A Comparative Study of GCC Banks Technical Efficiency
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ملخص

دراسة مقارنة للكفاءة التقنية لمصارف منطقة الخليج العربي

تستخدم الورقة منهجين لتقدير الكفاءة التقنية لاثنين وخمسين مصرفــــا فــى دول منطقة الخليج العربي. وفى هذا الإطار تم اعتبار القـــــروض والاستثمارات كمخرجات والأصول الثابتة والعمالة ورأسمال المالى كمدخلات فى عملية إنتـــاج الخدمات المالية من قبل البنوك. وتستنتج الورقة أن هناك مجالا رحبا لزيادة ودعـم الكفاءة التقنية للبنوك الخليجية. وبصفة أكثر تحديدا تبين أن البنوك فـــى البحريـن والسعودية هى أكثر كفاءة من مثيلاتها فى الدول الخليجية الأخرى. ويرجع هذا إلى أن المناخ الذى تعمل فيه البنوك فى البحرين والسعودية يعتبر أكثر ملاءمة. كمـــا تبين أن زيادة حجم البنوك وحصة حقوق المساهمين فى رأسمال البنـــــوك يســـاعد على زيادة الكفاءة.

كما أوضحت النتائج ضعف العلاقة بين الربحية والكفاءة من جهة وتـــاريخ تأسيس البنوك والكفاءة من جهة أخرى. وتعزى هذه النتائج وتؤكـــد علـــى تـأثـير المناخ الذى تعمل فيه البنوك على كفاءتها. وتشير النتائج بشكل عام إلى أن قـــدرة البنوك الخليجية للتعايش فى بيئة أكثر تنافسية وأمام تنيذب الأداء الاقتصادى العــالم. يقتضى إعادة النظر فى الإطار التشريعى الذى يجب أن يكون محفزا للمنافســة ولتحسين الكفاءة ويشجع البنوك على توحيد مواردها ولاسيما من خلال الاندمــــاج وإقامة التحالفات الاستراتيجية مع مصارف أخرى محلية أو إقليمية أو أجنبية.

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1- Introduction

The boom in oil markets during the 1970's and the first half of the 1980's has allowed the countries of the Arab Gulf Cooperation Council (GCC), Bahrain, Kuwait, Oman. Qatar. Saudi Arabia and the United Arab Emirates, to accumulate substantial financial wealth. Part of this wealth has been channeled to the population through high salaries, subsidies and transfers. The ensuing boost in income per capita and savings capacity in GCC countries have resulted in the development of a modern banking sector whose expansion over time has been remarkable.

Being a set of very homogeneous group in the region, GCC countries, and more specifically their respective banks, are facing many common challenges that are likely to affect their ability to grow and operate within a more competitive environment.

First, GCC banks operate in over-banked, limited and often recessionary domestic markets: Oil still represents a very large portion of their export earnings and budget revenues. In addition, the public sector dominates the economic sphere in terms of ownership and management of most activities. As a result of the over-dependence on oil and the dominance of the public sector, growth in the region remains vulnerable to the vagaries of world oil markets and fluctuation in oil prices. In addition, investors find it difficult to develop many profitable investment opportunities outside the scope of very few sectors such as real estate trade and stock market activities. This has translated into the concentration of bank lending mainly into consumer loans, real estate, construction and trade finance. Some of these lending opportunities are even more restricted considering the large share of expatriate population in GCC countries and given the limited access of expatriates to bank credit by virtue of many regulations including those related to real estate and corporate ownership.

In addition, many banks in the region have been over-protected and over-guaranteed. Most GCC banks have been protected from foreign competition through regulations imposing barriers to entry. Governments have also provided implicit guarantees for bank deposits. In sum, this state of affairs has reduced competitive pressure on domestic banks in the region and helped them achieve fairly reasonable profit rates.

This lax operating environment cannot be sustained, given the numerous challenges that are faced by the banking sector in the GCC

countries. A first challenge to GCC banks stems from their eventual commitment to liberalize many financial services, including banking, by virtue of their membership to the World Trade Organization (WTO)[1] GCC banks are expected to face more competitive pressure from foreign banks which will be allowed to operate on equal footing with local banks.

Expanding foreign banks are also bound to force their way into the wealthy GCC markets owing to the development of information technology and expansion of banking service delivery that escape domestic regulation.

Second, GCC banks are undergoing tremendous pressure to fulfill increasingly demanding international standards in terms of capital adequacy, risk management and accounting practices.

A third challenge faced by GCC banks is the mushrooming of investment companies that are likely to attract increasingly sophisticated bank clients looking for better financial investments than those actually offered by commercial banks.

The final challenge would result from lifting Government implicit guarantees on bank deposits and the reduction of its role as a bailer of last resort for troubled banks in the region.

The ability of GCC banks to meet the above challenges and to survive in a more competitive environment, will depend on how efficiently they are run. Even if many banks in the GCC countries were able to be profitable, this might be a misleading indicator of future performance given that these banks have been operating under a relatively lax regulatory environment.

In this paper, I will provide estimates of the efficiency of GCC banks in the sense of analyzing how optimally they use, physical capital, labor and financial resources to generate earning assets. This endeavor is relevant for policy purposes on several grounds. First, it allows decision-makers to evaluate how banks will be affected by increased competitive pressure within their operating environment. It also helps identify banks that need to merge with more efficient ones or exit the banking sector. Efficiency of banks is equally important for consumers to the extent that more efficient banks tend to have lower service charges, better loan and deposit rates and better quality services.

The next section presents a brief overview of the banking sector in GCC countries. Section 3 underlines the methodology and

data used in the analysis. The empirical results are discussed in section 4 and section 5 concludes.

2- Characteristics of the Banking Sector in the GCC Countries

The combined asset value of GCC banks is around U.S. $ 250 billion. These assets arc concentrated across banks and countries. The share of the top five GCC banks is around fourty percent of this total, while banks in Saudi Arabia hold about the same percentage share of the combined assets of GCC banks. The asset structure is also highly concentrated within the same country. Table 1 provided in the appendix, gives the share of the largest bank in each GCC country in the total asset value of all banks in that country. The reported figures become more revealing considering in details the distribution of assets across banks. In Saudi Arabia, for instance the largest three banks hold around seventy five percent of bank assets. In Kuwait the largest two banks own around fifty percent of the total assets of conventional banks, while the largest bank in Qatar holds around sixty five percent of total bank assets. This concentration in asset structure in GCC countries reduces the ability of smaller banks to survive in a more competitive environment and may explain the recent waves of bank mergers, consolidation and restructuring in the Gulf region.

Despite this fairly concentrated asset structure, GCC banks remain fairly small in size relative to large international banks. The largest GCC bank, with an asset value of around U.S. $ 25 billion, is considered a bank of modest size by international standards. In fact, the combined asset value of all GCC banks does not even come close to the asset value of one large international bank such as CITIGROUP, estimated at around U.S. $ 717 billion for the year 1999.[2]

Another salient feature of GCC banks is the mixed nature of their ownership. While few countries, such as Bahrain and Saudi Arabia, allow foreign banks to be shareholders and operate within their own countries, others impose various barriers to entry and restrictions on foreign ownership. In addition, while private ownership is allowed in all countries of the region, the Government is often a direct shareholder or an implicit guarantor. In many cases banks are owned by groups of families whose members are often directly involved in management.

The asset structure of GCC banks reveals the dominance of investment and loans in total assets with equal shares of around fourty five percent each. The rest is mainly distributed over liquid and fixed

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assets. External liabilities represent around ninety percent of total liabilities, while the remainder is made of equity. Deposits represent the main source of external liabilities with a share of more than ninety percent.

In order to analyze in little more details the comparative financial positions of GCC banks, three types of ratios will be used: liquidity, structural and profitability ratios. The liquidity ratios are used to depict the liquidity position of the banks. Liquidity refers to the cash, current account balances and any other assets that can be easily converted by the banks into cash. A more liquid position gives flexibility and more room of maneuvering to banks as they can instantly reallocate funds to more lucrative investment opportunities as they arise. However, holding more liquid assets means foregoing the income that could have been generated from less liquid but higher return assets. I will use the share of liquid assets in total assets to compare liquidity among GCC banks.

The structural ratios are often used to analyze differences in the asset and liability structure of banks. They reflect the capital structure of banks and bear important relations with operating and profitability measures. On the liability side, it is important to distinguish between equity and debt. For instance, a higher (lower) share of equity (debt) in total liabilities/assets indicates higher (lower) financial solvency.

In analyzing the capital structure of banks, it is also useful to indicate few important chapters such as deposits in the liability side, and loans as well as investment in the assets side. These chapters are also important in the context of this paper to the extent that they represent the inputs and the outputs of banks from an intermediation perspective as will be explained later.

The most common profitability measures used in banks literature to reflect their performance are the return on assets and the return on equity. The return on assets is defined as the ratio of net profit to total assets and the return to equity as the ratio of net profits to the shareholders' funds used by banks.

Table 2 in the appendix gives comparative liquidity, structural and profitability ratios for the GCC countries for the period 1999. The figures in this table reveal that banks in Bahrain and Saudi Arabia hold a less liquid position than the rest of GCC banks. In return, banks in these two countries hold higher shares of their assets in the form of investments but lower shares in the form of loans. GCC banks also maintain acceptable levels of financial risk and capital adequacy with

and financial capital, could expand the production of their earning assets by an average of around ten percent.

On the other hand, after classifying the top ten banks in terms of the two measures of efficiency, CRSTE and COLSDIST, five common banks came out in the two classifications. These were the Arab Banking Corporation Group (Bahrain); the Gulf International Bank (Bahrain); Oman Housing Bank (Oman); Saudi- Investment Bank (Saudi Arabia); Abu Dhabi Commercial Bank (U.A.E). Table 4 in the appendix, provides the ranking of the top ten banks according to the two measures of efficiency.

Table (5) provides country-specific sample descriptive statistics of the two efficiency measures CRSTE and COLSDIST. The results show some degree of variation in efficiency between countries. Upon applying mean equality tests using ANOVA method, it is found that the hypothesis of the equality of mean efficiency across countries is rejected at the five percent significance level and for the two measures of efficiency. The figures in table 5 also show that banks in Bahrain and Saudi Arabia tend to be more technically efficient than banks in the other GCC countries. The two-sample t tests of no difference between country efficiency means was rejected at the five percent significance level between Bahrain and every other GCC country except Saudi Arabia. The same result is found for the case of Saudi Arabia[14].

It should be noticed at this level that the figures reported in tables 3 and 5, represent crude technical efficiency measures that should be adjusted for differences in environmental conditions. In addition, banks may not be strictly comparable given the difference in their mandates and areas of specialization. Some margin of errors might have also affected the results given that variables expressed in local currencies had to be converted into a common currency, the U.S. dollar.

Notwithstanding these provisos, the results are still insightful in many respects. First, Bahrain and Saudi Arabia are leaders in GCC countries in terms of allowing foreign banks to compete and operate within their receptive countries. While offshore banks are entitled in Balirain to operate on equal footing with domestic banks; many foreign banks have been allowed in Saudi Arabia to be important shareholders in their domestic banks. The presence of foreign banks as independent entities or as shareholders directly involved in domestic bank management might have contributed to the improvement of the overall efficiency of banks in Bahrain and Saudi Arabia.

On the other hand, Bahrain and Saudi Arabia host the largest banks in the GCC countries. For the year 1999, the largest four banks, in terms of size of assets. were located in Bahrain and Saudi Arabia with a combined asset value of around, U.S. $ 78 billion[15]. This makes almost one third of the total asset value of all GCC banks and lends support to the argument that larger banks tend to have a better managerial expertise and room of maneuvering in terms of allocation of resources that would translate into better efficiency.

Third, Bahrain is considered the region's financial power house with an aggressive pricing policy and efficient regulation that allowed it to attract money from all over the world[16]. In fact it is argued that Bahrain owes its role as a regional financial centre to, among other things, its internationally recognized stern attitude toward banking regulation.

Fourth, the larger size of the economy of Saudi Arabia might have been an important factor in banking expansion beyond consumer loans and trade finance and in value-added operations such as large project finance.

The banking sectors in the rest of GCC countries remain relatively more conservative with overbanking and limited domestic markets coming into force as major constraints affecting their growth and performance. However, banks in the more dynamic economies of Kuwait and U.A.E seem to be slightly more efficient than their counterparts in Oman and Qatar.

In order to account for differences in technical efficiency between GC C banks, I have linked the measure of technical efficiency, CRSTE, to some of the characteristics of these banks namely, the value of its assets (ASSETS), the share of assets financed by shareholders (EQUAS), the date of establishment (ESTAB) and profitability proxied by the rate of return on assets (ROA)[17]. Table (6) reports the OLS estimation results[18]. The results seem to assert the positive link often found in the literature between bank size, measured by ASSETS, and the degree of technical efficiency. As mentioned earlier, it is generally argued that larger banks tend to have a better managerial expertise that translates into better efficiency. The positive relation between efficiency and the share of assets financed by shareholders, EQUAS. shows that, other things being equal, banks with greater contribution from, and possibly a wider base of, shareholders tend to be more efficient. This is in line with the predictions of moral hazard theory[19]. Shareholders would have more incentive to apply stricter monitoring on banks management. The insignificant coefficient of ESTAB, points surprisingly to the absence

of learning. As banks become more established, they tend to accumulate managerial experience that should lead in principle to better efficiency[26]. In the case of GCC banks, the lack of market discipline and absence of competitive economic environment might have affected the incentive of banks to improve their efficiency especially if they could still manage to be profitable. The negative sign and statistical insignificance of the ROA coefficient lend support to this claim. Higher efficiency is generally associated with higher profitability. If profitability of banks is not associated with higher efficiency, this might mean that the overall economic environment in which banks operate have a more important influence on profitability than the skills of its managers. The loose regulation and over-protection of banks in the region might explain the weak link between efficiency and profitability.

5- Conclusion

In this paper two methods are used to estimate the technical efficiency of 52 CCC banks. Using the earning assets, loans and investments, as outputs and fixed assets, labor and financial capital as inputs, I have found that GCC banks can, on average, improve their technical efficiency by ten percent. At the country level, I have found that banks in Bahrain and Saudi Arabia tend to be more technically efficient than banks in the rest of the GCC countries. I argue that this is mainly due to the fact that the environment in which banks operate in these two countries is more conducive to better efficiency.

In order to account for differences in technical inefficiency between GCC banks, I have linked technical efficiency to some relevant variables. The results show that larger bank size and higher share of equity capital in assets are associated with better efficiency. Although these results provide information on correlation rather than causality, they are quite informative from a policy perspective. First, as larger size tends to be associated with higher efficiency and hence, a better ability to survive in a more competitive world, there is room for efficiency improvement through resource consolidation mergers and alliances with other banks. In addition, to the extent that larger size is a good proxy for better management, banks ought to appoint professional bankers and managers in order to adopt the appropriate policies leading to a better use of their resources. De-linking management from ownership in the case of GCC banks is a good step in that direction. On the other hand enlarging the share of equity in total assets and broadening the base of ownership is another step toward improving bank efficiency.

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An important finding in this paper consists of the weak link found between technical efficiency and profitability on one hand, and between technical efficiency and date of establishment, on the other. I argue that this point to the fact that the overall economic and regulatory environment in which GCC banks operate might be an important factor affecting their efficiency, in addition to the characteristics of the banks themselves. The impact of excessive government intervention in the economy in general and in the banking sector in particular in the form of administrative control, subsidized loans, equity injections and bail-outs on efficiency and performance of the banking sector in the GCC countries, is a research avenue worth pursuing in that regard.

References

Ali. 1.A. and L.M. Seiford (1993), The Mathematical Programming Approach to Efficiency Analysis, in Fried H.O., C.A.K Lovell, and S.S. Schmidt (Eds) The Measurement of Productive Efficiency: Techniques and Applications, Oxford University Press, New York.

Berger, A.N. W.C. Hunter, and S.G. Timme (1993a), "The Efficiency of Financial Institutions: A Review and Preview of Research Past, Present, and Future", Journal of Banking and Finance 17,221-249.

Berger, A.N., D. Hancock, and D.B. Humphrey (1993b), "Bank Efficiency Derived from the Profit Function", Journal of Banking and Finance I 7, 31 7-347.

Berger, AN. and D.B. Humphrey (1991), "The Dominance of Inefficiencies over Scale and Product Mix Economies in Banking", Journal of Monetary Economics 28, 117-148.

Coelli, T.J. (1997), "A Multi-Stage Methodology for the Solution of Orientated DEA Models", Centre for Efficiency and Productivity Analysis, University of New England, Armidale, Australia. Mimeo.

Coelli, T.J. (1996), "A Guide to DEAP Version 2.1: A Data Envelopment Analysis (Computer) Program", Working Paper No. 08, Centre for Efficiency and Productivity Analysis, University of New England, Armidale, Australia.

Coelli. T.J. and S. Perelman (2000), "Technical Efficiency of European Railways: A Distance Function App oach", Applied Economics 32, 1967-1976.

Coelli, T.J. and S. Perelman (1999), "A Comparison of Parametric and Non-Parametric Distance Functions: With Application to European Railways", European Journal of Operational Research 117,326-339.

Coelli. T..J. D.S. Prasado Rao and G.E. Battese (1998), "An Introduction to Efficiency and Productivity Analysis", Kluwer Academic Publishers.

Curmmins. J.D. and MA. Weiss (1998) "Analyzing Firm Performance in the Insurance Industry Using Frontier Efficiency Methods", Working Paper 98-22, Financial Institutions Center, The Wharton School, University of Pennsylvania.

ELyasiani E. and S. Mehdian (1990), "Efficiency in the Commercial Banking Industry", A Production Frontier Approach, Applied Economics 22, 539-551.

English, M. S. Grosskopf, H. Hayes, and S. Yaisawarng (1993), "Output Allocative and Technical Efficiency of Banks", Journal of Banking and Finance, 17, 349-366.

Fare, R., S. Grosskopf, C.A.K. Lovell, and S. Yaisawarng (1993), "Derivation of Shadow Prices for Undesirable Outputs: A Distance Function Approach", Review of Economics and Statistics LXXXV, 374-380.

Ferrier, G.D. and C.A.K Lovell (1990) Measuring Cost Efficiency in Banking: Econometric and Linear Programming Evidence, Journal of Econometrics 46. 229-245.

Mester, L.J. (1994), "Efficiency of Banks in the Third Federal Reserve District", Working Paper 94-13, Financial Institutions Center, The Wharton School, University of Pennsylvania.

Mester, L.J. (1993), "Efficiency in the Savings and Loan Industry", Journal of Banking and Finance, 17, 267-286.

Shephard, R.W. (1970), Theory of Cost and Production Functions, Princeton University Press. The Banker (2000), various issues.

Wang, J.C. (2000), "Bank Production, Risk, and Output Measurement I: Theory", Unpublished manuscript, Department of Economics, University of Michigan.

Notes:

1) Among the six GCC countries only Saudi Arabia is not yet member of WTO.
2) These statistics are reported in various issues of the Banker magazine.
3) A good review of the literature can be found in Berger et al, (1993a).
4) Similarly, efficiency can be defined from an input orientation. Input and output efficiency measures can be shown to be equivalent in the case of constant returns to scale.
5) The advantages of these radial efficiency measures are that they are unit invariant and located between 0 and I.
6) See for instance, Berger et al. (1993a) and Berger and Humphrey (1991).
7) For a detailed description of the DEA approach, see for instance, Ali and Seiford (1993), Coelli (1996) and Coelli et al. (1998).
8) It can be shown that input-orientation and output-orientation are equivalent in case of constant returns to scale.
9) See for instance, Fare et al. (1993); Coelli and Pereleman (1999, 2000).

10) See for instance, Lovell (1993), pp.10-11.

11) For further discussions and applications of COLS, see Coelli and Perelman (1999, 2000) and the references cited therein.

12) For a discussion and references on the debate over the definition of banking output see, for instance. Wang (2000), Cummins and Weiss (1998) and Mester (1994).

13) In a sense, the results of the DEA method might be considered as more robust since they do not depend on any specific functional form for the production function.

14) This test was carried out only for the CRSTE measure of efficiency.

15) These banks are respectively, the Arab Banking Corporation (Bahrain); Saudi-American Bank (Saudi Arabia): Riyadh Bank (Saudi Arabia) and the Gulf International Bank (Bahrain).

16) The banker, article 2, September issue, 2000.

17) Given the limited number of countries in the study, the introduction of country-specific variables in the efficiency equation to account for the impact of the general economic environment on bank efficiency did not yield any meaningful results. That is why only bank characteristics were used in explaining efficiency.

18) Since the efficiency measures are bounded between 0 and 1, a TOBIT model, taking into account the truncation in the dependent variable, was estimated but produced results that are similar to those of OLS.

19) It should be mentioned that the moral hazard problem caused by asymmetric information inherent in financial transactions and intermediation is not the only problem affecting the efficiency of banks. In the case of GCC countries, adverse selection may have impacted efficiency of banks by deterring low-risk borrowers due to the high financial and administrative costs of borrowing and the practice of connected loans.

20) Mester (1994, p.18) has, for instance found that inefficient banks tend to be younger than more efficient banks.

Appendix:

Table (1)
Share of Largest Banks in Country's Total Bank Assets (1999)

Country	Number of Banks*	Name of Largest Bank	Share in Total Assets
Bahrain	9	Arab Banking Corporation	49.7
Kuwait	8	National Bank of Kuwait	34.4
Oman	7	Oman International Bank	23.1
Qatar	4	Qatar International Bank	64.4
Saudi Arabia	8	Saudi American Bank	27.1
United Arab Emirates	18	National Bank of Abu Dhabi	19.5

Source: Computed by author from the Financial Report of GCC Banks (1997-1999), The Research Unit of the Institute of Banking Studies, Kuwait.
* Some of the banks covered in the table are not included in the sample used in this paper for lack of data pertaining to relevant variables. In addition, the reported figures cover only domestic conventional banks and exclude other financial institutions such as Islamic banks.

Table (2)
Comparative Financial Rations (%) of GCC Banks
(Average over the period 1997-1999)

Variable	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	U.A.E	All GCC
Liquid Assets to Assets	3.0	11.9	7.5	9.5	5.6	10.9	7.4
Debt to Assets	91.3	87.5	87.3	85.9	89.6	86.3	88.7
Equity to Assets	8.7	12.5	12.7	14.1	10.4	13.8	11.3
Deposits to Assets	78.5	82.4	73.9	81.9	85.4	82.2	82.2
Loans to Assets	43.7	38.7	73.2	66.2	36.8	53.9	44.5
Investment to Assets	49.3	47.0	16.0	22.3	53.4	32.6	44.7
Return on Assets	0.8	1.6	1.9	2.0	1.6	2.1	1.5
Return on Equity	9.1	12.5	15.1	14.0	15.2	15.0	13.6

Source: Financial Report of GCC Banks (1997-1999), The Research Unit of the Institute of Banking Studies Kuwait.

Table (3)
DEA and COLS Efficiency Measures for GCC Banks

Country	Bank	CRSTE	VRSTE	SCALE	COLSDIST
Bahrain	Alahli Bank	0.844	0.846	0.997	0.849
	Arab Banking Corporation Group	1.000	1.000	1.000	0.991
	Bahrain International Bank	1.000	1.000	1.000	0.428
	Bahrain Middle East Bank	1.000	1.000	1.000	0.890
	Bahrain Saudi Bank	0.984	1.000	0.984	1.000
	Bank of Bahrain and Kuwait	0.860	0.861	0.999	0.883
	Gulf international Bank	1.000	1.000	1.000	0.971
	National Bank of Bahrain	0.897	0.899	0.997	0.898
	United Gulf Bank	0.921	1.000	0.921	0.867
Kuwait	Alahli Bank of Kuwait	0.891	0.893	0.998	0.875
	Bank of Kuwait and Middle East	0.913	0.915	0.998	0.891
	Burgan Bank	0.920	0.924	0.996	0.890
	Commercial Bank of Kuwait	0.928	0.930	0.998	0.904
	Gulf Bank	0.905	0.906	0.999	0.862
	Industrial Bank of Kuwait	0.974	0.975	0.999	0.907
	Kuwait Real Estate Bank	1.000	1.000	1.000	0.816
	National Bank of Kuwait	0.919	0.919	1.000	0.820
Oman	Bank Dhofar Al- Omani Al- Faransi	0.844	0.866	0.975	0.795
	National Bank of Oman	0.884	0.980	0.902	0.881
	Oman Arab Bank	0.892	0.921	0.969	0.860
	Oman International Bank	0.846	0.911	0.928	0.885
	Oman Housing Bank	1.000	1.000	1.000	0.958
Qatar	Qatar National Bank	1.000	1.000	1.000	0.708
	Doha Bank Limited	0.723	0.732	0.988	0.726
	Commercial Bank of Qatar	0.871	0.874	0.996	0.930
	Alahli Bank of Qatar	0.721	0.727	0.991	0.720
Saudi Arabia	Al- Bank Al Saudi Al- Faransi	0.952	0.953	0.999	0.913
	Arab National Bank	0.931	0.939	0.992	0.847
	Bank Al- Jazira	0.937	0.940	0.997	0.947
	Riyad Bank	0.915	0.958	0.956	0.760
	Saudi American Bank	0.926	1.000	0.926	0.842
	Saudi British Bank	0.946	0.946	1.000	0.892
	Saudi Hollandi Bank	0.937	0.940	0.997	0.928
	Saudi Investment Bank	1.000	1.000	1.000	0.997

Cont.Table (3)
DEA and COLS Efficiency Measures for GCC Banks

Country	Bank	CRSTE	VRSTE	SCALE	COLSDIST
U.A.E	Abu Dhabi Commercial Bank	1.000	1.000	1.000	0.965
	Arab Bank for Investment & Foreign Trade	0.940	0.944	0.995	0.876
	Bank of Sharjah	0.836	1.000	0.836	0.825
	Commercial Bank of Dubai	0.922	0.963	0.957	0.917
	Commercial Bank International	0.886	0.895	0.990	0.857
	Emirates Bank International	1.000	1.000	1.000	0.887
	First Gulf Bank	0.936	0.951	0.985	0.970
	Invest Bank	0.903	0.919	0.993	0.913
	Mashreq Bank	0.872	0.887	0.983	0.892
	Middle East Bank	0.951	1.000	0.951	0.939
	National Bank of Abu Dhabi	0.988	1.000	0.988	0.925
	National Bank of Dubai	0.968	0.983	0.985	0.824
	National Bank of Fujairah	0.818	0.825	0.991	0.843
	National Bank of Ras Al-Khaima	0.911	0.924	0.985	0.930
	National Bank of Sharjah	0.917	1.000	0.917	0.860
	National Bank of Umm Al-Quwain	0.813	0.822	0.990	0.839
	Union National Bank	1.000	1.000	1.000	0.900
	United Arab Bank	0.928	1.000	0.928	0.852

Table (4)
Ranking of the Top Ten GCC Banks for Alternative Efficiency Measures

RANK	Ranking by CRSTE	Ranking by COLSDIST
1	Arab banking Corporation Group	Bahrain Bank
2	Bahrain International Bank	Saudi Investment Bank
3	Bahrain Middle East Bank	Arab banking Group
4	Gulf International Bank	Gulf International Bank
5	Kuwait Real Estate Bank	First Gulf Bank
6	Oman Housing Bank	Abu Dhabi Commercial Bank
7	Qatar National Bank	Oman Housing Bank
8	Saudi Investment Bank	Bank Al- Jazira
9	Abu Dhabi Commercial Bank	Middle East Bank
10	Emirates Bank International	Commercial Bank of Qatar

Table (5)
Sample Statistics of DEA and COLS Efficiency Measures

Country	Mean CRSTE	Max CRSTE	Min CRSTE	Mean COLSDIST	Max COLSDIST	Min COLSDIST
Bahrain	0.945	1.000	0.844	0.908	1.000	0.824
Kuwait	0.931	1.000	0.891	0.871	0.907	0.816
Oman	0.893	1.000	0.844	0.876	0.959	0.795
Qatar	0.829	1.000	0.721	0.771	0.930	0.708
Saudi Arabia	0.943	1.000	0.915	0.891	0.997	0.760
U.A.E	0.922	1.000	0.813	0.890	0.967	0.824

Table (6)
Sources of Inefficiency for GCC Banks
(OLS Estimation with Heteroskedastic- Consistent Standard Errors)
Dependent Variable: CRSTE

Variable	Coefficient	t- Statistic
Constant	1.94	1.09
Assets	6.01 E-06	3.40[*]
EQUAS	0.56	3.44[*]
Estab	-0.56 E-03	-0.62
ROA	-0.97 E-02	-0.97
N = 52; Adj R- squared = 0.20; Log- Likelihood = 75.46		

[*] Significant at the 1% level.

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