloyd-Williams et al. (1991)	1986-88	Japan	monopoly
Molyneux et al. (1994)	1986-89	France, Germany, Italy, Spain, UK	mon.: Italy; mon. comp.: France, Germany, Spain, UK
Vesala (1995)	1985-92	Finland	monopolistic competition for all but two years
Molyneux et al. (1996b)	1986-88	Japan	monopoly
Coccorese (1998)	1988-96	Italy	monopolistic competition
Rime (1999)	1987-94	Switzerland	monopolistic competition
Hondroyiannis et al. (1999)	1993-95	Greece	monopolistic competition
Bikker & Groeneveld (2000)	1989-96	15 EU countries	monopolistic competition
De Bandt and Davis (2000)	1992-96	France, Germany and Italy	large banks: mon. comp. in all countries; small banks: mon. comp. in Italy, monopoly in France, Germany
Bikker and Haaf (2002)	1988-98	23 OECD countries	monopolistic competition
Hempell (2002)	1993-98	Germany	Monopolistic competition

shown by Shaffer (1994)

[6] Not to be confused with the notion of a 'structural model' in econometric modelling.

[7] The first application was by Rosse and Panzar (1977), who employed a cross-section of data in order to estimate the H-statistic for the newspaper firms in the local media markets.

Coccorese (2004)	1997-99	Italy	monopolistic competition

Following Shaffer (1982, 1985), Nathan and Neave (1989), Molyneux et al. (1994) and Hondroyiannis et al. (1999), we estimate the following bank revenue function (equation (1)) in which revenue is explained by factor prices and other bank-specific variables[8].

$$\ln(TREV) = \alpha_0 + \alpha_1 \ln PL + \alpha_2 \ln PK + \alpha_3 \ln PF + \alpha_4 \ln RISKASS$$
$$+ \alpha_5 \ln ASSET + \alpha_6 \ln BR \tag{1}$$

The revenue equation in the Panzar- Rosse model is interpreted as a reduced form rather than a structural equation. The variables are defined as follows:

TREV	The ratio of total revenue to total assets
PL	Ratio of personnel expenses to employees (unit price of labour)
PK	Ratio of capital expenses to fixed assets (unit price of capital)
PF	Ratio of annual interest expenses to total loanable funds - deposit and non-deposit liabilities (unit price of funds)
RISKASS	Ratio of Provisions to total assets
ASSET	Bank total assets
BR	Ratio of number of branches of a bank to the total number of branches per country

The *H*-statistic value is the sum of the factor price elasticity: *PL, PK*, and *PF*. A value of $H \leq 0$ implies monopoly equilibrium. That is each bank operates independently as under monopoly profit maximisation conditions (H is a decreasing function of the perceived demand elasticity) or perfect cartel. A value of $0 < H < 1$ implies that banks operate under conditions of monopolistic competition with free

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[8] Molyneux et al. (1996b) found that a log linear revenue equation gave similar results as a more flexible translog equation.. See also De Bandt and Davis (2000) for a discussion of the functional form.

entry equilibrium (*H* is an increasing function of the perceived demand elasticity). A value of H = 1 is the perfect competition case with free entry equilibrium and full efficient capacity utilisation[9].

In long-run equilibrium, rates of return should be uncorrelated with input prices. To test if the banking market is in long-run equilibrium we also estimate the auxiliary equation (2), which tests for the equality of risk-adjusted rates of return across banks.

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\begin{aligned}
\ln(1 + ROA) = \beta_0 &+ \beta_1 \ln PL + \beta_2 \ln PK + \beta_3 \ln PF + \beta_4 \ln RISKASS \\
&+ \beta_5 \ln ASSET + \beta_6 \ln BR
\end{aligned}
\tag{2}
$$

To verify that input prices are not correlated with industry returns, we regress the ratio return on assets (ROA) as the dependent variable. Because ROA can take on small negative values, following Claessens and Laeven (2004) and Utrero-Gonzalez (2004), we compute the dependent variable as $\ln(1+ROA)$ where *ROA* is the unadjusted return on assets. The long-run equilibrium test measures the sum of the elasticity of return on assets with respect to input prices. If the E-statistic $(\beta_1 + \beta_2 + \beta_3)$ = 0, this implies that the banking market is in long-run equilibrium. If rejected, the market is assumed not to be in equilibrium[10]. It should be noted that equilibrium does not mean that competitive conditions are not allowed to change during the sample period. It only implies that changes in banking are taken as gradual.

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[9] See Rosse and Panzar 1997; Panzar and Rosse 1982, 1987; Shaffer 1982, 1983; Nathan and Neave 1989. Also Coccorese (1998).

4. Empirical results

This study covers 52 banks privately held and domestically owned that are fully licensed commercial. The number of bank-year observations per country is 60 for Bahrain, 70 for Kuwait, 50 for Oman, 60 for Qatar, 100 for Saudi Arabia and 144 observations for UAE. The sample frame is not dissimilar to previous studies. For example, Nathan and Neave (1989) used samples of 39 observation on Canadian trust companies and 33 observations on mortgage companies; and Shaffer and DiSalvo (1994) used samples of 36 and 44 observations on duopoly banks in alternate specifications.

The independent variables are chosen to account for firm specific and market specific factors[11]. Bank specific risk is measured by the ratio of provisions to total assets (*RISKASS*)[12]. We expect the effect of *RISKASS* on revenue to be positive since higher provisions are associated with higher risk and higher expected return. Second, total assets, (*ASSET*) are included in the analysis to account for possible scale economies[13]. Third, the ratio of each bank's branches to total branches in the country, (*BR*), is used as a proxy for banks' market share. Finally, *PL*, *PK* and *PF* are variables of the unit prices of the inputs of the banks: labour, capital and funds or proxies of these prices.

The nature of estimation of the H-statistic means that we are especially interested in understanding how total revenues react to variations in the factor prices, *PL, PK* and *PF*. Based on the measures of HHI and CR*k* as shown at table 2, we

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[10] See Shaffer (1982) for the origination of this test and more recently for its application Molyneux et al. (1996b); Hondroyiannis et al. (1999); and Claessens and Laeven 2004)

[11] See Nathan and Neave, (1989), Molyneux et al., (1994), Hondroyiannis et al., 1999

[12] See also Coccorese (2004)

expect that the *H* values for testing the competitive conditions in the GCC are greater than zero and less than one. It is, therefore, hypothesised that the banks in the GCC operate under conditions of monopolistic competition.

The empirical results for the aggregated country-pooled data are reported in table 4.

Table 4: P-R model Aggregate results for the GCC banking market; 't' values in parenthesis				
Variable	lnTREV		ln(1+ROA)	
	Pooled	Country Fixed Effects	Pooled	Country Fixed Effects
Intercept	-1.466 (-13.52)***	0.677 (2.34)**	0.0041 (1.38)	0.0430 (4.99)***
lnPK	0.0520 (2.79)***	0.0397 (2.32)**	-.0017 (-3.24)***	-.0019 (-3.75)***
lnPF	0.2002 (9.90)***	0.2417 (12.54)***	-.0018 (-3.26)***	-.0012 (-2.04)**
lnPL	-.0067 (-1.43)	0.1899 (4.89)***	0.0004 (3.41)***	0.0043 (3.72)***
lnASSET	-.0616 (-2.85)***	-.3507 (-8.40)***	-.0024 (-3.98)***	-.0074 (-5.95)***
lnBR	-.0034 (-0.28)	0.1781 (8.28)***	0.0003 (0.84)	0.0034 (5.27)***
lnRISKASS	0.0417 (4.60)***	0.0378 (4.58)***	-.0006 (-2.43)**	-.0007 (-2.69)***
$\overline{R}^2$	0.2500	0.3900	0.0800	0.1400
H Value	0.24 [a,b]	0.47 [a,b]	-	
E Value	-	-	-.0031 [a]	0.0012 [c]
F-statistic	26.32119	28.48864	7.688253	8.050013

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[13] See also De Bandt and Davis (2000), Shaffer (2002)

| S.E. of Regression | 0.223765 | 0.200762 | 0.006206 | 0.005989 |

*** Significant at 1%, ** significant at 5%, * signifi8cant at 10%, a) significantly different from zero on Wald F test. b) Significantly different from unity on a Wald F test. c) Not significantly different from zero

A test for the country fixed effects specification versus pooled rejected the pooled specification (F test for ln*TREV* was 22.92, and for ln(1+*ROA*) was 6.95 both greater than the critical value of 2.21) . The sign on *ASSETS* suggests that as a whole the banking market in the GCC faces diseconomies of scale, whereas there are significant market share effects as suggested by the positive effect of *BR* on revenue per asset. The effect of *RISKAS* on revenue is positive as expected and indicates that greater risk is associated with higher revenue. On the fixed effects specification, the banking market is shown to be in long-run equilibrium and the Rosse-Panzar H Statistic indicates that the GCC banking market as a whole is operating under conditions of monopolistic competition.

While there are a number of advantages of using panel methods of estimation for the GCC as a whole, the rejection of the pooled specification raise the possibility that the country specific differences may disguise country-bank specific and competitive structure differences within the GCC. These potential differences are explored by estimating Rosse-Panzar H statistics for each country banking market.

Table 5 shows the estimates of the Rosse-Panzar H statistic for each country banking market. The auxiliary equations that indicate long-run equilibrium for each country (not shown) confirm that the sum of the elasticities of factor prices is not significantly different from zero. Therefore we can think of the banking sector in each economy as being in long-run equilibrium.

The econometric results from Table 5 are mixed[14]. In general, the value of the H statistic is significantly determined except in the case of the UAE. The disaggregated picture of competitive conditions is not consistent within the GCC. The banking sectors in Bahrain and Qatar appear to operate in conditions of monopolistic competition, whereas Kuwait, Saudi Arabia appears to operate in conditions of perfect competition. Because the estimated value of H for UAE is not significantly different from 1 (F= 0.00), the UAE banking sector is also consistent with perfect competition.

Table 5 – P-R Model for Individual Countries; 't' values in parenthesis						
Variable	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE
Intercept	5.443 (4.97)***	1.977 (2.24)**	-3.570 (-2.48)**	-2.168 (-2.73)***	2.605 (1.68)*	0.567 (1.52)
ln PK	-0.005 (-0.14)	0.027 (1.01)	-0.217 (-1.61)	0.076 (2.03)**	0.062 (1.72)*	0.014 (0.53)
ln PF	0.234 (5.37)***	0.549 (13.27)***	0.050 (0.60)	0.406 (10.98)***	0.326 (10.32)***	0.271 (6.58)***
ln PL	0.472 (3.9741)***	0.468 (5.0686)***	-0.011 (-0.0830)	0.146 (1.9285)*	0.616 (4.3951)***	0.747 (1.0425)
ln $ASSET$	-0.622 (-6.17)***	-0.125 (-1.66)*	0.0279 (0.40)	0.117 (1.80)*	-0.244 (-2.29)**	-0.170 (-5.13)***
ln BR	0.826 (3.64)***	-0.050 (-0.34)	-0.192 (-1.47)	-0.082 (-0.99)	0.135 (0.72)	0.201 (4.31)***
ln $RISKASS$	-0.010 (-0.50)	0.006 (0.60)	0.051 (2.16)**	0.031 (1.92)*	0.013 (0.88)	0.039 (2.09)**
H-Value	0.70	1.02	-0.18	0.63	1.00	1.04
F test H=0	34.8***	111.5***	0.92	78.5 ***	59.1***	2.03
F test H=1	6.31**	0.20	40.5 ***	27.3 ***	0.00	0.00
Adj. R^2	0.84	0.83	0.74	0.85	0.71	0.44

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[14] We also test for a delayed effect of input prices on revenue caused by the possibility of fixed rate loans of greater than one-year maturity. A dynamic version of equation (1) is estimated with one-year lags of input prices. The results are presented and discussed in the Appendix. We are grateful to an anonymous referee for suggesting this exploration.

Competitive condition	Monopolistic competition	Perfect competition	Undetermined	Monopolistic competition	Perfect competition	Perfect competition
F-statistic	28.03305	27.45107	14.74449	29.00449	16.41724	19.80558
S.E. of Reg.	0.143286	0.063344	0.145660	0.075831	0.081207	0.231624
*** Significant at 1%, ** significant at 5% and * significant at 10%. All countries estimated with fixed banks effects except UAE which is pooled (reject fixed effects)						

However, this interpretation is subject to the caveat that the value of H for UAE is not estimated with high precision. The estimated value of H for Oman is not significantly different from zero or, by continuity, from some small positive number; we cannot reject the hypothesis of monopolistic competition for the Oman banking industry. Thus, the result of Oman should be considered "undetermined" rather than "monopoly".

The sign of the *RISKASS* variable is positive and statistically significant in the case of Oman, Qatar and UAE (Qatar at the 10% level of significance). This indicates that banks that have riskier positions have higher rewards as measured by higher revenues per currency of assets. The coefficient on the value of assets (*ASSET*) is negative and significant in the case of Bahrain, UAE and Saudi Arabia, implying that larger banks seem to be less revenue efficient compared with smaller banks. The coefficient on the variable relating to size effects in terms of branches, *BR*, is positive and significant for Bahrain and UAE, suggesting that a greater number of a bank's branches give higher total revenue. This indicates that Bahrain, and UAE are not over branched and might have a scope of branch expansion.

5 Conclusions

This paper investigates the market structure of GCC banking industry during the periods of 1993-2002 and evaluates the monopoly power of banks. To our

knowledge, no econometric analysis of competitive conditions of banking in the GCC economies has been conducted before. Our investigation suggests that there is some merit to examining the banks of the GCC countries as an aggregate. In total the GCC banking system can be thought of as operating under conditions of monopolistic competition. However, there is considerable variation within each economy.

The results show that Kuwait, Saudi Arabia and UAE have unconcentrated markets and are moving to less concentrated positions. The P-R results suggest a mixed bag of competitive, monopolistic competition and monopoly within the GCC economies. The finding of perfect competition in the case of Kuwait and Saudi Arabia (and possibly UAE if the value of H is taken as 1) coincide with the results of measures of concentration CRk and HHI as shown in table 2. This could be explained by either the presence of the foreign banks in these countries as well as the preparation of these three countries for entering in WTO and the implications of 'threat of entry'. The H-statistics is 0.70 and 0.63 for Bahrain and Qatar, indicating that the banks in these two countries earn their revenue under monopolistic competition. The H-statistics is -0.18 for Oman, indicating that the banks in Oman earned their revenue under monopoly conditions. Our findings suggest that except in the case of Saudi Arabia and Kuwait, the banking market in the rest of the GCC has yet some way to go in developing a competitive structure if it is to face the forces of global banking competition.

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APPENDIX - Dynamic P-R Model

This appendix reports the results of a dynamic version of equation (1) for each country described as:

$$\ln(TREV)_{it} = \alpha_0 + \alpha_1 \ln PL_{it} + \alpha_2 \ln PK_{it} + \alpha_3 \ln PF_{it} + \delta_1 \ln PL_{it-1} + \delta_2 \ln PK_{it-1}$$
$$+ \ln PF_{it-1} + \alpha_4 \ln RISKASS_{it} + \alpha_5 \ln ASSET_{it} + \alpha_6 \ln BR_{it} + u_{it}$$

The variables are as described in the text, 'i' represents the bank in each country, 't' represents time, and u is a random term. The H statistic is calculated as the sum of the input price elasticities given by:

$$H = \alpha_1 + \alpha_2 + \alpha_3 + \delta_1 + \delta_2 + \delta_3$$

Similarly the long-run equilibrium equation (2) was modified in the same way as above and described below, where ε is a random term..

$$\ln(1 + ROA)_{it} = \alpha_0 + \alpha_1 \ln PL_{it} + \alpha_2 \ln PK_{it} + \alpha_3 \ln PF_{it} + \delta_1 \ln PL_{it-1} + \delta_2 \ln PK_{it-1}$$
$$+ \ln PF_{it-1} + \alpha_4 \ln RISKASS_{it} + \alpha_5 \ln ASSET_{it} + \alpha_6 \ln BR_{it} + \varepsilon_{it}$$

The long-run equilibrium test is given as:

$$E = \alpha_1 + \alpha_2 + \alpha_3 + \delta_1 + \delta_2 + \delta_3 = 0$$

Table A1 presents the results for the revenue function. The last row of the table shows that the long-run equilibrium condition was satisfied for each country on a Wald F test. The computed H statistics did not alter the results regarding the competitive condition of each banking market shown in Table 5. In most cases the additional lags of input prices were statistically insignificant, except for Saudi Arabia.

Table A1 – P-R Model for Individual Countries; 't' values in parenthesis					
Variable	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE
Intercept	2.955 (2.93)***	1.827 (1.89)*	-2.348 (-1.66)**	-1.426 (-1.88)*	1.689 (1.79)*	-0.390 (-1.13)
ln *PK*	-0.010 (-0.19)	0.012 (0.42)	-0.238 (-1.72)*	0.082 (1.75)*	0.070 (2.01)**	0.023 (0.48)
ln *PK(-1)*	0.006 (0.09)	0.022 (0.80)	-0.029 (-0.21)	-0.012 (-0.28)	0.050 (1.39)	0.029 (0.59)
ln *PF*	0.141 (2.77)***	0.525 (7.30)***	0.231 (1.26)	0.393 (4.28)***	0.459 (6.792)***	0.425 (3.61)***
ln *PF(-1)*	0.029 (0.68)	-0.006 (-0.14)	-0.027 (-0.23)	0.014 (0.24)	-0.089 (-2.41)**	-0.002 (-0.03)
ln *PL*	0.488 (3.92)***	0.290 (2.37)**	0.025 (0.15)	0.070 (0.48)	0.257 (1.66)*	1.048 (0.92)
ln *PL(-1)*	-0.159 (-1.22)	-0.016 (-0.32)	0.113 (0.74)	0.140 (0.85)	0.371 (2.49)**	-0.287 (-0.25)
ln *ASSET*	-1.971 (-8.27)***	-0.652 (-2.38)**	0.233 (0.66)	0.349 (1.45)	-0.852 (-2.98)***	-0.326 (-4.00)***
ln *BR*	1.033 (6.78)***	0.275 (2.21)**	-0.294 (-1.74)*	-0.084 (-0.99)	0.376 (1.89)*	0.162 (3.24)***
ln *RISKASS*	0.011 (0.61)	0.008 (0.68)	0.052 (1.60)	0.038 (2.17)**	0.013 (0.96)	0.028 (1.39)
H-Value	0.49	0.83	0.07	0.69	1.12	1.24
F test H=0	12.46***	36.24***	0.09	44.69 ***	60.74***	0.45
F test H=1	13.01***	1.58	13.34***	9.26 ***	0.68	0.02
Adj. R^2	0.92	0.72	0.32	0.77	0.75	0.20
Competitive condition	Monopolistic competition	Perfect competition	Undetermined	Monopolistic competition	Perfect competition	Perfect competition
F test lags = 0	0.60	0.07	0.07	0.77	4.94**	0.00
F test E = 0	0.01	1.03	0.36	0.01	0.54	1.01

A variable deletion test on the additional lags of input was rejected for Saudi Arabia on a conventional 'F' test (second last row of Table A1). The lag of the unit price of labour and unit price of funds were both statistically significant at the conventional level. The sum of the elasticities of the current and lagged unit price of labour is similar to that of the partial elasticity on the unit price of labour shown in Table 5, suggesting a distributive effect over a two-year period. The negative and significant coefficient on the lag of the unit price of funds suggests that in the case of Saudi Arabia there is a dynamic effect that indicates the presence of fixed-rate loans of greater than one-year maturity. All other variables have a similar effect on revenue as in Table 5. Importantly, Table A1 does not alter the conclusion of the state of the banking market in each country as given in Table 5.