Gulf Cooperation Council (GCC) Stock Markets: The Dawn of a New Era

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Abstract

Economic reforms and continuing market liberalization in the GCC strongly affect investors' demand for shares, resulting in an almost tripled market capitalization and a more than quadrupled average daily turnover, since 2002. We analyze the impact of this tremendous increase in market activity and the region's drive towards economic integration on the return behavior and the dynamic relationships among the regional stock markets. The objective is to determine the market dynamics and contemporaneous interactions of the stock markets of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates. While the return behavior is clearly not homogeneous, we find evidence of increasing market integration.

Keywords: Stock Return Behavior, Market Dynamics, Market Integration
EFM Classification: 620, 630

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1. Introduction

Stock Markets in the Middle East are growing at a breathtaking pace. With Oil prices at their highest levels in 20 years and interest rates as low as one percent, investors netted a staggering $153bn in profits in 2003 and $172bn so far in 2004, most of which were generated in the Gulf Cooperation Council (GCC) markets of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates (UAE). In less than two years, total GCC market capitalization increased by 161%, from $163.3bn in 2002 to $427.2bn in September of 2004. While the highest market growth rates were experienced by Qatar (+230%), Bahrain "only" grew by 65%. By far the largest stock market is Saudi Arabia, with a market capitalization of $237.1bn. Founded in 2000, the combined market capitalization of Dubai and Abu Dhabi ($67.1bn) have already elevated the UAE stock market to the second largest stock market in the GCC region, closely followed by the Kuwaiti stock market ($65.9bn), which was established more than twenty years ago. On overview of regional stock market and economic characteristics can be found in Table 1.

Economic reforms and continuing market liberalization strongly affected demand for shares, resulting in a more than quadrupled (since 2002) average daily turnover. With an average daily trading volume of $1.93bn, Saudi Arabia is the most active of the GCC stock markets. And while the regional markets in the past were a widely reserved playing field for GCC citizens, foreign investors who were only allowed stock ownership through mutual funds, if at all, are now given more freedom to directly invest in the shares of local companies.

The current economic picture could not be brighter. High oil and gas prices created an enormous petrodollar. This time, however, the petrodollar boom is of an unprecedented quality. The confluence of economic reforms with a growing appetite

for Islamic-compliant investments and the politically motivated, post September 11 repatriation of Arab money, provide the GCC countries with the financial means necessary to vigorously pursue the level of industrial diversification that would ensure economic growth and prosperity beyond the boundaries set by the inevitable depletion of natural resources, the wealth "sticks."[1] The GDP per capita of Kuwait ($31,400) and the UAE ($19,630) already compares favorably with most Western economies and the real GDP growth rates of the entire GCC region is among the highest in the world. The continuing economic expansion and the opening of the securities markets to foreign investors is likely to fuel interest in equity and debt securities of local companies even further. Accompanied by the requisite legal and regulatory stock market reforms, the region's prospering financial markets can promote necessary economic reforms by more efficiently allocating investments to new industries, widening the investor's base, and ultimately reducing local companies' cost of capital.

As the ongoing globalization demands coordination of the GCC economies, regional leaders have set their eyes on the blueprints of the European Union. In January 2003, the GCC customs union was launched, representing an important first step in the process of economic integration. Following the example of the European Union, the declared goal is a common market in 2007 and a single currency in 2010.[2] In fact, in studying the requirements and procedure needed for a monetary union, the European Central Bank is already providing assistance. In April 2004, key criteria for economic and fiscal integration, relating to budget deficit, interest and inflation levels, were set by the six GCC member states.

[1] See "Stocks are hot in Arab Gulf; Petrodollar Boom is fuelling IPOs and Equity Markets," by Simeon Kerr, *Wall Street Journal*, November 22, 2004.
[2] The currencies of the GCC member states are pegged to the US dollar except the Kuwaiti dinar, which is pegged to a basket of currencies including a heavy weighted US dollar.

In the past, stock markets in the Middle East have been widely ignored by international investors due to imposed restrictions on foreign stock ownership, the lack of common accounting standards and corporate transparency, or dismissed simply on the basis of economic and political uncertainty. As a consequence, and due to the difficulty of obtaining sufficient and reliable market data, researcher did not focus on the regional financial markets. The scarce research on Middle East financial markets was conducted on either individual stock markets (for example Erb, Harvey, and Viskanta, 1996) or on a set of markets of the Middle East and North African (MENA) region. For example, Abraham, Seyyed, and Al-Elg (2001), Darrat, Elkhal, and Hakim (2000), and Omran and Gunduz (2001) analyze various MENA market subsets but could not find any significant cross-linkages despite market proximity. Harvey (1995a and 1995b) discovers risk/return behavior and volatility clustering of selected MENA markets that differs from emerging market characteristics, i.e., low correlation with Western market returns or high volatility, commonly found in Asia, Latin America or Eastern Europe. Based on 1994 – 2001 daily return data, Hammoudeh and Aleisa (2004) found two equilibrium relationships with varying predictive power among GCC stock markets. The authors identified Saudi Arabia as being most influential on the return behavior of the other GCC markets. The authors did not include, however, the market of Qatar with a capitalization of currently $34.6bn, exceeding that of Bahrain ($12.7bn) and Oman ($9.3bn).

The tremendous increase in market activity, which is likely to have impacted return behavior, and the GCC economies' first steps towards economic integration may already have altered the dynamic relationships among the regional stock markets. By including the region's two youngest markets of Qatar and the UAE, this paper provides a first time, cohesive report on the stock return behavior of all six GCC

countries. The objective is to determine the market dynamics and contemporaneous interactions of the stock markets of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates. In particular, we attempts to (1) determine the degree of market integration, (2) qualify the return sensitivity among the markets, (3) reveal any lead-lag relationships, and (4) analyze degree and stationarity of relative market comovements.

2. Data and Methodology

Daily historic prices on six GCC country market indices were made available by Reuters Middle East and Shuaa Capital in Dubai, UAE. The data range is 1/2000 to 9/2004 for the stock markets of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates. For each price index, a series of weekly natural log prices and weekly natural log returns was generated.[3] The data series are divided into two subperiods. The first period includes 130 weekly observations (1/2000 – 6/2002), the second period covers the subsequent 117 periods (7/2002 – 9/2004). The UK stock market, as the largest European market, and the US stock market, as the largest stock market in the world, are included in the analysis for two reasons: First, to determine the impact of these major markets on the emerging stock markets of the GCC region and second, following the reasoning of Janakiramanan and Lamba (1998) and Dekker, Sen, and Young (2001), to prevent any possible distortion of linkage patterns among the GCC markets by allowing for the possible indirect influence of US and UK markets.

[3] The trading periods differ across the GCC countries. While the stock market in Saudi Arabia is open six days a week, all other markets have 5-day trading week. Markets are closed on Thursday/Friday (Kuwait), Friday/Saturday (Bahrain, Oman, Qatar and UAE), and Friday only (Saudi Arabia). To ensure consistency and comparability, the weekly index observations used in this analysis were made based on Wednesday's closing prices.

Before carrying out a cointegration test, the nonstationarity of the data series has to be established. To this extent, each market index is tested for the presence of unit roots using the Augmented Dickey Fuller (ADF) test (Dickey and Fuller 1979). Assuming the series have a non-zero mean, a constant is included in the regression. The null hypothesis of a unit root is tested against the alternative hypotheses of a stationary autoregressive process and a stationary autoregressive process with a trend. To ensure that the OLS regression will give an unbiased estimate of the lag coefficients, the number of lags included in the ADF is optimized by minimizing the Schwarz Information Criteria (SIC) and the presence of no autocorrelation in the residuals. Relaxing the i.i.d. $(0, \sigma^2)$ assumption and allowing errors to be dependent with heteroscedastic variance, a Phillips-Peron test is conducted to verify the ADF results. Finally, since it is well known that the ADF tests notoriously have lower power against the stationary alternative (see for example Crowder 1996), a KPSS test (Kwiatkowski, Phillips, Schmidt, and Shin 1992) under the reversed null hypothesis that the variable is stationary is conducted to ensure the robustness of the test results. Subsequently, the presence of a unit root in the first differences of index prices is tested to verify that the order of integration is 1.

The Johnsen (Johansen 1988) and Johansen and Juselius (Johansen and Juselius 1990) cointegration procedure is implemented based on a vector autoregression (VAR) model, which Sims (1980) and Dekker et al. (2001) argued gives a realistic description of market linkages, formally:

$$(1) \qquad X_t = A_1 y_{t-1} + \ldots + A_p y_{t-p} + \mu + \delta_t + \varepsilon_t \qquad (t = 1, \ldots, T)$$

where X_t is a n-dimensional vector of GCC markets prices ($n = 6$); $A_1, \ldots, A_p$ are n x n coefficient matrices; μ is a vector of constants; δ_t is a vector of trend coefficients and ε_t is a vector of innovations that may be contemporaneously correlated but are uncorrelated with their own lagged and uncorrelated with any of the right-hand side variables (white noise). The minimum lag length to eliminate autocorrelation in the residuals is denoted with p. Within the framework of cointegration, the data generating process of X_t should be modeled into an error correction model (ECM) with p-1 lags to avoid variable misspecifications (Engle and Granger 1987):

$$(2) \qquad \Delta X_t = \Pi X_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta X_{t-1} + \mu + \varepsilon_t$$

where the long-run multiplier matrix $\Pi = \alpha\beta'$, α and β are n x r matrices (r is the number of cointegrating vectors). The error correction coefficients contained in α measure the extent to which each variable responds to disturbances in the long-run equilibrium, while the parameters ($\Gamma_1, \ldots, \Gamma_{p-1}$) of dimension n x n define the short-run adjustment to changes in the variables, which implies the presence of $p - r$ common trends (Gonzalo and Granger 1995). The model is structured such that short-run deviations from the long-run equilibrium will be corrected. The trace statistic tests the null hypothesis of at most r cointegrating vectors. The alternative hypothesis is the existence of p (the number of endogenous variables) cointegrating vectors. Formally,

$$(3) \qquad \lambda trace_r = -T \sum_{i=r+1}^{p} \ln(1 - \lambda_i)$$

where λ_i is the largest i^{th} eigenvalue of the long-run multiplier matrix Π. The null hypothesis of r cointegrating vectors against the alternative of r + 1 cointegrating vectors is tested by computing the maximum eigenvalue, formally:

(4) $$\lambda \max_{r|r+1} = -T \ln(1-\lambda_{r+1})$$

Lütkepol and Reimers (1992) have argued that the individual coefficients of an ECM are difficult to interpret as a shock to the i^{th} variable may not only affect the variable itself but also be transmitted to other endogenous variables in the system through the dynamic lag structure of the VAR. If the innovation vector ε_t increases by a vector d, the effect upon ΔX_{t+n} is given by $A_p d$, where

(5) $$A_p = \frac{\Delta X_{t+n}}{\Delta \varepsilon_t}$$

with the elements i, j measuring the effect of a one-unit increase in ε_t . If only the first element ε_{1t} of ε_t changes, the effects are given by the first column of A_p. The elements in the first column and the j^{th} row of $A_1, \ldots, A_p$ trace the dynamic effects of an innovation in the i^{th} market on all the other markets j individually, thereby providing insight into the dynamic interactions among GCC markets. Hamilton (1994) showed that the underlying impulse response function can be determined by simulation methods. Koop, Pesaran, and Lee (1996) derive generalized impulse responses from an orthogonal set of innovations to the j^{th} variable by incorporating a variable specific Cholesky factor to the j^{th} variable. The relative importance of each random innovation in i^{th} market on market j, is determine by the generalized forecast error variance decomposition techniques of Pesaran and Shin (1998).[4] While the results of the generalized forecast error variance decomposition qualify the impact dynamics of innovations among GCC stock markets, the impact direction is revealed by using the

[4] An alternative approach would be the Choleski factorization (Lütkepol 1991). This procedure, however, is sensitive to the ordering of variables when the covariance matrix of the error terms is non-diagonal.

Granger causality test (Granger 1969). In a bivariate system of jointly stationary time series x_t and y_t, the variable x is said to Granger cause y if lagged x improves the predictions of y, even after lagged y variables have been excluded as explanatory variables (Granger 1988). The vector autoregression model can be used to investigate the lead-lag relationship within the co-dependent GCC stock markets. Given

$$(6) \qquad \begin{aligned} x_t &= c_1 + \sum_{i=1}^{q} \alpha_{1i}\, x_{t-i} + \sum_{j=1}^{q} \beta_{1j}\, y_{t-j} + \varepsilon_{1t}, \text{and} \\ y_t &= c_2 + \sum_{i=1}^{q} \alpha_{2i}\, x_{t-i} + \sum_{j=1}^{q} \beta_{2j}\, y_{t-j} + \varepsilon_{2t} \end{aligned}$$

where q is the order of the respective lag variable. An F-test for the joint significance of $\alpha_{2i}, \ldots, \alpha_{2q}$ ($\beta_{1j}, \ldots, \beta_{1q}$) is formulated to test if x Granger causes y (y Granger causes x).

Possible nonstationarity in the degree of relative comovement among GCC and with the UK and US stock markets is investigated based on a comparison of correlation coefficients between the first period (1/2000 – 6/2002) and the second period (7/2002 – 9/2002). According to Kendall and Stewart (1967), the null hypothesis of correlation coefficient equality, H_0: $r_1 = r_2$, can be tested as follows:

$$(7) \qquad Z = \frac{(z_1 - z_2)}{\sqrt{\left[\left(\frac{1}{n_1 - 3}\right) + \left(\frac{1}{n_2 - 3}\right)\right]}} \sim N(0, 1) \text{ provided } |r_1| \text{ and } |r_2| \neq 1;\ n_1 \text{ and } n_3 > 3$$

where:

$$z_1 = 0.5 \ln\left(\frac{1 + r_1}{1 - r_1}\right), \text{ and } z_2 = 0.5 \ln\left(\frac{1 + r_2}{1 - r_2}\right)$$

The number of return observations in each period is denoted with n. A higher level of integration between two stock markets would be suggested by a significant increase in the correlation coefficient (Taylor and Tonks 1989).

3. Results

The three unit root test results are shown in Table 2, suggesting the existence of a unit root in the weekly index series of all six GCC stock markets across the two subperiods. Only in the case of Bahrain, does the ADF test indicate the possible stationarity in the first subperiod at the 10%-level. Given the more robust PP test statistics (which reject stationarity at the 10%-level) and KPSS test statistics (which accepts nonstationarity at the 5% significance level), however, it is reasonable to assume uniformly the presence of a unit root. Test results of first differences indicate the order of integration to be 1.

Descriptive statistics of weekly returns are shown in Table 3. GCC stock markets clearly outperformed their western counterparts. While UK and US stock markets saw vastly declining prices as a consequence of the bursting of the new economy bubble, GCC stock markets greatly benefited from in part politically motivated repatriation of Middle Eastern funds. Over the full period, average weekly returns for GCC markets range from 0.13% (Bahrain) to 0.61% (Kuwait), compared to -0.05% and -0.11% for the UK and the US, respectively. In the first period, Bahrain (-0.15%) and Oman (-0.21%) were the only GCC markets with negative weekly return averages, yet UK and US market performances were even worse, averaging -0.26% and -0.28%, respectively. Most striking is the performance difference in the second period. UK and US markets generated the lowest returns with the highest standard deviations, leading to the least favorable risk/return relationship, as measured in form of the coefficient of variation (CV), among the eight markets with 16.79 and 36.73, respectively. In contrast, the risk/return relationship in the GCC countries seems to be not only more advantageous but also quite homogeneous. The CV difference among the markets of Bahrain (2.93), Kuwait (2.57), Oman (2.67), Saudi

Arabia (2.98), and the UAE (2.37) is a mere 0.61. The return distribution appears to be leptokurtic for all markets, with a generally low degree of positive skewness with the exception of Kuwait and Saudi Arabia.

The multivariate cointegration test results of the error correction model (eq.2), as reported in Table 4, suggest the absence of any cointegrating vectors among the GCC markets for the period of 1/2000 – 6/2002. While the critical values of the trace test indicate the existence of a single cointegrating vector only in the linear trend model (at the 5%-level), the null hypothesis of zero cointegrating vectors cannot be rejected based on the maximum eigenvalue statistics. These results suggest that the emerging stock markets of the GCC region were relatively independent from each other during the earlier period. This picture of heterogeneity in the price behavior changed dramatically during the subsequent period. Both trace statistics of the six-dimensional ECM of stock prices in Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates identified three cointegrating vectors for the period of 7/2002 – 9/2004.

The results of the generalized forecast error variance decomposition document that the index return variations in the GCC countries dependents to a greater extent on shocks from within the region rather than from the outside. Table 5 shows that after four weeks, the average error variance of an individual GCC stock market explained by the sum of index variances of all other stock markets in the region is about 11.6% in the second period (down from 13.5% in the first period). In contrast, only about 1.6% of individual GCC stock market variation can be explained by US (up from 0.5%) and UK (down from 3.8%) innovations. And while US market innovations have the highest impact on Bahrain and Saudi Arabia, Kuwait seem to be most sensitive to UK market innovations during the second period. Results of changes in

explanatory power of GCC innovations on individual markets in the region over time are mixed. While Bahrain, Oman, and Saudi Arabia became less sensitive, Kuwait, Qatar, and the UAE became more sensitive to GCC market innovations. A more detailed breakdown of the error variance sensitivities four weeks after the initial shock is provided in Table 6. Most striking is the great impact of innovations in Saudi Arabia on the United Arab Emirates (10.61% in the second period). This reflects the strong economic and political ties between the two countries. On average, stock market innovations in Saudi Arabia can explain 4.2% of the error variances in all regional markets, followed by Bahrain (3.7%), Kuwait (2.4%), Oman (1.8%), the UAE (1.4%), and finally the least influential market Qatar (0.4%). The greater change in explanatory power is found in Bahrain, down to an average of 3.7% from 6.0%. Among the two most recently emerged markets, the UAE has gained influence within the region (1.4% after 0.2%) while Qatar has lost relative importance (0.4% after 1.2%).

While impulse response functions trace the effect of a shock to one endogenous variable on to the other variables in the VAR, variance decomposition separates the variation in an endogenous variable into the component shocks to the VAR.

In general, inferences from the impulse response analysis support the results of the variance decomposition procedure. The particular findings are shown in Table 7. For example, a generalized one standard deviation shock to the market in Bahrain triggered the greatest initial response during the first period from Saudi Arabia (0.099) and Oman (0.074). The magnitude of the Omani market response decreased during the second period to 0.033, while the Saudi market hardly responded at all (-0.003). As shown in Table 6, the explanatory power of the Bahraini market on Omani

and Saudi market variations went down from 15.27 and 10.37 to 9.19 and 3.29, respectively. Over time, the responsiveness of one market to shocks in another market has increased noticeably in case of Oman and Qatar. Also, impulses given by the fast growing market of the UAE generated greater responses from all GCC markets in the second period, underlying the growing regional importance of the Dubai financial markets. Responses to US and UK market impulses generally confirmed the findings of the variance decomposition, in particular the growing market impact of the UK on Kuwait and the US on Saudi Arabia. The greater US market impact on Bahrain, as suggested by the results of the variance decomposition, was not reflected in the outcome of the impulse response analysis.

After qualifying the impact dynamics of innovations among GCC stock markets, the impact direction is analyzed by using the Granger causality test. The test results indicate that in the first period the US market was most influential to the markets of or "Granger caused" Bahrain, Kuwait, and Saudi Arabia (Table 8). This causality disappeared during the second period. In general, Granger causality test results support the findings of the preceding variance decomposition and the impulse response analysis. For example, variance decomposition revealed that innovations in the Bahraini market could explain a greater portion of the market variance in Oman then innovations in the Omani market could explain variance in Bahrain. Similarly, a one standard deviation impulse from the market in Bahrain would trigger a greater response in the Omani market than that of the Bahraini market to the same impulse emitted from the market in Oman, according to the results of the impulse response analysis. It is therefore not surprising that Bahrain is found to Granger-cause Oman. Also, Saudi Arabia, as the most influential among the GCC markets, seemingly Granger-caused Oman and Qatar. No causality could be established, however,

between the stock markets of the closely connected economies of Saudi Arabia and the United Arab Emirates.

The final step in the analysis of the contemporaneous structure of market interaction is taken by testing the equality of correlation coefficients in the two periods. According to the results shown in Table 9, the average correlation coefficient among the six GCC markets is a mere 0.12 in both periods. The implication is duo fold: First, the level of GCC stock market integration is relatively low, suggesting that the fast growing economies of the Middle East are still quite heterogeneous. Consequently, GCC citizens, and to a lesser extent non-GCC citizens would benefit greatly from a regional diversification of their stock portfolios. Second, while the change of correlation coefficients among GCC countries is not uniform, the overall degree of co-movement has not changed since 2000, despite political events that could suggest otherwise. Also, the degree of co-movement between the GCC markets and US and UK markets overall has remained fairly stable. The only exception is the significant decrease in the correlation coefficient of the US and the UAE (-0.05 after 0.16). Given the similar correlation coefficient with the UK (-0.07), and the fact that UAE correlations with all other GCC markets have increased, especially with Saudi Arabia, it appears as if the UAE is emerging into the financial hub of the Middle East almost independently of major Western markets. Finally, as already suggested by the variance decomposition procedure and the impulse response analysis, both the US and the UK markets have surprisingly little impact on stock market return behavior in the Middle East.

4. Conclusion

Conditioned on the continuation of economic reforms and a further liberalization of financial markets in the GCC region, investors are likely to benefit from above average stock returns. Relatively low return volatility and minimal foreign exchange rate exposure through the dollar peg promise an advantageous risk/return relationship. In addition, the low correlation of GCC markets and with US and UK markets point to diversification opportunities for international investors. Diversification within the GCC region is still beneficial as market return behavior is yet far from homogeneous. Cointegration analysis has discovered the increase in the number of cointegrating vectors. This is likely to be the reflection of ongoing attempts to synchronize market economies in preparation for an economic union and ultimately the introduction of a single currency. Consequently, market return behavior is likely to become more homogeneous within the six GCC.

Saudi Arabia clearly dominates GCC stock market activities and constitutes the bulk of GCC market capitalization. The Saudi stock market leads the markets of Oman and Qatar and explains a relatively high portion of the error variances in all the other GCC markets. The UAE, often regarded as the regional safe haven, is gaining market influence and its impulses trigger an increasing response from other market in the region. Western markets have surprisingly little impact on stock market return behavior in the GCC region. This may change temporarily as financial markets embrace more foreign investments. With the formation of the economic union, however, Western influence on GCC markets will remain limited while the stock market behavior among the markets of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates is likely to become more homogeneous.

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Table 1: GCC Stock Market and Economic Characteristics

	Markets/Economies:					
Characteristics	**Bahrain**	**Kuwait**	**Oman**	**Qatar**	**Saudi Arabia**	**UAE**
Stock trading began	1957	1952	1988	1997	1935	1989
Current market system established	1987	1983	1998	1997	1985	2000
Electronic trading since	1987	1995	1998	2002	1988	2000
Number of companies listed	48	114	128	30	72	49
Market capitalization (US$bn)	12.7	65.9	9.3	34.6	237.6	67.1
Average daily trading volume (mil. shares)	1.1	124.6	2.2	0.5	38.9	38.9
Average daily trading volume (US$mil.)	1.4	183.8	10.4	9.9	1931	113.6
Max.% of foreign investment[2]	100[1]	49[1]	25 - 100	25[1]	0	49
Foreign investment through mutual funds	yes	yes	yes	yes	yes	yes
Regional cross-listing	yes	yes	yes	no	no	no
Length of settlement procedure (days)	2	1[3]	2	3	real time	2
Stock/index futures trading	no	limited	no	no	no	no
Market index January 2000	2187	1428	251	1007	2025	993
Market index September 2004	2918	6065	346	3500	6554	2187
Average index return p.a. 2000-2004	5.9%	33.5%	6.6%	28.3%	26.5%	17.1%
P/E	16	n/a	11	n/a	28	27
Dividend Yield	3.8	n/a	4.2	n/a	2.3	1.8
Moody's Souvereign Rating	Baa1	A2	Baa2	A3	Baa2	A2
Nominal GDP in 2003 (US$bn)	8.23	41.9	21.1	19.56	210.91	78.48
GDP per Capita (US$)	11,310	16,700	8,070	31,400	8,700	19,630
Real GNP change in %	4.9	4.6	1.1	8.5	5.2	5.2
Inflation Rate (CPI % change)	0.4	1.4	n/a	1.6	0.3	3.1
Current account balance/GDP in %	-3.1	20.6	10.7	23.4	11.8	15.9
External vulnerability indicator[4]	0.53	1.12	0.33	0.93	0.87	0.72

Note : The economic data was provided by SHUAA Capital, Dubai. The stock market related data was provided in part by the Arab Monetary Fund and the individual stock market organizations.

[1]GCC nationals only

[2] In Bahrain, seven companies (mostly banks) are open to 100% foreign ownership which is otherwise restricted to 49%. Kuwait does not allow non-GCC citizens to invest directly in the stock market and Saudi Arabia makes only bank shares available to GCC citizens. In the UAE, non-nationals can buy up to 20% of Emaar and 49% of Tabreed shares, whereas in Qatar, GCC citizens can buy up to 25%. However, while ownership in bank and financial services companies is restricted to Qatar nationals, non-GCC citizens can invest in Qatar Telecom and Salam International.

[3] Balances are available after one day; general settlements between all parties every Saturday.

[4] A ratio used by Moody's that measures a country's ability to cover its maturing debt only through its reserves, computed as: (Short Term Debt + Maturing Portion of Long Term Debt)/ Foreign Exchange Reserves

Table 2: Unit Root Tests

ADF, PP, and KPSS denote the Augmented Dickey-Fuller test, Philips-Perron test, and the Kwiatkowski, Phillips, Schmidt, and Shin test for unit roots, respectively. The optimal number of lags was chosen according to the Schwarz Information Criterion (SIC), provided that the lags yield white-noise residuals.

		Levels:			First Differences:		
Markets	**Period**	**ADF**	**PP**	**KPSS**	**ADF**	**PP**	**KPSS**
Bahrain	1	-2.80*	-2.89*	0.33***	-7.06***	-7.58***	0.06
	2	0.46	1.15	0.18**	-4.47***	-7.98***	0.05
Kuwait	1	1.13	1.46	0.23***	-7.56***	-7.64***	0.06
	2	-0.20	-0.29	0.20***	-8.79***	-9.44***	0.14
Oman	1	-2.21	-2.20	0.19***	-9.97***	-10.01***	0.06
	2	0.23	0.21	1.26***	-8.21***	-8.19***	0.15
Qatar	1	1.93	1.36	0.32***	-9.03***	-9.40***	0.03
	2	-0.68	-0.71	1.23***	-9.32***	-9.34***	0.08
Saudi Arabia	1	-0.68	-0.76	1.15***	-10.37***	-10.37***	0.06
	2	0.48	0.74	1.23***	-7.41***	-7.36***	0.31
UAE	1	0.24	0.18	0.31***	-5.38***	-9.71***	0.07
	2	2.09	2.09	0.25***	-8.12***	-8.43***	0.05
UK	1	-0.34	0.09	0.17**	-9.98***	-9.93***	0.14
	2	0.14	0.21	0.86***	-14.67***	-16.49***	0.25
US	1	-0.57	-0.06	1.30***	-12.26***	-12.34***	0.17
	2	-0.94	-0.98	1.14***	-13.93***	-14.86***	0.16

*, **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

Table 3: Descriptive Statistics of Weekly Returns

Full Period: 1/2000 - 9/2004, n = 247

	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE	UK	US
Mean	0.13	0.61	0.15	0.53	0.50	0.33	-0.05	-0.11
Median	0.06	0.66	0.05	0.19	0.41	0.18	0.00	-0.05
Maximum	4.75	7.42	12.11	10.31	7.54	6.34	13.17	14.55
Minimum	-4.85	-6.72	-7.46	-6.23	-7.38	-5.73	-11.46	-9.87
Std. Dev.	1.29	1.89	1.94	2.38	2.05	1.50	2.89	2.68
Skewness	0.06	-0.20	0.82	1.05	-0.06	0.24	0.45	0.70
Kurtosis	5.28	4.57	9.66	6.00	4.79	5.74	5.86	8.85
CV	10.34	3.12	13.00	4.46	4.11	4.54	-55.03	-24.83

First Period: 1/2000 - 6/2002, n = 130

	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE	UK	US
Mean	-0.15	0.36	-0.21	0.43	0.26	0.05	-0.26	-0.28
Median	-0.09	0.30	-0.38	0.20	0.22	-0.08	-0.36	-0.16
Maximum	3.68	3.92	12.11	9.16	7.54	4.85	9.91	5.56
Minimum	-4.85	-4.37	-7.46	-4.14	-7.06	-5.73	-6.40	-7.01
Std. Dev.	1.27	1.45	2.24	1.93	1.79	1.44	2.76	2.14
Skewness	-0.59	-0.22	1.11	1.30	0.20	0.04	0.45	-0.06
Kurtosis	4.92	3.73	10.23	7.88	6.70	6.60	3.54	3.58
CV	-8.50	4.01	-10.74	4.54	6.96	27.31	-10.55	-7.59

Second Period: 7/2002 - 9/2004, n = 117

	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE	UK	US
Mean	0.43	0.88	0.55	0.65	0.76	0.64	0.18	0.09
Median	0.35	0.99	0.33	0.17	0.80	0.52	0.21	0.23
Maximum	4.75	7.42	4.99	10.31	6.31	6.34	13.17	14.55
Minimum	-2.64	-6.72	-2.96	-6.23	-7.38	-4.35	-11.46	-9.87
Std. Dev.	1.26	2.26	1.46	2.80	2.28	1.52	3.02	3.16
Skewness	0.80	-0.39	0.76	0.83	-0.34	0.41	0.43	0.82
Kurtosis	4.86	4.12	3.83	4.61	3.90	5.06	7.61	8.56
CV	2.93	2.57	2.67	4.29	2.98	2.37	16.79	36.73

Table 4: Multivariate Cointegration Results

The number of cointegration vectors r is shown as well as critical values for trace ($\lambda trace$) and maximum eigenvalue λmax) statistics. The critical values are taken from Osterwald-Lenum (1992).

First Period: 1/2000 - 6/2002

Without Linear Trend

H_0	Trace Tests	λtrace 0.99	λtrace 0.95	H_0	Eigenvalue Tests	λmax 0.99	λmax 0.95
r = 0	86.85	103.18	94.15	r = 0	39.42	45.1	39.37
r ≤ 1	47.43	76.07	68.52	r = 1	19.88	38.77	33.46
r ≤ 2	27.54	54.46	47.21	r = 2	12.17	32.24	27.07
r ≤ 3	15.37	35.65	29.68	r = 3	8.31	25.52	20.97

With Linear Trend

H_0	Trace Tests	λtrace 0.99	λtrace 0.95	H_0	Eigenvalue Tests	λmax 0.99	λmax 0.95
r = 0	120.49**	124.75	114.9	r = 0	42.43	49.51	43.97
r ≤ 1	78.07	96.58	87.31	r = 1	32.24	42.36	37.52
r ≤ 2	45.82	70.05	62.99	r = 2	19.88	36.65	31.46
r ≤ 3	25.94	48.45	42.44	r = 3	12.16	30.34	25.54

Second Period: 7/2002 - 9/2004

Without Linear Trend

H_0	Trace Tests	λtrace 0.99	λtrace 0.95	H_0	Eigenvalue Tests	λmax 0.99	λmax 0.95
r = 0	142.89***	124.75	114.9	r = 0	46.58**	49.51	43.97
r ≤ 1	96.31**	96.58	87.31	r = 1	29.78	42.36	37.52
r ≤ 2	66.53**	70.05	62.99	r = 2	25.93	36.65	31.46
r ≤ 3	40.61	48.45	42.44	r = 3	18.86	30.34	25.54

With Linear Trend

H_0	Trace Tests	λtrace 0.99	λtrace 0.95	H_0	Eigenvalue Tests	λmax 0.99	λmax 0.95
r = 0	113.56***	103.18	94.15	r = 0	35.37	45.1	39.37
r ≤ 1	78.13***	76.07	68.52	r = 1	29.68	38.77	33.46
r ≤ 2	48.51**	54.46	47.21	r = 2	23.78	32.24	27.07
r ≤ 3	24.72	35.65	29.68	r = 3	15.95	25.52	20.97

** and *** denote statistical significance at the 5% and 1% level, respectively.

Table 5: Generalized Forecast Error Variance Decomposition

Each entry denotes the total percentage of forecast error variance of a particular market explained by the sum of index variances of all other markets. The "market explained" is excluded from the decompostion.

		By Innovations in:					
Market	**Number of**	**GCC**		**UK**		**US**	
Explained	**Weeks**	1/00 - 6/02	7/02 - 9/04	1/00 - 6/02	7/02 - 9/04	1/00 - 6/02	7/02 - 9/04
Bahrain	2	10.87	2.32	1.92	0.38	0.16	4.24
	4	18.73	5.36	1.59	1.15	0.20	4.59
	6	24.07	5.38	1.49	1.07	0.17	4.67
Kuwait	2	4.28	8.61	0.66	5.51	1.73	0.02
	4	6.95	10.81	0.57	5.11	1.38	1.56
	6	7.27	11.71	0.46	5.62	1.17	1.41
Oman	2	14.24	13.85	4.06	0.36	1.50	0.06
	4	19.45	15.10	6.22	0.43	1.06	0.30
	6	21.08	15.15	6.78	0.59	1.15	0.24
Qatar	2	6.12	12.31	1.05	0.65	0.04	1.37
	4	10.40	12.03	5.04	0.55	0.33	0.96
	6	10.26	12.16	5.04	0.49	0.38	0.77
Saudi Arabia	2	12.75	9.04	10.02	0.48	0.04	2.38
	4	17.99	10.65	8.78	0.98	0.04	2.06
	6	17.18	10.46	8.76	0.81	0.05	1.68
UAE	2	7.30	14.62	0.62	1.49	0.00	0.01
	4	7.66	15.89	0.87	1.39	0.03	0.28
	6	7.53	16.37	0.69	1.38	0.03	0.27

Table 6: Generalized Forecast Error Variance Decomposition

First Period: 1/2000 - 6/2002, week 4

Market Explained	By Innovations in:					
	Bahrain	**Kuwait**	**Oman**	**Qatar**	**Saudi Arabia**	**UAE**
Bahrain	79.5	1.3	1.0	2.1	14.2	0.1
Kuwait	1.5	91.1	0.3	2.2	3.0	0.0
Oman	15.3	1.7	73.3	0.8	1.6	0.1
Qatar	1.9	4.4	0.6	84.2	3.5	0.1
Saudi Arabia	10.4	4.6	1.9	0.5	73.2	0.6
UAE	0.8	4.0	1.5	0.5	0.8	91.4
GCC[1]	6.0	3.2	1.1	1.2	4.6	0.2

Second Period: 7/2002 - 9/2004, week 4

Market Explained	By Innovations in:					
	Bahrain	**Kuwait**	**Oman**	**Qatar**	**Saudi Arabia**	**UAE**
Bahrain	88.9	1.5	0.1	0.3	2.4	1.0
Kuwait	1.1	82.5	3.7	0.3	2.4	3.2
Oman	9.2	1.8	84.2	0.4	2.9	0.8
Qatar	2.1	2.6	4.5	86.5	2.6	0.2
Saudi Arabia	3.3	4.3	0.3	0.7	86.3	2.0
UAE	2.7	1.7	0.5	0.4	10.6	82.4
GCC[1]	3.7	2.4	1.8	0.4	4.2	1.4

[1]Represents the average error variance in the GCC stock markets explained by innovations in the particular counrty.

Table 7: Impulse Response Analysis

First Period: 1/2000 - 6/2002

Market Responding	week	To one S.D. Impulse in:							
		Bahrain	**Kuwait**	**Oman**	**Qatar**	**Saudi Arabia**	**UAE**	**UK**	**US**
Bahrain	**1**	0.167	0.024	0.037	0.017	0.050	0.000	0.011	0.029
	2	0.093	0.035	0.010	0.029	0.086	-0.001	0.039	0.043
Kuwait	**1**	0.028	0.200	-0.009	-0.043	0.051	0.034	-0.010	-0.004
	2	0.006	0.111	-0.010	0.009	0.039	0.013	0.016	0.031
Oman	**1**	0.099	-0.020	0.450	-0.009	-0.018	0.022	-0.025	-0.028
	2	0.127	-0.053	0.169	-0.011	0.066	0.012	0.106	0.036
Qatar	**1**	0.028	-0.060	-0.006	0.276	-0.008	-0.023	0.031	0.005
	2	-0.008	-0.006	0.010	0.118	-0.012	0.007	0.042	0.012
Saudi Arabia	**1**	0.074	0.063	-0.010	-0.007	0.247	-0.018	0.015	0.026
	2	0.002	0.018	-0.017	0.017	0.098	-0.031	0.094	0.054
UAE	**1**	0.000	0.037	0.011	-0.019	-0.016	0.221	0.011	0.034
	2	0.015	0.035	-0.008	0.012	0.009	0.069	0.024	0.025

Second Period: 7/2002 - 9/2004

Market Responding	week	To one S.D. Impulse in:							
		Bahrain	**Kuwait**	**Oman**	**Qatar**	**Saudi Arabia**	**UAE**	**UK**	**US**
Bahrain	**1**	0.165	0.019	0.019	-0.011	-0.002	0.025	-0.008	-0.005
	2	0.066	0.027	0.011	-0.015	0.013	0.029	0.010	-0.007
Kuwait	**1**	0.032	0.285	0.015	-0.008	0.068	0.052	0.043	0.047
	2	-0.020	0.091	0.071	0.011	0.035	0.066	0.078	0.074
Oman	**1**	0.033	0.016	0.293	0.049	-0.008	0.027	-0.035	-0.032
	2	0.110	0.060	0.174	0.041	0.025	0.077	0.006	0.005
Qatar	**1**	-0.026	-0.011	0.065	0.391	0.004	0.001	0.038	0.045
	2	0.063	0.078	0.088	0.173	0.082	0.049	0.064	0.042
Saudi Arabia	**1**	-0.003	0.069	-0.008	0.003	0.292	0.066	0.057	0.055
	2	-0.047	0.016	-0.007	0.032	0.177	-0.018	0.064	0.036
UAE	**1**	0.035	0.042	0.021	0.001	0.052	0.229	-0.006	-0.004
	2	-0.034	-0.008	0.010	0.018	0.054	0.089	0.034	0.029

Table 8: Granger Causalities

First Period: 1/2000 - 6/2002

Null Hypothesis:	Obs	F-Statistic	Probability
Oman does not Granger Cause Bahrain	128	0.3232	0.7244
Bahrain does not Granger Cause Oman**		3.1847	0.0448
Saudi Arabia does not Granger Cause Oman**	128	3.3837	0.0371
Oman does not Granger Cause Saudi Arabia		0.1999	0.8191
Saudi Arabia does not Granger Cause Qatar***	128	7.4534	0.0009
Qatar does not Granger Cause Saudi Arabia		1.3471	0.2638
UK does not Granger Cause Kuwait***	128	5.6053	0.0047
Kuwait does not Granger Cause UK		2.4088	0.0942
US does not Granger Cause Bahrain***	128	7.8401	0.0006
Bahrain does not Granger Cause US		3.0661	0.0502
US does not Granger Cause Kuwait***	128	4.9718	0.0084
Kuwait does not Granger Cause US		4.8976	0.0898
US does not Granger Cause Saudi Arabia***	128	8.5309	0.0003
Saudi Arabia does not Granger Cause US		0.2739	0.7609
US does not Granger Cause UK***	128	8.2093	0.0005
UK does not Granger Cause US		1.9790	0.1426

Second Period: 1/2000 - 6/2002

Null Hypothesis:	Obs	F-Statistic	Probability
Oman does not Granger Cause Bahrain	117	0.3205	0.7264
Bahrain does not Granger Cause Oman**		3.9769	0.0215
UAE does not Granger Cause Oman**	117	3.4556	0.0350
Oman does not Granger Cause UAE		0.4076	0.6662
Saudi Arabia does not Granger Cause Qatar**	117	3.8613	0.0239
Qatar does not Granger Cause Saudi Arabia		2.5905	0.0795

Note : Only the country pairs that displayed 5%-level (**) or 1%-level significance (***) are shown in this table.

Table 9: Test of Equality of Correlation Coefficients

First Period: 1/2000 - 6/2002

	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE	UK
Kuwait	0.32						
Oman	0.20	-0.01					
Saudi Arabia	0.19	0.04	0.01				
Qatar	0.31	0.30	0.04	0.12			
UAE	0.09	0.20	0.03	0.00	-0.02		
UK	0.11	-0.05	-0.13	0.01	0.04	0.03	
US	0.12	-0.05	-0.09	0.01	0.14	0.16	0.68

Second Period: 7/2002 - 9/2004

	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE	UK
Kuwait	0.13						
Oman	0.15	0.21					
Saudi Arabia	0.01	-0.02	0.21				
Qatar	0.01	0.19	0.03	0.16			
UAE	0.18	0.21	0.10	0.02	0.22		
UK	0.01	0.09	-0.04	0.07	0.11	-0.07	
US	0.08	0.16	-0.01	0.08	0.13	-0.05	0.85

Difference in Correlation Coefficients

	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE	UK
Kuwait	-0.19						
	(-1.52)						
Oman	-0.04	0.22*					
	(-0.35)	(1.70)					
Qatar	-0.19	-0.07	0.20				
	(-1.46)	(-0.50)	(1.58)				
Saudi Arabia	-0.30**	-0.11	-0.01	0.04			
	(-2.38)	(-0.91)	(-0.06)	(0.34)			
UAE	0.09	0.02	0.06	0.01	0.24*		
	(0.69)	(0.14)	(0.48)	(0.11)	(1.88)		
UK	-0.11	0.14	0.10	0.07	0.07	-0.09	
	(-0.83)	(1.11)	(0.76)	(0.51)	(0.52)	(-0.72)	
US	-0.04	0.21	0.08	0.07	-0.01	-0.21*	0.17***
	(-0.29)	(1.61)	(0.59)	(0.56)	(-0.05)	(-1.68)	(3.27)

*Indicates an increase or decrease in correlation coefficent in the second period that is significant at the 10%-level.

**Indicates an increase or decrease in correlation coefficent in the second period that is significant at the 5%-level.

***Indicates an increase or decrease in correlation coefficent in the second period that is significant at the 1%-level.