DISSERTATION

FINANCIAL INTEGRATION OF STOCK MARKETS IN THE GULF COOPERATION COUNCIL COUNTRIES

Submitted by

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WE HEREBY RECOMMEND THAT THE DISSERTATION PREPARED UNDER OUR SUPERVISION BY SALEH ALSUHAIBANI ENTITLED FINANCIAL INTEGRATION OF STOCK MARKETS IN THE GULF COOPERATION COUNCIL COUNTRIES BE ACCEPTED AS FULFILLING IN PART REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY.

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ABSTRACT OF DISSERTATION

FINANCIAL INTEGRATION OF STOCK MARKETS IN THE GULF COOPERATION COUNCIL COUNTRIES

The purpose of this study was to establish the level of integration that exists among the GCC stock markets and between GCC stock markets and major international markets. The research defines market integration in terms of co-movement of stock prices. Markets are considered to be integrated if national stock prices share a common long-run relationship. Correlation, cointegration analysis, and Granger causality tests were applied in the investigation of the stock markets' integration. The five GCC stock markets included in the analyses represent five GCC states—Bahrain, Kuwait, Oman, Qatar, and Saudi Arabia. The measures of major international stock markets were applied to stock markets in the United States (S&P 500), the United Kingdom (FTSE 100), and Japan (Nikkei 225). Additionally, the Morgan Stanley Capital International Index (MSCI) reflected all major stock markets on a global basis. Weekly country equity market indices were collected for the period from August 1998 to August 2003.

Evidence of cointegration was found for some pairs of the GCC stock markets during the five-year period. Multilateral cointegration of the five markets was established minimally among these markets as a group. Contemporaneous correlations among the GCC markets are less than perfect. However, the estimates suggest considerable effects of variations in one market on another. The study suggests that the GCC stock markets, except the BSE, are not cointegrated with the developed markets,

which indicates that there is considerable evidence of the diversification benefits of investing in the emerging markets of the Gulf region. That is consistent with results of the correlation analysis, which found negative correlations among GCC and developed stock markets. The UK market is found to be the most influential market, while the US market is the least influential market affecting stock markets in the GCC countries.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

The growing integration of financial markets has been the subject of extensive research over the last two decades. The degree of integration of stock markets around the world increased significantly during the 1980s and 1990s. Major factors underlying this process are attributed to the increase in capital flows across national boundaries, potential benefits from diversification of investment on an international level, and the existence of stock market leaders and followers.

International stock markets have become more integrated as capital account restrictions have been lifted in developed counties. Developing countries have made such efforts toward liberalization and deregulation of their capital markets. As a result, capital flows to developing counties, including Foreign Direct Investments (FDI), have sharply increased in recent years. The increase of capital flows to developing countries has been accompanied by a significant rise in the degree of integration of world capital markets.

A key factor causing growing integration of world stock markets is the increased globalization of investment seeking higher rates of return and the opportunity to diversify risk internationally. The potential benefits of diversification from investing in markets of developing counties, which are known as Emerging Stock Markets (ESMs), have been observed in the last few years. Equity portfolio flows to emerging markets have led to an expansion in these markets. According to Emerging Stock Markets

Factbook, total market capitalization of ESMs has increased from $981.61 billion in 1992 to $2,572 billion in 2001. The growth of ESMs has been attributed to financial liberalization and an increase in foreign portfolio flow from industrial countries.

With the presence of dominant economies, the existence of stock market leaders and followers has been observed in the real world. Stock market integration has been evidenced as a result of the 1987 crash; as the US market collapsed, developed and emerging markets followed. Many studies found a substantial amount of integration among markets, with the US market as the most influential, followed by the markets of Tokyo, London, and Paris, respectively.

With the emergence of globalization, the majority of the countries of the world have formed regional blocks to protect their trade. However, in recent years it can be seen that regional blocks are realizing that competitive advantage can be gained if there is a horizontal integration in financial sectors as well as other economic activities. The Gulf countries,[1] in spite of their differential financial openness, are finally realizing the value of horizontal integration. The opportunities for integrating the stock markets among the Gulf states no doubt would change the financial structure in the region. Currently the Gulf countries are making efforts to follow the parallel trading system of the stock exchanges of other regional blocks, including the European Union and that of the United States. Such integration would not only boost investment level but it would also increase the viability of the Gulf states as an investment arena for investors around the world (PricewaterhouseCoopers for the European Commission, 2003).

[1] The Gulf here is the Persian Gulf, which is located in the southwest of Asia. The Gulf countries discussed in this study are Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the UAE.

1.1 Stock Market Integration: An Overview

The term "stock market integration" means different things in different contexts. One meaning ascribed to the term implies an amalgamation of stock markets regionally or globally, where the same securities are available in multiple stock exchanges, investors can live in one country and trade with an exchange in another, and stock exchange members on a regional or global basis provide investment services by foreign firms. A second meaning of the term "stock market integration" refers to a regional or global investment environment wherein the pricing of financial assets with similar risk and return profiles are comparable in trading on stock exchanges on a transnational basis (Alford, 1993). However, this study will focus on the integration of stock markets in the Gulf region of the Middle East within the context of the latter conception of stock market integration, where the pricing of financial assets with similar risk and return profiles are comparable in trading on stock exchanges on a transnational basis.

The definition of financial market integration usually involves equality of asset prices. Shepherd (1994) stated that this equality requires asset substitutability and capital mobility. Kenen (1976) defines equity market integration operationally, which is a part of financial market integration, in term of market prices' interdependence, although it is usually defined theoretically in terms of equality of expected stock returns.

The concept of financial market integration is based on the law of one price in more than one market—if assets of the same risk in different markets have the same yield, then the financial markets are defined as integrated (Stulz, 1981). When yields are

different, arbitrage is expected to bring them back into equality. A corollary of this hypothesis is that assets are perfectly substitutable, and/or capital is perfectly mobile. Shepherd (1994) maintains that perfect assets substitution means there is uncovered interest rate parity, while perfect capital mobility implies the presence of covered interest rate parity.

However, when there are regulatory and informational barriers in the way of the exchange of financial assets, then the forward premium may be different from the expected exchange rate change, and perfect asset substitution does not always mean there is perfect capital mobility. In addition, there may not be uncovered interest rate parity because of risk premium in foreign exchange markets caused by such things as default risk. There are, therefore, significant differences between the theoretical definition of financial market integration and the way market integration operates in the real world. Practically, capital market integration means that participants in one market have to pay attention to what happens in other related markets (Roca, 2000).

There are several factors that affect the extent of integration between different equity markets such as:

Economic integration. When economies are highly integrated, there is a corresponding high integration of their equity markets (Eun and Shim, 1989). The dividend discount model shows that economic activity affects the discount rate and movement in dividends, which in turn affect stock prices. Disturbances in one economy that is integrated with another affect the stock markets of both economies, with a corresponding increase in price co-movement.

Janakiramanan and Lamba (1997) hypothesized that the stock market prices in a country that is world dominant will create ripple effects in stock markets worldwide, as a result of economic factors affecting the dominant country's economy. Prices in the US stock market therefore drive prices in other small equity markets. Price co-movements also occur because the markets of two countries can react to another market that is dominant. Espitia and Santamaria (1994) found that interaction among European stock markets was high due to each market's interaction with the US market. Price co-movement can also occur when two markets react indirectly to a third market. For example, the Singapore market could react to the US market one day, and then on the next day might react to the UK's reaction to the US market.

Multiple-listing of stocks. Co-movement is also affected by multiple listing of stocks. For example, if a share is listed in the stock markets of two countries, disturbances in one market can be transmitted to the other. For example, many Swiss stocks are multiple listed in other European markets, so they are substantially affected by other European markets.

Barriers of regulation and information. The degree and speed of capital mobility and portfolio readjustment are affected by regulatory and information barriers. When barriers are high, there is less equity market integration. One way to locate barriers is to find evidence that there are limitations on cross-border transactions.

Institutionalization and securitization. When institutions transfer funds overseas, there is increased equity market integration (Fabozzi and Modigliani, 1992). Examples of such institutions are country and global funds such as the Korea Fund and Templeton Funds. Securitization, or the use of securities in raising funds, enables companies to cross-list

shares in different stocks, thereby facilitating international diversification because investors can access shares listed in different exchanges.

Market contagion. Prices in different national stock markets can move together because of a contagion effect. An error in one market can be transmitted to another market because investors take action in their own market based on action in another market. Market contagion has been used to explain the stock market crash of 1987, when equity prices worldwide fell almost simultaneously (King and Wadhwani, 1990). Theories on contagion explain that it operates more along regional than along global lines such as the Asian financial crisis in 1997, which spread particularly within Asian countries. In general, contagion more typically spreads from large countries to smaller ones.

1.2 Statement of the Problem

While stock markets exist in several Middle Eastern countries, the developmental levels of these stock markets vary greatly from one another. Some of the markets are much more efficient than others in generating the capital required by the economy and more effective in facilitating the creation of wealth.

A part of the variance among stock markets in the Middle East lies in the differences in governmental policies applying trading on the exchanges. In Saudi Arabia, only Saudi Arabian-owned and chartered banks, as an example, are permitted to act as stockbrokers. Further, until recently Saudi Arabia allowed only residents of the Gulf Cooperation Council (GCC) countries to purchase shares in Saudi Arabian public companies or joint stock companies. In contrast, some other countries in the region have much freer stock markets.

The integration of stock markets in the Gulf region of the Middle East can lead to an enhanced environment for both investors and companies whose shares are traded on the stock exchanges in these countries. The few studies reported in the literature indicate that the level of integration of these stock markets was minimal. It is important, however, to establish the level of integration that does exist so that policymakers in the affected Gulf region countries will have the necessary and valid information upon which to develop policies to enhance stock market integration in the region.

The purpose of this study is to investigate the interrelationship among the GCC stock markets in the long run. Five markets are included: the stock markets in Bahrain, Kuwait, Oman, Qatar and Saudi Arabia. Accordingly, the study investigates research questions related to integration among these five stock markets. Moreover, the study investigates the integration of these markets with leading international stock markets. In this context, four world stock markets were selected: the stock markets in the USA, the UK, Japan, and other developed markets represented by the Morgan Stanley Capital International (MSCI) Index. Specifically, the study addresses the following research questions for the presence of integration:

1. What are the characteristics of the bilateral integration of the stock markets in Bahrain, Kuwait, Oman, Qatar, and Saudi Arabia (i.e., Bahrain and Kuwait, Bahrain and Oman, Bahrain and Qatar, Bahrain and Saudi Arabia, Kuwait and Oman, Kuwait and Qatar, Kuwait and Saudi Arabia, Oman and Qatar, Oman and Saudi Arabia, and Qatar and Saudi Arabia)? How is the price movement in one market transmitted to other markets?

2. What are the characteristics of the integration of the stock markets in Bahrain, Kuwait, Oman, Qatar and Saudi Arabia as a group?

3. What are the characteristics of the bilateral integration of each stock exchange in the GCC countries with the S&P 500, FTSE 100, Nikkei 225 and MSCI index? Do international markets influence the GCC markets?

1.3 Motivation for the Study

There are several reasons why policymakers and economists focus on financial integration. In the first place, it is axiomatic that the macroeconomic policy mix depends crucially on the openness of the financial system (Fleming, 1962; Mundell, 1963). The more mobile is capital, the more substitutable financial assets and the less flexible the exchange rate, the more difficult it is for a country to set its interest rates independently of interest rates in the rest of the world.

Financial integration induces change in basic economic structure and in the operating environment for policy, business and households. This change can also make it confusing and difficult to determine what is happening in an economy in transition, and so some prospective view on what happens to an economy when it liberalizes its capital market is necessary. For the Gulf states, integration of stock exchanges in these countries means that the business environment in these countries would have to change and improve its trade infrastructure. The construction of trade zones, tax-free policies, and special subsidies for foreign investors, as well as ownership shares in companies invested locally, would attract foreign investors. The emergence of the foreign investors in the region means that the local banking and private sector would have to meet

international standards of quality and operations in order to compete effectively (Korajczyk, 1995; Bill and Springborg, 1994).

Economic growth is fundamentally linked to financial integration. A number of recent models show how improved risk sharing leads to higher economic growth. For example, Pagano (1993) presents a study relating financial markets integration to economic growth. Capital market integration provides the opportunity for better diversification. In a segmented economy, a consumer or a firm may only select low-risk low-expected-return investments. With integrated markets, individuals shift to high-risk high-expected-return projects because they are able to diversify their overall risk (Obstfeld, 1994). There is an expanding body of empirical work on the relation between capital market restrictions and economic growth. King and Levine (1993) detail a significant cross-sectional correlation between variables that proxy for both the depth of the financial sector and its development and economic growth. Atje and Jovanovic (1993) found a significant correlation between the ratio of stock market trading volume to GDP and economic growth. Bekaert and Harvey (1995) explored an empirical relation between financial integration and economic development.

The potential promotion for monetary union is another motivation of stock market integration in the Gulf region. In 2001, the GCC states decided to establish a single currency pegged to the US dollar by January 2010. The establishment of a monetary union will create an important regional entity. The monetary union is likely to promote policy coordination, reduce transaction cost and provide a more stable environment for business and for facilitating investment decisions. The high correlation of the stock markets will automatically cause the promotion of a single currency

because the returns on the investment have to be the same for all countries. Stock market integration would make the effect of exogenous shocks similar on integrated countries, making it is easier to stimulate these economies by sharing a common monetary policy.

Stock market integration provides benefits to the investors and companies that are involved in the integration process. One of the more important advantages is the lowering of the risk premium associated with investing in stocks of those countries in comparison with investing in a non-integrated stock market. Hamara (2002) found that stock market integration leads to lower levels of price variability of equity stocks traded in the integrated markets. A lower level of price variability manifests itself as reduced volatility in the markets that are integrated. Moreover, stock market integration also leads to increases in both quality and quantity of information. These are substantial advantages to both investors and the companies whose equity shares are traded in the markets.

The integration of stock markets will benefit the investors by enabling them to invest in a variety of new firms from other countries and minimize transaction and monitoring costs. Investors from different countries of the GCC states will be able to invest in ventures outside their country, yielding them the same profit or even more. If the GCC countries strengthen their structures, investors will invest in these states rather than in less-developed states due to the risk involved. Investors will invest in firms where they get the assurance of a return on their investment. Investors will also benefit from the fact that a large number of companies will be enlisted on the integrated stock

market, they can buy and sell shares more easily, and they can benefit from the convenience of an integrated stock market.

Companies whose shares are traded on an integrated stock market gain many advantages. Companies are able to raise capital by reaching investors in other countries. They are able to raise capital in a less costly manner. Cost of capital is likely to be lower if a firm has unrestricted access to regional and international capital markets. Moreover, stock market integration enables companies to expand and benefit from economies of scale, as they are able to attain economies of large-scale production.

Stock markets' integration may involve some costs as well. The extensive dependence on other countries' markets will cause subtle and less visible problems. Conflicts with the other countries may affect the economy on the whole. Substantial political changes in one country can adversely influence the neighboring states, causing the stock market to fluctuate. If markets are found to be integrated, there is a danger that a disturbance in one market may spill over to other markets, as happened in the crash of 1987. Another disadvantage of stock markets' integration arises from losing the benefits of diversification. If markets move in parallel, the gain from diversification will disappear as these markets provide similar returns over time.

If stock markets are not found to be integrated, the finding will allow policy makers to identify and correct problems. A typical barrier to stock market integration involves restricted capital flows across national borders. Thus, a finding of non-integration among the stock markets of the GCC countries could highlight the policy changes required to improve stock market functioning in the region for the benefit of

both investors and companies whose equity stocks are traded on the regional stock exchanges.

1.4 Data

Stock markets in five countries in the Gulf area have sufficient history to permit an investigation of the degree of integration among these stock markets. These five markets are: Bahrain Stock Exchange (BSE) in Bahrain, Doha Securities Market (DSM) in Qatar, Kuwait Stock Exchange (KSE) in Kuwait, Muscat Securities Market (MSM) in Oman, and Saudi Stock Market (SSM) in Saudi Arabia. Four stock markets functioning in the Gulf region have been in continuous operation since 1995. These four stock markets are those in Bahrain, Kuwait, Oman, and Saudi Arabia. The fifth GCC stock exchange included in the study, DSM, has been in continuous operation since 1998. Stock markets in the United Arab Emirates (UAE) are relatively new. Abu Dhabi Securities Market and Dubai Financial Market were founded officially in 2000.

Data for the study pertaining to the five stock markets listed above cover a sufficient time span to provide reliable outcomes for the data analyses. The data that obtained relative to the stock exchanges in the five Gulf region countries are the closing weekly value index for each exchange. The data was obtained directly from the five stock exchanges and the Arab Monetary Fund (AMF) located in Abu Dhabi, UAE, for the inclusive period from August 14, 1998, to August 15, 2003 (a data set of 262 weeks for each of the five stock exchanges included in the investigation).

In order to measure integration with international stock markets, four world stock market indices are selected. Standard and Poor's 500 (S&P 500) Index is selected

as a measure of performance of the top 500 companies in the US market. Financial Times Stock Exchange 100 (FTSE 100) Index and Nihon Keizai Shimbun 225, or Nikkei 225 Index as it is more widely known, are selected to measure the performance of the UK and Japanese stock exchanges, respectively. Morgan Stanley Capital International (MSCI) Index in US dollars is considered as a measure of world stock markets' performance. It is a complex index that is designed to measure the performance of global developed equity markets.[2] Weekly data of developed markets was obtained from DataStream Data Base for the study period.

The primary criterion for admissibility of the data is that it is reliable. The second criterion for admissibility is that the data reflect trading for all equity shares traded on an exchange. An important requirement of the analysis is that data for comparable equity assets be available across the stock exchanges included in the investigation.

1.5 Organization of the Study

Following this introductory chapter, the dissertation has seven additional chapters. The following chapter provides a review of relevant theoretical literature, as well as a review of studies of transnational stock market integration, both global and regional. The third chapter of the study presents an overview of economic structure and economic and financial integration in GCC countries, focusing on efforts toward economic integration from the Unified Economic Agreement in 1981 to the

[2] As of April 2002 the MSCI World Index consisted of the following 23 developed market country indices: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Hong Kong, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, the UK and the US.

commitment made in 2001 to adopt a common currency by 2010. The fourth chapter introduces stock market development in GCC countries in terms of market capitalization, volume of shares traded and value of shares traded. Market regulations and trading systems are considered in this chapter as well. The fifth chapter presents the methodology used in the study. The sixth chapter presents the results of the research investigating bilateral and multilateral integration of the five stock markets included in the study. The seventh chapter introduces the results of the research investigating bilateral integration of each stock exchange in the five countries included in the investigation with world stock markets. The final chapter provides the conclusions drawn from the study findings, and presents necessary policy recommendations for financial regulators in the GCC countries.

CHAPTER II

LITERATURE REVIEW

The literature review develops a theoretical background for the study through a review of relevant theories. The literature review places the study in context by reviewing prior stock market integration studies in both global and regional contexts. Although there has been extensive research on equity market integration, there is no set agreement on this phenomenon. Research results differ according to the methodology used, the model, the data, the sample, and the time period. Some studies have concluded that world equity markets are integrated, that the US market is the most influential stock market in the world, and that the Japanese market is the second most influential. On the other hand, some studies have reported no lead or lag relationships among international markets at all.

Grubel (1968) was the first to explore the risk-return relationships of internationally diversified portfolios by employing the models of portfolio balance developed by Tobin (1958) and Markowitz (1959). He studied the effect of international diversification of asset holdings on international economic relations by using data on the share price indices of 11 industrialized countries from 1959 to 1966. Results indicated that diversification among the 11 countries has allowed investors a superior return-risk trade-off compared to a portfolio consisting of Moody's Industrial Average of Common Stock. Final conclusions were that international capital movements are directly affected not only by interest rate differentials but also by rates of growth in total

asset holdings in any two countries. Capital flows between countries when interest rate differentials are zero or negative, but usually does not flow when there is a positive interest differential.

Granger (1969) studied the feedback and functions arising in spectral analysis between certain economic models, in particular the cross-spectrum and the partial cross-spectrum. Direction of causality was studied. Conclusions were that in the two-variable case, feedback mechanisms have two causal relations, and the cross spectrum is the sum of two cross-spectra, each of which is closely connected with one of the causations.

Agmon (1972) compiled and compared monthly data on the following four stock market indices: the US (Fisher Arithmetic Index and Dow Jones), Germany (Frankfurter Allgemeine Zietung), the UK (Financial Times Ordinary Share and Economist/Extel Indicator), and Japan (Tokyo Stock Exchange Price and Dow Jones Tokyo) from January 1955 to October 1966. Agmon concluded that there was a high degree of relationship among the four markets, with very fast responses in the non-US markets to changes in the US market. He considered that the US, UK, and Germany comprise a single multinational equity market. Later, Dwyer and Hafer (1988) studied the same markets and came up with different results. Correlation analyses and unit root tests were used to evaluate daily stock market prices from July 1987 to January 1988. Between 1957 and 1987, stock market prices were evaluated on a monthly basis and broken down into two periods: 1957 to 1973, and 1973 to 1987. The conclusion reached is that there was a linkage among changes in stock market prices, but no linkage among levels. In addition, there was a low correlation among markets that were higher in the later period. And more recently, Jeon and Von Furstenberg (1990) investigated

relationships among the same four markets from January 1986 to November 1988. They used vector autoregression analysis and found that after the crash of 1987 the influence of the US decreased, with the Tokyo market becoming increasingly independent of other markets. There were more co-movements after the crash of 1987.

Stehle (1977) studied the segmentation of the US stock market and other markets, using a version of the Capital Asset Pricing Model to analyze monthly equity market data from stock price indices for Belgium, Canada, France, Germany, Italy, Japan, Netherlands, Switzerland, the UK and the US Conclusions were that there was neither segmentation nor integration of the US equity market with other stock markets.

Finnerty and Schneeweis (1979) studied how international equity and bond returns move together during a period of floating exchange rates. They used data from weekly stock market index levels, exchange rates, and corporate bond yields for the US, UK, France, Belgium, Netherlands, Italy, West Germany, Switzerland, and Japan from April 1973 to July 1977. Results revealed a low correlation between foreign and US stock and long-term bond returns.

Hillard (1979) examined daily equity market data from Frankfurt, New York, Tokyo, Zurich, Amsterdam, Paris, London, Milan, and Toronto for linkages during the period of the oil crisis from July 1973 to April 1974. Hillard used cross-spectral analysis and found high correlations among markets on the same continent, but low correlations among markets on different continents.

Errunza and Losq (1985) examined whether equity markets were integrated or segmented, using monthly return data for securities from Chile, India, Korea, Thailand, Argentina, Mexico, Greece, Zimbabwe, Brazil, and the US between 1976 and 1980.

Mild segmentation was discovered, using a restricted version of international capital asset pricing.

Aggarwal and Soenen (1989) compiled weekly data for seven Asia-Pacific fixed-income and equity markets, with the goal of determining the diversification gains to US investors. Data was compiled from seven markets from 1981 to 1985: US (S&P 500), Philippines (Manila Mining), Thailand (Bangkok Book Club), Hong Kong (Hang Seng), Singapore-Malaysia (Straits Times), and Japan (Nikkei Stock Average). Commercial bank deposit rates for 1981 to 1985, and foreign exchange rates for the same time period, were also examined. The methods used were mean-variance and correlation analysis. Results of the examination of data from these seven markets revealed low correlations among US market and Asia-Pacific market returns in both fixed-income and equity markets. Conclusions were that US investors could profit by investing in the Asia-Pacific markets. A similar result was concluded by Bailey and Stulz (1990), who found that there is a low correlation between the US and Pacific Basin markets, resulting in significant return on investment for US investors working in these markets. They reached that conclusion by using mean-variance and correlation analysis of returns to analyze daily, weekly, and monthly stock market data for the US (S&P 500) and the same Pacific Basin markets. Estimates were made of the return of investment to be expected from investing in these markets from January 1977 to December 1985.

Eun and Shim (1989) used vector autoregression analyses to study the movement of international stock markets. The study used the daily Morgan Stanley Capital International stock market indices for Canada, France, Australia, Germany,

Japan, the UK, Hong Kong, Switzerland, and the US from December 1979 to December 1985. Conclusions were that there is significant interdependence among these nine markets, with the US market being the most influential, followed by Switzerland and the UK. Australia, Canada, Hong Kong and the UK were discovered to have significant interdependence, which was attributed to the fact that all were British Commonwealth members. There was no lag in responses between Canada and the UK, while responses among France, Germany, and Switzerland occurred within one day. There was a two-day lag between Australia and Japan.

Becker, et al. (1990) used correlations and regression analyses with ordinary least squares (OLS) to determine the relationships between the opening price of Japan's stock market on one day and the closing price for the US equity market on the previous day. It investigated also the opening price of the US equity market on one day and the closing price of Japan's market on the previous day. Daily opening and closing data for the Nikkei Index, S&P 500, and the yen/dollar exchange rate were used from October 5, 1985, to December 1988. Conclusions reached were that the opening price of Japan's market is highly correlated with the US previous day closing price, but the opening price of the US market is not influenced by the previous day's closing price in Japan. Campbell and Hamao (1992) measured integration between the US and Japanese stock markets. They examined the value-weighted index of the New York Stock Exchange and the Tokyo Stock Exchange to determine the integration between US and Japanese equity markets. Single latent variable capital asset pricing models were used to study the one-month Treasury bill yield and the 20-year government bond yield for both countries. Data were studied from January 1971 to March 1993. Conclusions were that

there was considerable integration of the US and Japanese markets in the 1980s. US and Japanese excess returns (return on stock less risk-free interest rate) moved together, with similar variables explaining excess returns in the US and Japan.

Fischer and Palasvirta (1990) investigated changes among 23 national stock market indices, including the US and the two emerging markets of Malaysia and Mexico, using cross-spectral analysis in their study. They found that levels of interdependence were increasing among these markets, with the US having the most influence.

King and Wadhwani (1990) used high-frequency data from the stock markets of New York, London, and Tokyo from July 1987 to February 1988 to study linkages among these markets during the 1987 crash. The contagion model of stock markets was used for the analysis, which showed evidence of contagion among the markets studied. The larger the volatility, the larger the contagion effect observed, in particular immediately after the crash.

Ng et al. (1991) examined the volatility spill-over among the following five stock markets: US (S&P 500), Tokyo (Tokyo Stock Price Index), Korea (Composite Stock Price Index), Taiwan (Stock Exchange Weighted Stock Price Index), and Thailand (SET Index) from January 1985 to December 1987. The autoregressive conditional heteroskedasticity (ARCH) model was used, and conclusions were that there is no volatility spill-over to Taiwan and Korea from the US. In addition, spill-over from the US to Japan and Thailand occurs only when cross-country investments occur in Japan and Thailand. The final conclusion was that cross-country investment transmits volatility among different national markets.

Solnik (1991) examined the benefits of diversification within the following markets of the Asian Pacific: Australia, Hong Kong, Korea, Thailand, Japan, Singapore, Malaysia, Taiwan, and Japan, and other developed markets in France, Germany, the US, and the UK from December 1977 to December 1988. Mean-variance and correlation analyses of local and US dollar returns were used, and it was found that there is higher correlation between US and European returns than there is with Pacific Basin returns. The correlation of the US with the rest of the world is relatively low (0.43). There is low correlation between the three markets of Korea, Taiwan and Thailand and other markets.

Arshanapalli and Doukas (1993) used unit root and cointegration analyses to examine relationships and interactions among the stock markets of New York (Dow Jones Industrial Average), Japan (Nikkei 225), Paris (CAC General Price), Frankfurt (FAZ General Price), and London (FTSE 100) from January 1980 to May 1990. The authors concluded that there has been an increasing interdependence among these stock markets after the crash of 1987, except for the Nikkei index. The French, UK and German markets were significantly affected by the US market. The Japanese market performance had no links at all with any market in the US, France, Germany and the UK.

Koch and Koch (1993) examined the changes in relationships among national market indices since 1972, using Morgan Stanley Capital International stock market indices for Hong Kong, West Germany, the UK, the US, Japan, Australia, Singapore, and Switzerland for 1972, 1980, and 1987. A structural, block-recursive, dynamic simultaneous equations model was used to study contemporaneous and lead-lag

relationships. Conclusions were that there are increasing interrelationships in these markets, with Japan's influence increasing while that of the US declines. Lag time was usually 48 hours. Additional conclusions were that intermarket relationships were informationally efficient.

Espitia and Santamaria (1994) studied the interdependence among markets in New York, London, Paris, Milan, Madrid, and Tokyo, using daily data from October 1987 to September 1992. The authors used vector autoregression analysis to determine interrelationships among markets in these six countries and how one market affects others. A high level of interdependence was discovered among these six markets, with New York being the most influential among the six. The second most influential was Tokyo, followed by London and Paris. There was no influence noted by other European markets, and European markets were not noticeably interdependent with each other.

King, et al. (1994) analyzed the time variation in the covariances and the integration between the stock markets of the US, Australia, Canada, Germany, Netherlands, Spain, Sweden, Austria, Belgium, France, Italy, Norway, Spain, Switzerland, the UK, and Denmark. Monthly Morgan Stanley Capital International stock market indices for these countries were used in a multivariate factor model-dynamic version of the Arbitrage Pricing Theory, together with vector autoregression and autoregressive conditional heteroskedasticity. Conclusions were that these stock markets are not integrated.

To et al. (1994) investigated interdependence among the emerging and major equity markets of Argentina, Brazil, Chile, Colombia, Greece, India, Jordan, Korea, Malaysia, Mexico, Nigeria, Pakistan, the Philippines, Taiwan, Venezuela, Zimbabwe,

Japan, the UK and the US from 1976 to 1992. Unit root, cointegration and vector autoregression analyses revealed increasing interaction among these markets from 1985 to 1992, with the US being the most influential market. The US influences Brazil, Greece, India, Mexico, Malaysia, the Philippines and Thailand; the UK influences African emerging markets; the US, UK and Japan influence Colombia, Greece, Mexico, the Philippines, Taiwan and Thailand; and Japan affects Asian emerging markets.

Akdogan (1995) studied equity market integration in Europe and market relationships between the US and Europe. For the first study, Akdogan used data published by the IMF to determine relationships among the UK, Germany, France, the Netherlands, Belgium, Denmark, Italy and Spain between 1978 and 1992. The second study examined relationships among Belgium, Denmark, France, Germany, Italy, Netherlands, Spain, the UK, Australia, Norway, Sweden, and Switzerland from January 1972 to February 1992. The third study used the same data as the second study to examine markets in the European Union, the European Free Trade Association, and the Americas. The methods used included single index, bifactor, market size-adjusted, regional and international formulations of the Capital Asset Pricing Model. Akdogan concluded that these markets became integrated in the 1980s, but were segmented in the 1970s.

Bekaert and Harvey (1995) studied capital market integration caused by a conditional regime-switching model, with the goal of predicting returns in countries that are separated from world capital markets in one part of the sample, and later become integrated in the sample. Results indicate time-varying integration for a number of countries. Conclusions were that several emerging markets show time-varying

integration. More integration was observed in some markets than knowledge of investment restrictions in those markets might lead one to expect. Other markets appear segmented even though foreigners have relatively free access to their capital markets. Conclusions were that world capital markets are not becoming more integrated in those countries characterized by a regime-switching model.

Smith et al. (1995) used monthly Morgan Stanley International Capital Perspective stock market indices to study equity integration among the following eight stock markets: the US, Canada, the UK, Japan, Germany, France, Switzerland, and Australia. In addition, the three-month Treasury bill rate for the US was compared with the Canadian finance paper rate. The Gensake rate for Japan, the French interbank loan rate, the interbank loan rate for Switzerland and the interbank sterling rate for Australia were also studied. These investigations were conducted from August 1980 to September 1991 using the Capital Asset Pricing Model. Conclusions were that there is no full integration or equality of risk/return ratios between any of these equity markets.

Kwan et al. (1995) used monthly stock market series for Japan, Taiwan, West Germany, Singapore, Australia, South Korea, Hong Kong, the UK and the US to study the long-run and short-run linkages among equity markets in these countries. Conclusions drawn from the Granger-causality and cointegration analyses were that there is no cointegration among these markets, although there is bidirectional causality between Japan and South Korea, Singapore and Australia, Singapore and the UK, Taiwan and Singapore, Singapore and Hong Kong, Taiwan and Japan, and Taiwan and South Korea. The US market leads Australia, Japan, Hong Kong and the UK, with no market leading the US.

Some research has pointed to close regional, economic and geographical relationships as causing linkages between some equity market groups. For example, research indicates that Japanese and Asian emerging markets are linked, and the UK and African markets are linked.

Jorion and Schwartz (1986) used monthly return data from January 1963 to December 1982 to study integration between Canadian and US stock markets. The Capital Asset Pricing Model, plus the maximum-likelihood estimation technique, were used, and conclusions were that legal barriers prevent integration of the Canadian and US markets.

With respect to the regional integration of stock markets in Europe, Pagano and Roell (1993) found a high level of correlation in the pricing of stocks with similar risk and return profiles on the London and Paris stock exchanges. The study involved the pricing of 16 different common equity securities across 380 different trading opportunities.

Moon (2001) applied cointegration analysis and variance decomposition analyses to investigate the integration of stock markets in East Asia. He also compared the integration of East Asian stock markets with the integration of European stock markets. Moon found that the integration of the East Asian stock markets strengthened in the early- to mid-1990s. The study found that the linkages among the East Asian markets were stronger than the linkages among European stock markets.

Neaime (2002) applied unit root tests for stationarity to assess the integration of seven stock markets in North Africa and the Middle East. The stock markets included in the analysis were Bahrain, Egypt, Jordan, Kuwait, Morocco, Saudi Arabia, and Turkey.

For the unit root analysis, he applied both the Phillips-Perron (PP) and Augmented Dickey-Fuller (ADF) tests. Following the determination of stationarity characteristics of the stock markets, Neaime applied the Johansen (1988) cointegration test. He segregated the stock markets of the Gulf Cooperation Council countries in the study (Bahrain, Kuwait, and Saudi Arabia) from the remaining four North African and Middle East countries in the study to test for stock market integration among the countries of the two groups separately. He found that the stock markets of the four non-Gulf Cooperation Council countries (Egypt, Jordan, Morocco, and Turkey) were integrated with one another, while the stocks markets of the three Gulf Cooperation Council countries included in the study (Bahrain, Kuwait, and Saudi Arabia) were characterised by only minimum integration.

Research on equity market linkages has shown mixed results. Most conclusions have been based on asset pricing models, while others have used correlations and econometric techniques that are not reliable. In addition, the daily or monthly equity market data used in some studies has been shown to be unreliable because it is excessively short-term. In fact, stock markets act in predictable ways depending on the day and month, and reliable information is obtained only by analyzing information on a yearly basis (Bailey and Stulz, 1990). Research results on equity market integration are mixed because of problems with methodology and data. Since the crash of the stock market in the United States in 1987, the conclusion of several studies is that the correlation of co-movements in prices and volume among international stock exchanges is higher than was the case before the 1987 crash (Hamao, Masulis, and Ng, 1990; Lee and Kim, 1993; and Masih and Masih, 1997). Many of the studies also identified other

factors involved in the higher correlations in movements in prices and trading volume across international markets. Hamao et al. (1990), as an example, cited increased financial and economic integration among Western European countries as a major contributing factor to increased levels of co-movement in that region. Chelley-Steeley, et al. (1998) cited exchange controls in the European Community as a major factor explaining the increased levels of co-movement among Western European stock exchanges.

CHAPTER III

ECONOMIC AND FINANCIAL INTEGRATION IN THE GCC COUNTRIES

Since the mid-1950s, the terms "economic integration" and "regionalism" have become main economic concepts. The processes the terms refer to eliminate restrictions on international trade and mobility of labor and capital. The objective has been to enhance trade among specific nations without restrictions or limitations for the benefit of each nation based primarily on the theory of comparative advantage. Since that time, a number of unions have been created, such as economic unions, common markets, customs unions, and political unions. The organizations involve countries within a particular region for the purpose of benefiting each other about the same way as they would if they were all states in one country. At the same time, each member nation retains its identity, government, and culture with only the economic system being affected.

The integration of a number of European countries, known as the European Economic Union (EEU), serves as an excellent example. Since its creation in 1950, the integration has delivered half a century of stability, peace, and economic prosperity for member nations. It has helped raise standards of living, built an internal market, launched the Euro as a unified currency and strengthened the EEU's voice in the world.

Such integration is not limited to developed countries. Developing countries also seek integration with each other. A major block among developing countries is the

Cooperation Council for the Arab States of the Gulf, more commonly known as the Gulf Cooperation Council (GCC), which was founded on May 25, 1981. The member states of the Cooperation Council are the Kingdom of Bahrain (formerly known as the State of Bahrain), the State of Kuwait, the Sultanate of Oman, the State of Qatar, the Kingdom of Saudi Arabia, and the State of United Arab Emirates (UAE). The Council aims to deepen areas of cooperation among member countries in various fields.

The GCC Charter emphasized the deepening and strengthening of relations, links and areas of cooperation among citizens. The charter sets forth the special relations, common qualities, and similar systems founded in the creed of Islam, faith in a common destiny and sharing one goal, and the cooperation among states to serve the objectives of Arab nations in the Middle East. The Charter states that the basic objectives are to effect coordination, integration and inter-connection among member states in all fields. It strengthens ties among their peoples, formulating similar regulations in various fields such as economy, finance, trade, customs, tourism, legislation, and administration as well as fostering scientific and technical progress in industry, mining, agriculture, water and animal resources, establishing scientific research centers, setting up join ventures, and encouraging cooperation from and with the private sector (GCC, Concept and Foundations, 2003).

The council plays its role through three main entities. The GCC Supreme Council is the highest authority of the GCC. It consists of the Majesties and Highnesses, the leaders of member countries. Its presidency rotates according to the Arabic alphabetical order of the names of the member states. It convenes one regular session every year. However, extraordinary sessions may be convened at the request of any

member state seconded by another. In 1998, the GCC Supreme Council decided to hold consultative meeting in between two summits every year. Meetings of the Supreme Council are considered valid if attended by two thirds of the member states, at which time each has one vote. Resolutions on substantive matters are issued by unanimous approval of the members present, while a majority is enough to approve matters of a procedural nature (GCC, The Organizational Structure, 2003).

The second entity is the Ministerial Council. It is made up of the Ministers of Foreign Affairs of the various states, or other ministers acting on their behalf. The Presidency of the Ministerial Council presides over the session of the Supreme Court, or, when necessary, with the member state that is next to preside over the Supreme Council. The Ministerial Council convenes every three months, and may hold extraordinary meetings upon the request of one member state seconded by another. The meeting is considered valid if attended by two thirds of the member states. The Ministerial Council is authorized to propose policies, lay out recommendations, and encourage and coordinate the already existing activities in oil fields. Resolutions adopted by other ministerial committees are referred to the Ministerial Council, which in turn would refer the relevant matters, along with appropriate recommendations, to the Supreme Council for approval. The Ministerial Council is also charged with arranging the Supreme Council meetings and preparing agenda (GCC, The Organizational Structure, 2003).

The third entity is the Secretariat-General, which is responsible, among other functions, for preparing studies relating to cooperation, coordination, and integrated plans and programs for joint work. It also prepares for the meetings, and prepares the

agendas and draft resolutions for the Supreme Council and the Ministerial Council. The headquarters of the Secretariat General is located in Riyadh, Saudi Arabia. It is divided into six directorates or sectors of activity in the areas of political affairs, economic affairs, environment and human resources, legal affairs, financial and administrative affairs, and information.

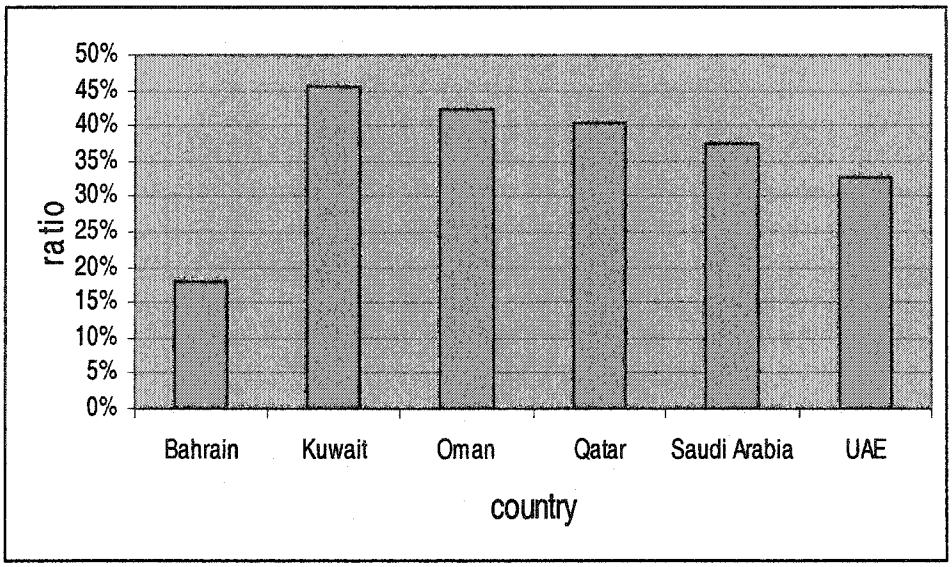
3.1 Economic Overview

3.1.1 Economic Structure

The economies of the GCC nations are largely dominated by the oil sector. The GCC countries produce on average 13.6 million barrels a day, which represents about 20 percent of the world oil supply, and have about 44 percent of the world's proven crude oil reserves. With the exception of Bahrain, the oil sector accounts on the average for about 40 percent of GDP, and its revenue represents approximately 70 percent of total government revenues in the last decade. Such exports comprise on the average 65 percent of total exports. Four of the GCC countries (Kuwait, Qatar, Saudi Arabia and UAE) are members of the Organization of the Petroleum Exporting Countries (OPEC), and they play an important role in stabilizing oil prices. Oil dependency is illustrated in Figures 3.1, 3.2, and 3.3.

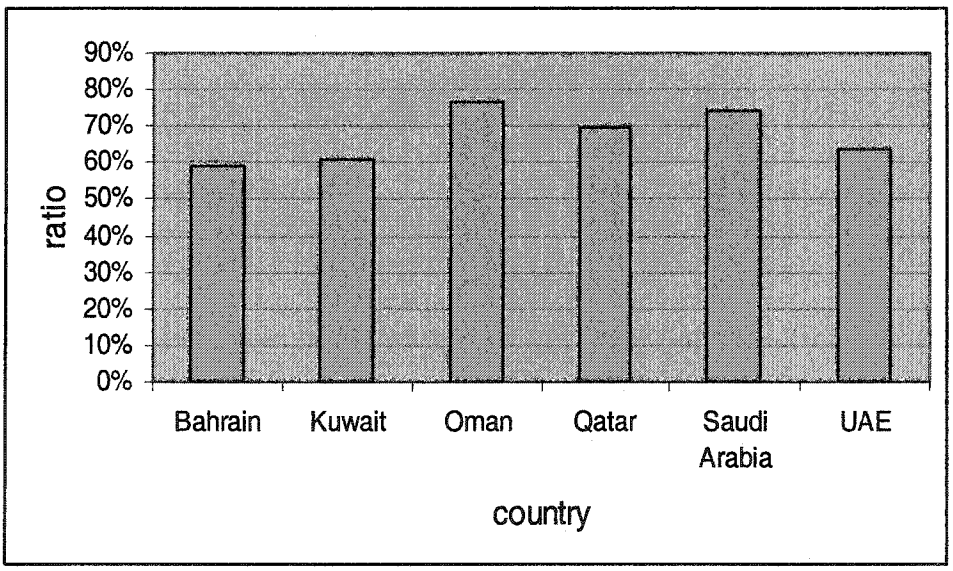
The economies of the GCC countries are considered to be among the most open economies in the Middle East due to heavy reliance on exported oil and imported consumer and capital goods. Traditionally, the degree of openness is measured by the value of traded goods and services (exports plus imports) as a percentage of GDP. As shown in Figure 3.4, the average ratio for the GCC countries is relatively high and is

higher than the world average and for other countries in the region. High ratios reflect high dependency on oil exports and capital goods imports.



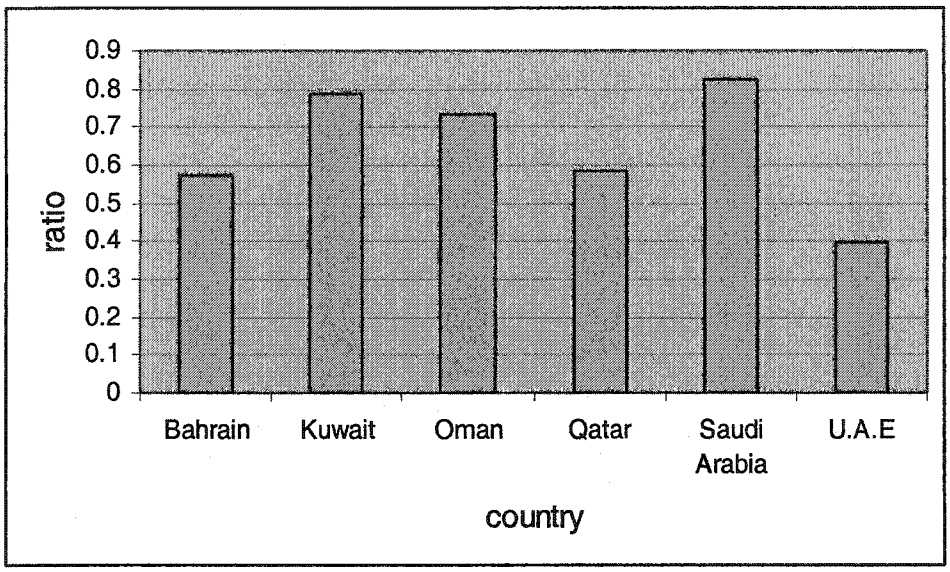
Source: IMF, World Economic Outlook 2003

Figure 3.1: Average of Oil Sector GDP-Total GDP Ratio (1991-2002)



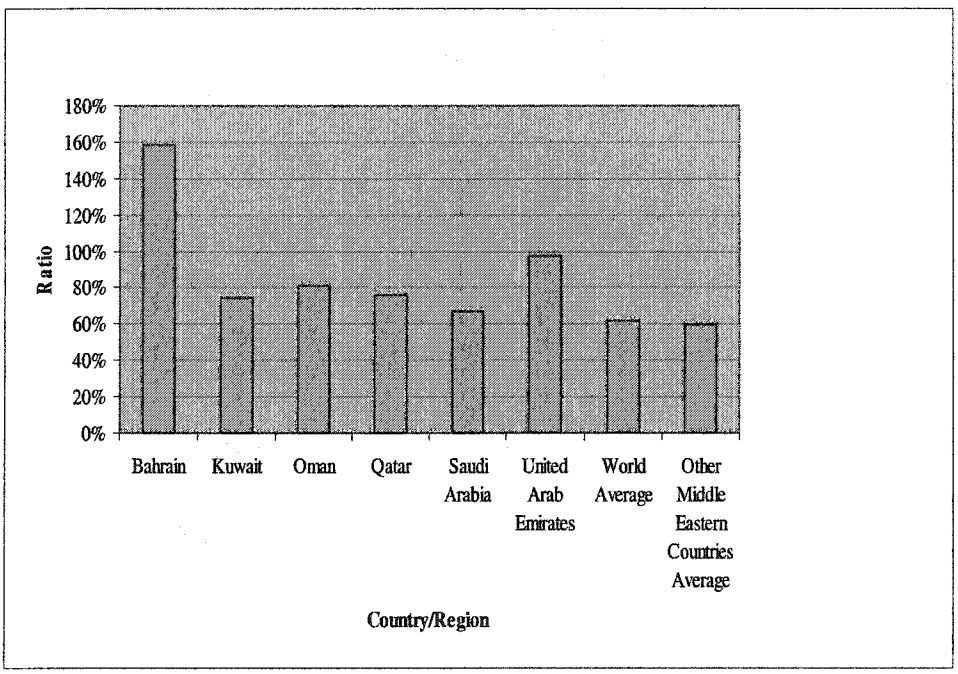
Source: IMF, World Economic Outlook 2003

Figure 3.2: Average of Oil Revenue-Total Revenue Ratio (1990-2002)



Source: IMF, World Economic Outlook 2003

Figure 3.3: Average of Oil Export / Total Exports Ratio (1990-2002)



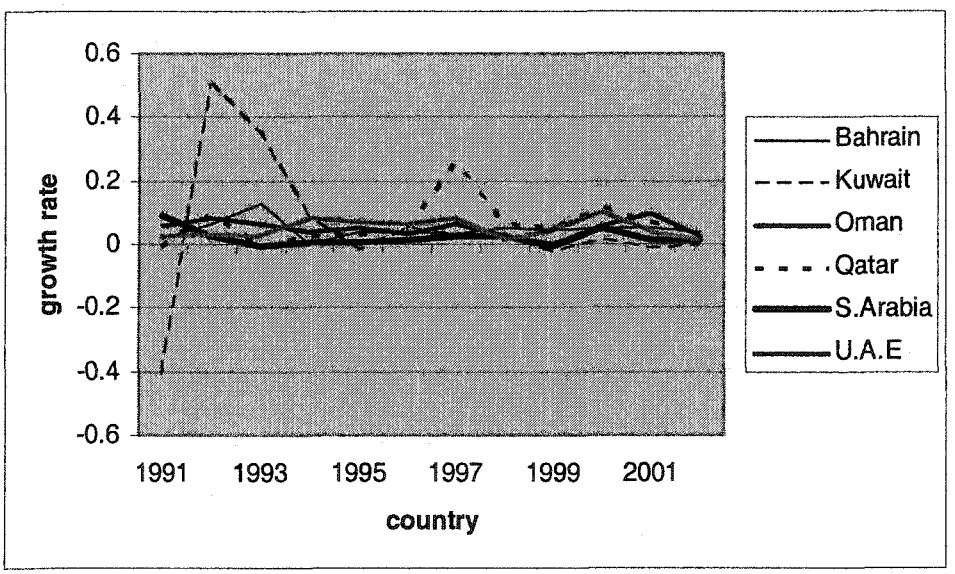
Source: World Bank, World Development Indicators

Figure 3.4: Average of Trade / GDP Ratio (1980-2000)

3.1.2 Economic Performance

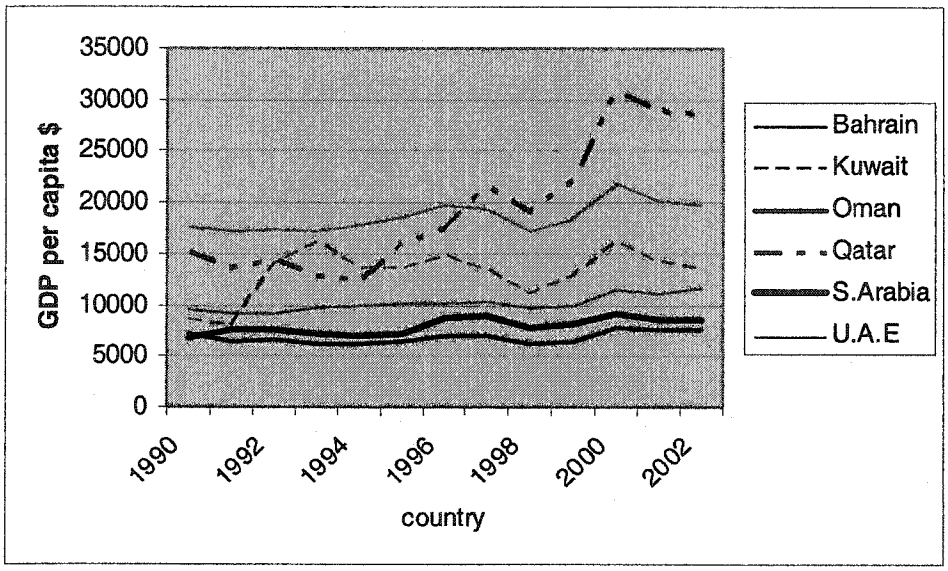
The economic outlook of the GCC countries is shaped by factors influencing demand for oil. The economies of the GCC nations continue to be largely dominated by the oil sector and thus remain at the mercy of fluctuations in the price of as well as the demand for petroleum in the international markets. Fueled by a dramatic increase in the price of oil during the 1970s, per capita GDP in the region grew from a simple average of $2,366 in 1970 to $12,495 in 1995.

The GCC countries have experienced frequent large swings in overall GDP growth as a result of wide fluctuations in their oil production and volatile international oil prices. Annual real GDP growth averaged about 4 percent in the period from 1991 to 2002 and GDP per capita has grown gradually in all countries since 1991, as shown in Figures 3.5 and 3.6.



Source: IMF, World Economic Outlook 2003

Figure 3.5: Real GDP Growth Rate (1991-2002)



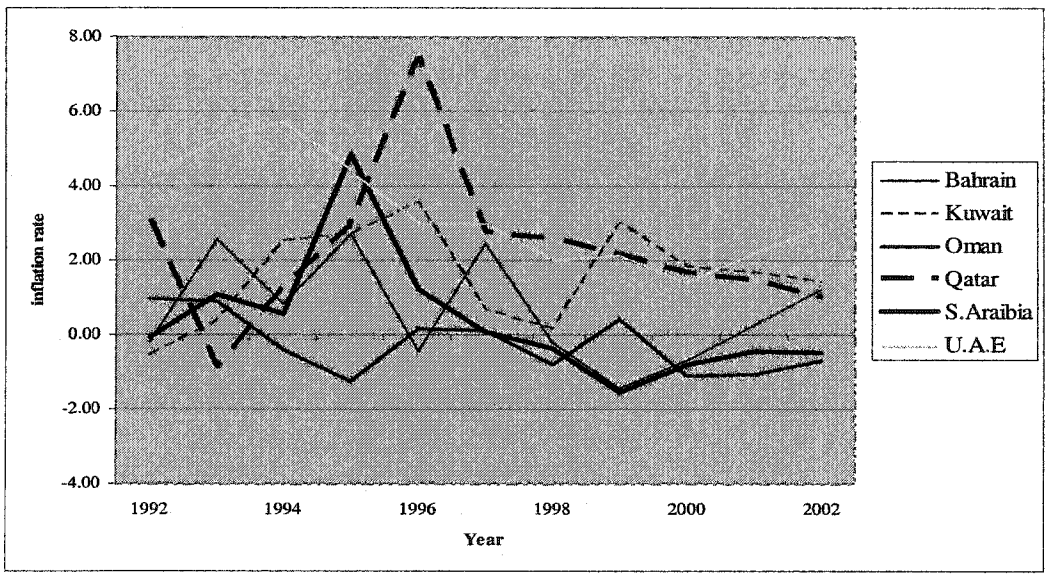
Source: IMF, World Economic Outlook 2003

Figure 3.6: Nominal Per Capita GDP from 1991 to 2002

In Bahrain, economic growth has become quite independent from oil shocks as reflected in 1998, when oil prices collapsed. That independence has contributed to a gradual improvement in the country's per capita GDP. Kuwait's growth rate has declined from 10 percent on average in the first half of 1990s to about 1 percent from 1996 to 2002, reflecting a drop in oil output. GDP per capita has decreased in the second half as well. Qatar turned to its huge untapped reserves of natural gas to improve its economic activity. As a result, real GDP growth climbed to about 7 percent on average between 1997 and 2002 compared to less than 3 percent during the period from 1990 to 1996, leading to a sharp increase in per capita GDP, which reached $30,850 in 2000, becoming among the highest income countries in the world. Saudi Arabia recorded the lowest economic growth in the GCC area during the last decade, with an average of 2 percent, leading to stagnant per capita GDP. The economies of Oman and

the UAE grew similarly, with approximate average of 5 percent; per capita income increased slightly in last decade.

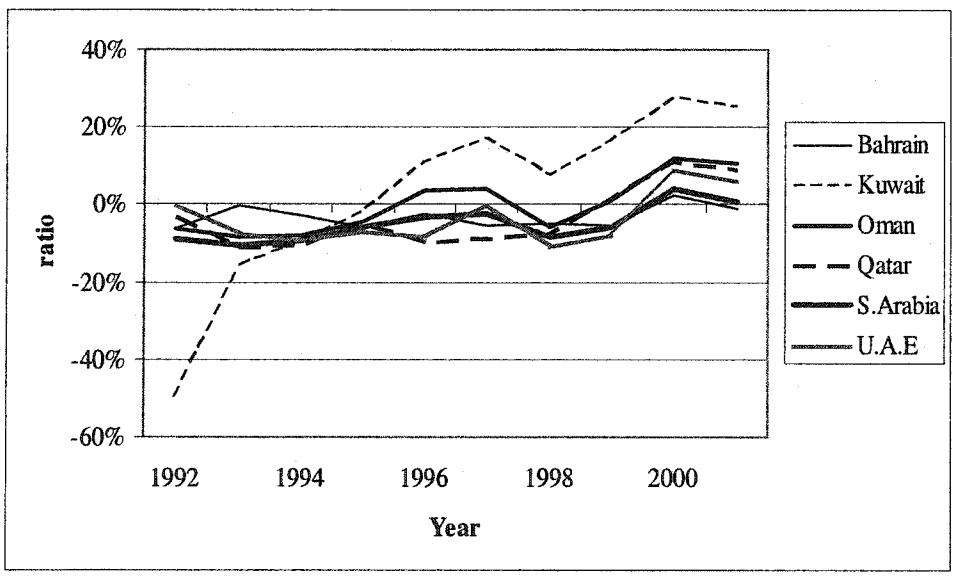
Inflation rates have been low in the GCC area by both regional and international standards, an average of 1.6 percent in the last decade. Saudi Arabia and Bahrain had the lowest inflation rates in the GCC area, with less than 1 percent on average during the past decade. Oman's inflation rate is relatively low, less than 2 percent on average from 1991 to 2002. Kuwait and Qatar recorded a moderate inflation rate for the same period, with the average rates of 2.33 percent and 2.06 percent, respectively. The UAE recorded the highest inflation rate in the region, averaging 3.5 percent over the same period. Figure 3.7 shows the convergence of inflation rates in the member countries in the last few years.



Source: IMF, International Financial Statistics, 2003

Figure 3.7: Convergence of Inflation Rates

The regional crisis of 1990-91 increased a need for expenditures that placed pressure on the budgets of the GCC countries. The countries directly involved suffered the worst. The budget deficit in Kuwait, for example, exceeded 100 percent of GDP in 1991. Later, total expenditure was reduced significantly, resulting in a shift from deficit to surplus in late 1990s. Saudi Arabia's budget deficit increased to 17 percent of GDP in 1991. As a result, the country implemented a fiscal policy involving primarily cuts in expenditure (Sassanpour, 1996). The result was a decline in the budget deficit ratio from 11 percent in 1992 to an average of 3 percent in later years. Other GCC countries generally recorded small consolidated fiscal deficits during the period from 1991 to 1999. These deficits averaged about 2 percent of GDP. Rising global oil prices in 2000 contributed to a sharp improvement in the fiscal accounts that reached a surplus of 6 percent of GDP on average from 2000 to 2002. Figure 3.8 illustrates the improvement of fiscal accounts in the last decade.



Source: IMF, International Financial Statistics, 2003

Figure 3.8: Budget Surplus/Deficit-GDP Ratio (1992-2002)

The GCC countries' current accounts remained sensitive to oil price movements because oil still accounts on average for about 65 percent of export receipts. Excluding Kuwait and the UAE, the average external current account balance of the GCC countries moved from an average deficit of close to 5 percent of GDP a year in the first half of the 1990s to a surge in the deficit of around 9 percent in 1998 due to the decline in oil prices. The balance turned into a surplus, reaching 4 percent of GDP in 2000-2002, reflecting the recovery in oil prices. Kuwait and the UAE experienced a current account surplus in the last decade, even in 1998 when global oil prices collapsed. That can be attributed to large government investment income receipts in Kuwait and to a more diversified economy in the UAE compared to other GCC countries.

Traditional measures of financial deepening indicate the region is well monetized. In most GCC countries, the ratio of money supply (M3) to GDP ranges between 50 percent and 90 percent, and has been relatively stable over the years, reflecting the ability of the banking sector to attract more deposits.

3.2 Efforts Toward Economic Integration

Economic cooperation is considered to be the cornerstone of the GCC. This goal is broad, moving from cooperation and coordination to advanced stages of economic integration. Economic integration has been a focus of the council since its establishment, and has been promoted through different stages in the last two decades. This section presents major stages of economic integration from the Unified Economic Agreement in 1981 to the commitment made in 2001 to adopt a common currency by 2010.

3.2.1 The Unified Economic Agreement

The first effort toward economic integration in the GCC countries was through the Unified Economic Agreement (UEA) in 1981. The agreement determined the complete framework for economic and financial cooperation among the GCC states. The UEA stresses the establishment of GCC joint projects in industry, agriculture, and services using public, private, or mixed capital in order to achieve economic integration.

The UEA is divided into seven chapters with a total of 28 articles. The first chapter concerns trade. It states that all national products, including agricultural, animal, industrial, and natural resources products are tariff-exempt. It calls for more coordination regarding trade policies. The second chapter underlines free movement of capital and labor between member states, and freedom of ownership and participation in economic activities for GCC citizens. Coordination of economic development plans among member countries was the focus of chapter three. Since all member countries depend mainly on oil, harmonization of their oil policies is needed to achieve an advanced stage of economic integration. Chapter four states that member countries should cooperate with each other for common technical cooperation through supporting scientific research and importing technology. Chapter five calls for free transportation of passengers and cargo of member countries with a need to establish transportation infrastructure. Chapter six focuses on financial and monetary cooperation. It calls for coordination regarding investment laws, convergence in fiscal and monetary policies, and more harmonization between monetary authorities and banking sectors in member countries. The last chapter presents closing provisions (GCC, The Unified Economic Agreement, 2003).

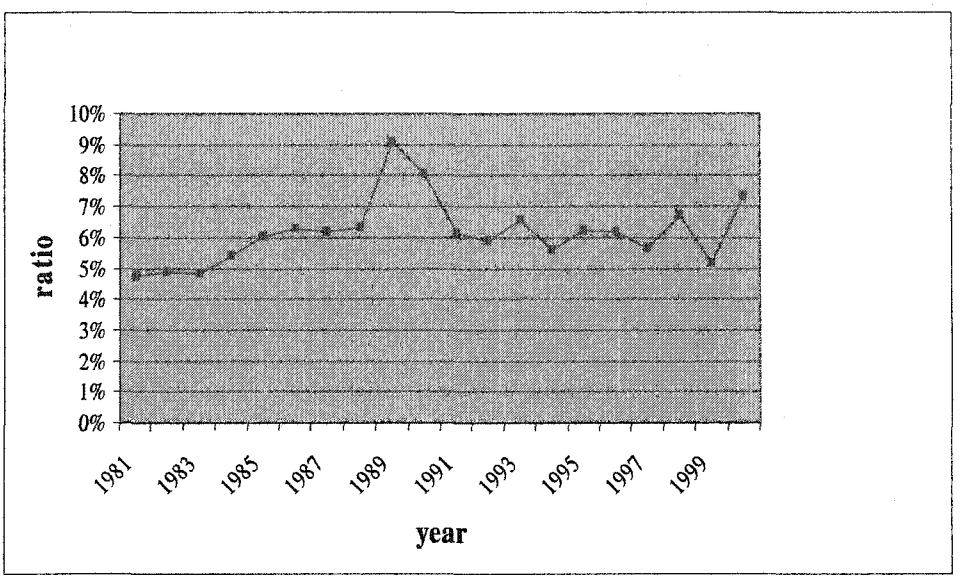
The major achievement of the UEA is trade liberalization among member countries. According to the agreement, all products that are of national origin will be traded as national products. In order for a product to qualify as a "product of national origin," it must be produced locally with value added of 40 percent or more and at least 51 percent of the enterprise owned by GCC citizens. In practice, the definition of products of national origin varies from country to country due to deviations in standards and measurements among GCC countries.

Although free trade was introduced in 1981, trade barriers were not eliminated completely. There has not been much growth in intra-regional trade among GCC members because of several factors. The main reason is that there is a similarity in the economic structures of GCC countries. With the exception of Bahrain, GCC countries have oil-based economies. Because of this similarity, there is little opportunity for member countries to complement one another. Besides that, non-tariff barriers such as differential product specifications, overburdening bureaucracy, and obstacles over borders caused by defense and security issues exist (Dar and Presley, 2001).

Even though the Unified Economic Agreement is the GCC's major success on the economic side, most of its clauses remain simply ink on paper. While some articles have not been applied yet, other have been delayed. For instance, restrictions on capital and labor still exist in most member states. The implementation of a custom union is in fact 15 years late. Moreover, the UEA existed for some 20 years without change or update in spite of dramatic changes in economic conditions for member countries and the world economy as a whole in the last two decades. In 2001, the UEA was supplanted by a new agreement called the Economic Agreement.

3.2.2 The Gulf Customs Union

According to the Economic Agreement signed in December 2001, the Gulf Customs Union (GCU) came into effect in January 2003, moving member states to a single customs area in which trade barriers, taxes, and related procedures are eliminated among them. The objective of this union was to create competition, efficiency, income, productivity, growth, and more jobs, and to achieve an advanced state of economic integration. The benefits of a customs union would be achieved upon the untangling and removal of economic distortions caused by different tariff levels. With large variations in external tariffs and trade policies among GCC counties, the economic integration process has progressed slowly over the last two decades.[3]



Source: Arab Monetary Fund

Figure 3.9: Ratio of Intra-trade to Total Trade in GCC Countries

[3] Tariff on some imports was low (within 5 percent) in UAE, while in Saudi Arabia it reached 21 percent.

However, the GCC countries' trade with each other far less than do countries in any other regional bloc. The share of trade among GCC countries has increased from 5 percent in 1981 to only 7 percent in 2000 as shown in Figure 3.9. It is low compared to other regional trading groups, such as the EU, which exceeded 55 percent in 2002. With the exception of Saudi Arabia and Bahrain, other GCC countries have failed to show any significant sign of intra-trade integration.

The Gulf Customs Union (GCU) was designed to increase trade among GCC member countries, create links to the international marketplace, and push local producers to match the rest of the world in pricing. The GCU is based on the following principles:

- A Common External Tariff (CET) of 5 percent that is applicable to all imports into the six member states that come from the rest of the world
- Common customs laws, regulations and rules in all member states
- Unification of customs procedures and financial and administrative instructions
- With the exception of the prohibited and restricted goods, and taking into consideration the implementation of the veterinary and agricultural quarantine regulations, all goods move freely among the GCC countries without customs or non-customs restrictions (GCC, The GCC Customs Union, 2003).

The GCU is expected to play an important role in liberalizing trade in the region. Economists state that increasing Arab trade (only 2 percent of the world's trade) would enable Arab countries to deal on a more equal footing with the world's giant economic blocs, such as the European Union, the GCC's biggest trading partner, and would benefit from joining the WTO. Membership in the WTO and adherence to its

rules and regulations can be advantageous, particularly for the Gulf countries as they will be entitled to most-favored-nation treatment and national status treatment, effectively securing market access.[4] Membership and compliance with WTO obligations encourage greater private sector participation, increasing competition, efficiency, and product diversification. Admittedly, membership encourages diversification in the global community (Al-Khatib and Hashmi, 2003).

3.2.3 Monetary Union

A factor indicative of an advanced stage of economic integration is monetary union. The theory of an optimum currency area (OCA), introduced mainly by Mundell in 1961, is a major framework available to economists for assessing the feasibility of monetary union. An OCA can be defined as a region that exhibits key elements necessary for, and which would profit by, having its own currency and its own monetary policy. The theory predicts that it is beneficial for countries to join monetary union if they are highly economically integrated (Mundell, 1961).

The OCA theory predicts that a high degree of economic integration between a country and a fixed exchange rate area magnify the monetary efficiency gain the country reaps when it fixes its exchange rate against the area's currencies. Monetary efficiency is promoted by avoiding uncertainty and reducing transaction costs. On the other hand, the theory indicates that there are costs incurred by a country that joins a currency area. These costs can be considered as a country loses its ability to use monetary policy to stabilize its economy. A high degree of economic integration

[4] Currently, Bahrain, Kuwait, Qatar, Oman and UAE are members of the WTO, while Saudi Arabia applied for WTO membership in 1993 and negotiations continue.

between a country and the fixed exchange rate area that it joins reduces the resulting economic stability loss due to output market disturbances (Krugman and Obstfeld, 2000).

The GCC states realize that a common currency is beneficial to their economies and will promote an advanced stage of economic integration. As stated above, joining a currency area can be beneficial for a country in terms of reducing transaction costs and avoiding uncertainty associated with exchange rate fluctuations. Therefore, a joint currency has been a high priority for member countries since the founding of the GCC. The UEA outlines guiding principles toward monetary union. According to Article 22 of the agreement:

> Member States shall seek to coordinate their financial, monetary and banking policies and enhance cooperation between monetary agencies and central banks, including the attempt to establish a joint currency in order to further their desired economic integration (GCC, The Unified Economic Agreement, 2003).

A large step toward an advanced stage of economic integration was taken in December 2001. The member states agreed to adopt a common currency by 2010. The member countries set a preliminary agenda for monetary union. According to the agenda, a temporal program of monetary union will consist of three stages. The first stage began with the announcement of a single currency in the end of 2001 and spanned until the end of 2002. In this stage, all GCC states were required to peg their currency officially to the US dollar no later than January 2003. This stage did not require much effort because all the countries already correlate their currencies to the US dollar except Kuwait, which pegged the Kuwaiti diner to the US dollar in the end of 2002. The second stage will last from 2003 until 2008. There is the implication that a set of criteria

will be created in 2003 and will be met by the end of 2008. The final stage will take place from 2008 through 2010, and will include issuing the common currency and establishing related institutions such as a gulf central bank.

In order to benefit from the European experience, GCC monetary authorities asked the European Central Bank (ECB) to conduct a study on the modalities to be followed while integrating the economies of member countries and implementing a common currency. Much can be learned from the experience European Union. Specific criteria were set up in Maastricht in 1991 for all EU countries willing to join the single currency. The following is a brief summary of the five criteria laid out for a single currency in the Maastricht Treaty:

- Government budget deficit has to be below 3 percent of GDP.
- The public debt has to be less than 60 percent of GDP.
- Inflation rates must not exceed 1.5 percent above average of the three EU countries with the lowest inflation rate.
- Interest rates must not exceed 2 percent above average of the three EU countries with the lowest interest rate.
- Exchange rates must be kept within "normal" fluctuation margins of Europe's exchange rate mechanism.

In order to be involved in a single currency area, GCC countries need to achieve a high level of economic convergence to ensure smooth movement down the often-difficult road to monetary union. They need to be aware of the vast disparities in their financial and economic positions that are required for monetary union, in particular the public debt, interest rates and fiscal deficits. The GCC countries are advised to follow

criteria similar to those that the European countries adopted in Maastricht in 1991 while working toward a single currency. The ability of GCC countries to meet these criteria would provide preliminary indicators for GCC countries' readiness for a common currency based on the European experience.

Regarding the fiscal criteria, all member countries have lately fulfilled the condition of the budget deficit-to-GDP ratio. A major problem arises in the debt-to-GDP ratio criterion that might be a barrier toward a monetary union in the region. A huge divergence in this ratio exists among member countries. The inflation-rate criterion can be met by all member states. The range of highest inflation rate in the region to the average of the three countries with the lowest inflation rates has declined from 4.58 in 1992 to 2.9 in 2002. The same thing can be said about the interest rate criterion. Monthly average interest rates on deposits for three months have moved closely since 1997. Finally, the exchange rate criterion has already been met because the six GCC currencies are already pegged to the US dollar.

3.3 Financial Integration and Liberalization

During the 1980s and 1990s, the financial sector played an important role in the GCC countries. This was made possible by commercial oil production, which accumulated large amounts of oil income. This gave impetus to the development of financial institutions in these countries. Cooperative efforts have so far been made to liberalize capital and develop interaction and integration among financial institutions in these countries. Since its creation, the GCC countries have taken steps to achieve financial integration. They have lifted formal impediments to the free movement of

labor and capital across boundaries, and they have similar policy preferences regarding liberal capital flows.

The Unified Economic Agreement considered such issues of financial integration. Article 8 of the agreement states that:

> The Member States shall agree on executive principles to ensure that each Member State shall grant the citizens of all other Member States the same treatment as is granted to its own citizens without any discrimination of differentiation in the following fields:
> 1. Freedom of movement, work and residence.
> 2. Right of ownership, inheritance and bequest.
> 3. Freedom of exercising economic activity.
> 4. Free movement of capital (GCC, The Unified Economic Agreement, 2003).

The Economic Agreement signed in 2001 added other areas of economic participation. It allowed GCC citizens and business to own and trade shares of joint companies in other GCC countries, and to establish companies as well. Moreover, it called for unified tax treatment among citizens and business of GCC counties across borders.

The GCC countries have similar financial systems, which mainly consist of the central bank, commercial banks, insurance companies, stock brokerage firms, stock exchanges, etc. Integration of the GCC financial systems has increased in the last few years as a result of the deregulation of domestic interest rates and the removal of remaining capital controls, which have facilitated free private capital movements.

3.3.1 Banking Sector

The beginning of the banking industry in the GCC countries goes back to 1926, when the first bank was opened in Saudi Arabia to meet needs of pilgrims for Saudi

Rials. With the discovery of oil, banks have grown rapidly in terms of number of branches and total assets to play a major role in economic development. In terms of shareholders' equity, the GCC banks are relatively large compared to other countries in the region. According to *Al-Majalla* magazine, nine out of the 10 largest Arab banks in 2002 were from the GCC countries (Al-Majalla, 2003). Although the majority are privately owned, the role of the public sector remains substantial through equity participation in several banks or through a number of government-owned specialized credit institutions that provide financing to public and private sector enterprises at subsidized rates.

Degree of openness of banking system varies from one country to another across the GCC countries. Bahrain has the most liberalized banking sector in the region, allowing foreign commercial banks, offshore banking units, foreign exchange brokers and representative offices to operate freely in the country. Qatar, Oman, and the UAE technically allow foreign banks to operate in a limited way through offshore banking units. In Saudi Arabia, the foreign share of operating banks (with the exception of the GCC banks) must not exceed 40 percent, while in Kuwait, banking is closed to foreigners.

Due to the limited size of the markets they service, GCC commercial banks are faced with a strong need for consolidation. In order to evolve into major players in international financial markets, it is imperative that these banks succeed in expanding their asset base. Such a strategy will allow them to improve the quality of their assets through diversification, and to invest in expensive new technology that has increasingly become critical to success in the global banking industry (Jaber, 2000).

The nature of the banking system in the GCC countries is conservative. Banking roles and regulations were designed to guarantee the liquidity of banks and the soundness of their operations with a view to preventing bank failure. In spite of that, regulations must be balanced. The regulations must allow for the development of new services. For instance, some of the GCC countries still lack a deposit insurance system to protect depositors in the case of bank failure.

One of the major factors in promoting integration of the banking sector in the GCC states is the need for uniform rules and regulations regarding banking. All GCC countries have laws that lay down a comprehensive framework for the banking industry's regulatory and supervisory structures. These laws also go a long way in delimiting (sometimes excessively) the activities of financial institutions operating within their boundaries. Nevertheless, banking laws in the GCC countries do suffer from a number of shortcomings. For one, these laws are relatively dated, with the newest banking law in the region—those of the UAE—originating in 1980. They do not necessarily incorporate the regulatory developments that have occurred during the late 1980s and 1990s. Nor do they take into consideration the global changes that have taken place in the banking industry since that time (Jaber, 2000).

In order to integrate their financial systems, the GCC countries permitted the governmental specialized credit institutions to offer free or low interest loans for domestic investment. Since 1986, Gulf Cooperation Council citizens have been treated equally in applying for loans from any of the special funds. These financial institutions include funds for agricultural, industrial, and real estate loans.

On the banking side, progress has been made by GCC regulators to integrate their banking systems. A major accomplishment in this regard is the resolution taken by Kuwait Summit 1997, which permits national banks to open branches in GCC member states. The resolution is intended to develop the banking sector and increase its competitiveness, both regionally and internationally. The GCC also established the Gulf Network of the National ATM Networks, and approved the Centrality of Risks Law, the Efficiency of Capital and Risks of Assets Law, and the Credit Concentration in GCC Banks Law (GCC, Areas of Cooperation, 2003).

Although progress has been made by the GCC countries, there exists substantial room for improvement. To integrate the banking system within the GCC countries will require extensive evaluation of rules and regulations that will enable member state banks to work more closely together both from the perspective of country to country, but also when functioning within the international system.

3.3.2 Stock Markets

Most of the GCC stock markets are relatively small and virtually closed to foreign investors, a situation that blocks foreign portfolio investment inflows. Moreover, these markets (with the exception of the BSE) still impose some restrictions on nationals of GCC countries, even though the Supreme Council in 1988 called for free participation in the GCC stock markets among member states. Variation in governmental policies applying trading on these exchanges has led to different degrees of openness in these markets.

The Bahrain Stock Exchange is the most liberalized market in the region. In 1999, the market was opened up to foreign investors, with GCC nationals being allowed to own up to 100 percent (up from 49 percent) of joint companies, and non-GCC investment up from 24 percent to 49 percent. This move reflected positively on the trading figures, with the increase of shares traded by GCC investors up from 16.4 percent in 1998 to 25 percent in 2000, and non-GCC investors up from 1.5 percent in 1998 to 9 percent in 2000 of total traded shares. By the end of 2002, GCC and non-GCC nationals owned approximately 49 percent and 7.5 percent of Bahraini companies, respectively.

The Doha Securities Market (DSM) in Qatar came into existence in May 1997 listing only the public shareholding companies. In February 2000, the government issued a law allowing GCC nationals to hold up to 25 percent of Qatari shares in all firms listed on the DSM, with the exception of banks and finance companies. It is expected that non-GCC nationals will also soon be allowed to invest in shares through mutual funds. The Qatar Telecommunications (Q-Tel) in late 1998 issued an initial public offering (IPO) that was open to both local and Gulf investors.

Although the Kuwait Stock Exchange (KSE) is the oldest market in the region, it is still not fully liberalized. Non-GCC nationals are forbidden to trade in Kuwaiti stocks on the KSE, except through the medium of mutual funds. GCC country nationals have been allowed to own shares of the Kuwaiti companies listed on the exchange, with the restriction that they cannot hold more than 49 percent of the total shares outstanding of banks and insurance companies.

When trading began in 1989 on the Muscat Securities Market (MSM), the market was closed to non-Omani citizens. Later, GCC nationals and foreigners were allowed to invest in the market. In 1998, there were 123 companies listed in the market. Of these, 98 were open to GCC nationals and 56 were open to all foreign investors, normally up to a limit of 49 percent foreign ownership. In March 2003, GCC nationals and foreigners owned 8.5 percent and 8 percent of capital of companies listed on the market, respectively. Currently, all companies seeking listing on the MSM must agree to be open to all foreign investors, up to 49 percent. This means that the majority of IPOs are now open to foreign investors.

Although Saudi Arabia has the largest stock market in the region in terms of market capitalization, the market is not well regulated. Neither regulator nor an independent exchange is available, and the market is closed to foreigners. Only nationals can acquire and trade without limit in shares, while GCC citizens can trade and own in shares except banks, with a limit of 25 percent. The reform of 1999 has given foreigners the opportunity to participate indirectly in the market through mutual funds. The Saudi Arabia Investment Fund (SAIF), which was launched by the Saudi American Bank in 1997, invests in Saudi equities. It is traded on the London Stock Exchange, allowing foreign investors to trade indirectly in Saudi shares.

Ownership of most stocks in the UAE is restricted to UAE nationals. While GCC citizens are allowed to participate in the market with certain limits, non-GCC members can buy shares indirectly through some mutual funds. There are signs that listed companies in the UAE may soon open up to foreign ownership. Emaar Properties,

a public joint stock company, allowed for 20 percent foreign ownership of its stock, and is thus the first in the country to offer its shares to non-UAE investors.

In terms of market accessibility and cross-trading, there are significant differences among the GCC stock markets. The markets of Saudi Arabia and Qatar are not linked to any of the stock markets in the region. However, the development in computer-based trading and the inter-listing of shares on their stock markets is the concern of authorities in these countries. This cooperation has come in the form of cross-listing.

In March 1995, the Bahraini market established full linkage with the Omani market. This gave investors in both countries an opportunity to deal in 110 listed shares. The Bahrain Stock Market reports that it is considering listing other GCC companies. In 1998, the BSE was linked to the KSE. As of the end of 2003, there were six non-Bahraini companies traded on the market. Out of the six companies, five were from other GCC countries and one was from a non-GCC Arab country.

In addition to its linkage with the BSE, the Kuwait Stock Exchange has link agreements with the Egypt Securities Market in Egypt and Beirut Stock Exchange in Lebanon. Currently there are 12 non-Kuwaiti companies traded on the KSE. Out of these companies six are from the UAE, five from Bahrain, and one from Egypt. The market's administration is working to establish more connections and links with Arab and Gulf financial markets.

In the UAE, the main concern is to link the country's two trading floors. The progress in linking the Abu Dhabi Securities Market (ADSM) and Dubai Financial Market (DFM) is in the final stage. An electronic link between the two trading floors in

Dubai and Abu Dhabi is being tested and will be scheduled to become effective in early 2004. In fact, the lack of a formal link-up between the two markets has led to a decline in stock values and a generally negative impact on equity markets. The two markets plan to establish a link with other GCC markets. The authorities in UAE and Oman agreed on an electronic link between the MSM and the ADSM. Currently, there are only two non-UAE companies traded in the country.

3.3.3 Intra-region Investment

The GCC members aim at coordinating policies related to investment in order to reach a common investment policy that would liberalize capital movement among member countries and attract foreign direct investments (FDI) that are needed as a source of capital. In this matter, the council has promoted free capital movement through different agreements, regulations and laws since the UEA in 1981. From a legal perspective, the Gulf's capital enjoys a high degree of mobility. In practice, there is no indication of substantial capital movement across the Gulf States. Low capital mobility can be attributed to the fact that most of the Gulf states are capital exporting countries, due to their similar production factors, small populations, limited investment opportunities, and high income levels.

One of the problems of financial integration among the GCC members is the fact that each member has virtually the same resource—oil—with limitations in other resources. Most of their investment has been primarily in their own country mainly because of the development and modernization plans. Throughout the six members there continues to be a lack of diversification, which is reflected in the member states'

need for foreign investment rather than intra-region investments. As a result, there are limited opportunities within the industrial sector, while integration within the financial sector, stock markets, and banking have been the main roads to integration.

Cooperation is being expressed through direct investment of one GCC member into another GCC member's state. At the present time, investment is pouring into new projects in the Gulf at an astonishing rate. The boom in the GCC area is said to be just starting, and is expected to be unstoppable. The investments include projects in each member country as well as in the other member countries. According to the Inter-Arab Investment Guarantee Corporation (IAIGC), Saudi Arabia has been the biggest player in the inter-Arab investment movement, pumping around $2.26 billion and receiving around $12.7 billion between 1985 and 2001. A large portion of Saudi capital flowed to Arab non-GCC countries, while more than 50 percent of received capital came from the GCC states (Inter-Arab Investment Guarantee Corporation, 2002).

Kuwait was the second largest recipient of Arab capital, standing at around $3.5 billion, with GCC members pumping in $807 million. It lagged behind all other GCC countries as an investor in other Arab states, pumping only $78 million. Kuwait has attracted more Arab capital than it has invested in other Arab states, mainly because of the improvement in investment laws and the introduction of more incentives.

The UAE attracted more than $2 billion in direct Arab capital and pumped over $7 billion into fellow Arab League members since 1985, to become one of the biggest contributors to regional investment activity. By the end of 2002, total direct Arab investment in the UAE stood at $2.39 billion and covered industry, farming, tourism, banking and other services. Only 14 percent of capital flow came from the GCC

countries with Saudi Arabia pumping nearly $157 million, while Qatar invested $78 million. The UAE's investment in other Arab markets totaled around $7.38 billion, with almost 98 percent to GCC members. Approximately 90 percent of the capital was pumped into Saudi Arabia, which received $6.53 billion; with Kuwait being second, around $362 million; followed by Qatar, which received $254 million; and Oman, which got around $66.8 million.

Bahrain, Oman and Qatar invest primarily in the Gulf region rather than investing in other Arab countries. Their accumulated investments in the GCC countries for the period from 1985 to 2002 reached $620 million, $97 million, and $253 million, respectively. On the other hand, these countries received relatively lower amounts of Arab capital.

3.3.4 Foreign Direct Investment

The GCC region is well integrated with the rest of the world in terms of trade flows, but poorly integrated globally in terms of FDI flows. The GCC countries receive very small amounts of FDI. Net FDI inflows to the region in 1993 amounted to about $2 billion. By the end of 1999, this had more than doubled to $5.4 billion, but it represents less than 1 percent of world FDI. This was relatively insignificant compared to other developing countries. With respect to approximating and unifying procedural systems and laws regarding FDI, GCC member states endorsed the Model Regulation for the Promotion of Foreign Investment in the GCC.

FDI in the GCC countries is greatly affected by political unrest in the region as well as developments in the oil and oil-related sectors. Political conditions, especially

after September 11, 2001, and the continual Israel and Palestinian War and the Iraq War, have had and continue to have a negative impact on encouraging FDI in GCC countries. In 2002, FDI to Arab countries recorded a 33 percent drop from $6.7 billion in 2001 to $4.5 billion in 2002. Another requirement is acceleration of the implementation of economic reforms, which leads to the liberalization of trade and capital flow to attract higher FDI inflows. Another aspect of the problem is the existence of laws and legislation that support private sector activities and FDI inflows. The most important of such laws are competition laws, private property and intellectual property rights laws, modernization of judiciary systems, and commercial courts. In addition, commitment to privatization, together with a reduction of bureaucracy and red tape, would greatly enhance FDI inflows. The adoption of laws that encourage FDI is necessary, but it is insufficient in the absence of a campaign against mismanagement and corruption, factors that obstruct the application of those laws. The integration of Arab countries into world markets is also crucial to attract more FDI (Mellahi et al., 2003).

In order to attract FDI, the GCC countries have liberalized their FDI policies since the late 1990s. There have been some reforms in laws, including regulations governing the status of foreign firms, commercial laws, and laws to protect intellectual property rights. The new legal environment has become favorable to foreign investors, as only a few restrictions remain. Favorable changes include more liberal entry, fewer performance requirements, more incentives, and more guarantees and protections for investors.

The GCC countries face other problems relative to FDI, some of which are directed to the country itself, others to the region, and other factors beyond their control. Arab countries face difficulties in attracting high quality, non-oil-driven FDI for several reasons. This is expected to continue to be the trend until the manufacturing sector in these counties is accorded greater importance—GCC countries need to focus on greater diversification, some of which can be achieved through privatization. However, massive infusion of technology, training, and know-how and management and market skills are especially needed to achieve such economic diversification.

Bahrain is considered to be the most economically free country in the Middle East. Simplified administrative and legal systems and procedures, along with high incentives for foreign investors, have attracted FDI to the country. A major motivation is that 100 percent ownership is permitted for international companies in the sectors of technology, tourism, health care, education and training, services, industry, and others. In addition, investment incentives include 100 percent foreign ownership of land, the absence of personal, corporate, or withholding tax, and VAT and sales tax, very short delay in for commercial registration procedure for new companies, and tariff-exempt raw materials.

Kuwait opened up most economic sectors to foreign investors through implementation of the Direct Foreign Investment Law in 2003. Under the law, foreigners can establish companies in Kuwait and own 100 percent of the shares. They can invest in all industries, except oil and gas production and utility infrastructure projects. The direct foreign investment law provides new investors with tax holidays for up to 10 years as well as exemption from customs and charges on raw materials.

In Oman, the 1994 Investment Law and subsequent amendments were designed to encourage FDI by liberalizing the country's investment structure. New legislation has been introduced that permits 100 percent foreign ownership on specific projects with the approval of the Council of Ministers. Corporate tax rates have dropped from 50 percent to 25 percent for investments that are fully owned by foreigners with eligibility for tax holidays of up to 10 years. In general, Oman provides national tax treatment for joint venture firms with less than 70 percent foreign direct investment.

Qatar introduced a new foreign investment law in 2000 that allows foreign investors to invest in most sectors except banking, insurance, commercial agencies and real estate. The general rule is that 51 percent of the capital of the project should be owned by Qatari citizens. Foreign investors were allowed to own up to 100 percent of the capital in the fields of agriculture, industry, health, education and tourism. Moreover, the new law exempted new projects from income tax for a period of 10 years.

After more than 20 years of its old foreign investment law, the government of Saudi Arabia issued the Foreign Investment Act in April 2000. Moreover, the Saudi Arabian General Investment Authority (SAGIA) was established to be responsible for proposing and implementing policies to promote FDI and for issuing investment licenses. Key provisions allow foreign investors to own up to 100 percent of the projects in selected sectors and the property required for the project itself. Furthermore, the new law enables foreign companies to retain the same incentives given to national companies including eligibility for loans from the Saudi Industrial Development Fund. Another very significant change is the reduction in the corporate tax rate for foreign

companies with profits over SR100, 000 ($26,667) a year from 45 percent to 30 percent. In 2001, Saudi Arabia set a list of 22 sectors in which foreign investment was prohibited. The list, which is reviewed annually, has been reduced to 19 sectors in 2003, and includes the following activities:

1. Oil exploration, drilling and production
2. Manufacturing of military equipment
3. Manufacturing of civilian explosives
4. Catering to military sectors
5. Security and detective services
6. Insurance services (until the issuance of the new Insurance Act)
7. Real estate investment in Makkah and Madina
8. Tourist orientation and guidance services related to Hajj and Umrah
9. Recruitment and employment services including local recruitment offices
10. Real estate brokerage
11. Printing and publishing, except certain activities
12. Distribution services
13. Audiovisual and media services
14. Telecommunications services
15. Land and air transportation
16. Satellite transmission services
17. Services rendered by midwives, nurses, physiotherapists and paramedics

18. Fisheries

19. Blood banks, poison centers and quarantines (Saudi Arabian General Investment Authority, 2004).

Under the UAE Commercial Companies Law of 1984, foreign investors are permitted to hold up to 49 percent equity ownership in UAE companies; 51 percent of the equity must be held by UAE nationals. The law has been amended several times to permit foreign investors to own 100 percent of companies in free zones. Since the country lacks a law regulating foreign investment, a draft law on FDI has been formulated and is waiting for final endorsement.

It is obvious that the GCC countries implemented similar laws, regulations, and policies to attract FDI. The rule of Reference Model Regulation for the Promotion of Foreign Investment in the GCC states was significant in approximating and unifying procedural systems and laws regarding foreign investment among member countries. The main issue in this matter is the ability to attract significant amount of FDI. It is believed that the new laws will lead to expanding foreign participation in local business activities and hence to the expansion of the GCC economy. The future success of the GCC countries depends on stabilization, diversification, privatization, economic reform, financial liberalization, and an increased role in the global marketplace.

CHAPTER IV

GCC STOCK MARKETS DEVELOPMENT

An important part of any modern economy is its financial system. A major component of the financial system is the system's financial markets. Efficient financial markets have a substantial effect in the real economy through increased level of investment. The basic purpose of a financial market is to provide capital for investment. From the point of view of savers, efficient financial markets provide opportunities to increase future consumption by allowing others to use their surplus current income. In addition, it encourages thrift by allowing individuals to build wealth for the future. Therefore, the main reason for the existence of financial markets is reallocation of resources and channeling of funds from savers to businesses that offer profitable opportunities for investment. One of the most important financial institutions in most countries is the nation's stock exchange in which stocks, mutual funds, and bonds are traded by the public.

Stock markets are the main fund-raising institutions in the Gulf area. GCC countries established stock markets primarily for the purpose of encouraging people to invest in their own country rather than sending capital to foreign markets. The stock markets have also served well in the process of privatization, with stocks being issued for the sale of state-owned enterprises. Some markets have been more successful than others. Each of the six member states in the GCC has at least one functioning stock

exchange. Some analysts have suggested that the integration of these separate stock markets would be beneficial to the GCC states.

Equity markets in the GCC countries are of fairly recent origin in comparison with well-established markets of the Western world. The stock market in Kuwait, the oldest in the region, dates back only to the late 1960s, while other GCC markets were not established until the late 1980s and the 1990s. By world standards, the capitalization of the GCC stock markets is small. In 1997, the aggregate capitalization of these markets was US $128.63 billion, smaller than those of Korea or Mexico. The stock markets themselves are very small. The Saudi Arabian stock market is the largest in the Middle East and North Africa, and is at least 22 times larger than that of Qatar and almost seven times larger than those of Bahrain and Oman. Nevertheless, when the economic size of the GCC countries is taken into consideration, their markets seem to be well capitalized. In fact, capitalization of the stock markets of Bahrain and Kuwait, relative to GDP, is greater than that of Chile, Korea, or Mexican markets (Jaber, 2000).

Stock markets in the GCC have changed drastically over the last five years. Some change has been directly related to privatization programs, and new issues of shares have surfaced. Moreover, the developments in computer-based trading and the cross-listing of shares on their stock markets have had an effect. By the end of 2003, total GCC markets' capitalization reached approximately $305 billion, compared to $76 billion at the end of 1998. Growth of shares traded and value of shares traded has been remarkable.

Performance of GCC stock markets varied from one exchange to another. In general, these markets performed well in the last five years compared to other

international markets. Table 4.1 provides descriptive statistics of weekly returns of the five GCC markets and four international indices included in the study for the period from August 14, 1998 to August 15, 2003. Weekly returns are calculated as the natural logarithmic differences in prices (ln (p_t/p_{t-1})). The table shows that the stock markets in Qatar, Saudi Arabia and Kuwait had a significant positive mean return, while the markets of Oman and Bahrain had a negative mean return. The highest mean of return was found in the DSM, with a value of .43 percent, followed by the SSM and the KSE, with values of .34 percent and .26 percent, respectively. The MSM and the BSE had a negative return, with values of -.03 percent and -.08 percent. With the exception of the S&P 500, world indices provided negative mean returns. Return on the S&P 500 reached .01 percent, -.06 percent on the FTSE 100, -.12 on the Nikkei 225, and -.05 percent on the MSCI. Regarding market volatility, measured by standard deviation, GCC markets were more stable than international markets. Standard deviation of all GCC markets was found to be less than in other international markets, In GCC markets, MSM has the highest volatility, followed by DSM, KSE, SSM and BSE, while in international markets, the Nikkei 225 has the highest volatility, followed by the S&P 500, the MSCI and the FTSE 100.

Regarding the distribution of returns, the table shows that among GCC markets those for Oman, Qatar and Saudi Arabia are skewed to the right, while those for Bahrain and Kuwait are skewed to the left[5]. For international markets, returns in the S&P 500 and the MSCI are skewed to the left, while in the UK and Japan the returns

[5] Skewness is a measure of asymmetry of the distribution of the series around its mean. It is computed as: $S = \frac{1}{N}(\frac{y-\bar{y}}{s})^3$, where s is an estimator for the standard deviation.

are distributed symmetrically (close to zero skew). As a measure of peakedness of the returns, the coefficients of kurtosis are high for all GCC markets, but particularly in the case of the MSM and the DSM, with values of 12.3 and 9.3, respectively[6]. For other GCC markets, the coefficient of kurtosis is within 4.7. Regarding international markets, the coefficient of kurtosis ranges from a high of 4.6 for the MSCI to a low of 3.2 for the Japanese market. Since the coefficients exceed 3, it implies that the distribution of returns is peaked in all markets. Finally, the Bera-Jarque statistic is high for all markets except the Japanese market, which indicates that the null hypothesis of normal distribution of return is rejected in all cases[7].

Table 4.1: Descriptive Statistics of Weekly Returns by Market
(August 14, 1998 to August 15, 2003)

Market/ Index	Mean (%)	Maximum (%)	Minimum (%)	Standard Deviation	Skewness	Kurtosis	Jarque-Bera
BSE	-0.083	2.992	-4.956	0.013	-0.803	4.613	56.315
KSE	0.263	7.416	-6.748	0.0205	-0.128	4.505	25.339
MSM	-0.029	16.48	-6.87	0.026	1.929	12.361	1114.721
DSM	0.433	11.185	-9.56	0.022	1.412	9.333	522.965
SSM	0.34	8.2	-6.063	0.0203	0.455	4.855	46.424
S&P 500	0.015	7.78	-11.6	0.029	-0.266	4.289	21.151
FTSE 100	-0.062	10.594	-8.483	0.026	-0.017	4.077	12.632
NIK. 225	-0.116	9.931	-10.678	0.031	-0.078	3.188	0.653
MSCI	-0.048	9.598	-11.034	0.027	-0.12	4.588	28.043

Source: BSE, KSE, MSM, DSM, SAMA and DataStream.

[6] Kurtosis measures the peakedness or flatness of the distribution of the series. It is computed as $K = \frac{1}{N}\sum_{i=1}^{N}(\frac{y_i - \bar{y}}{s})^4$, where s is the standard deviation.

[7] Jarque-Bera is a test statistic for testing whether the series is normally distributed. It is calculated as $JB = \frac{N-k}{6}(S^2 + \frac{(K-3)^2}{4})$, where K is Kurtosis coefficient, S is the skewness, and k is the number of estimated coefficients used to create the series.

The following is a review of the stock markets that currently exist within the GCC member countries. Tables and figures that give graphic and tabular information about the GCC stock markets are included at the end of the chapter.

4.1 Bahrain Stock Exchange

It was in 1920 that the first branch of a commercial bank opened its doors in Bahrain, the first to do so in the region, in order to facilitate the business community at that time. By 1957, Bahrain had its first public shareholding company, the National Bank of Bahrain. It was not until the late 1980s that Bahrain realized there was a growing need for an organized stock market due to the growth provided by the oil price boom in the region. As a result, the government, in cooperation with the International Finance Corporation (IFC), prepared a feasibility study highlighting the importance of establishing an official stock market in Bahrain. In 1987 Amiri Decree No 4 was issued, establishing the Bahrain Stock Exchange (BSE), which officially commenced operations on June 17, 1989, with 29 companies listed (Bahrain Stock Exchange, 2003). Since the end of 2002, the Bahrain Monetary Agency (BMA), which is considered to be the central bank of Bahrain, has become responsible for regulation and supervision of the BSE.

By the end of 2002, there were 40 companies listed in the BSE, with total market capitalization of $7.7 billion, which accounts for almost 90 percent of GDP. Activity on the BSE decreased from about 619 million shares traded, with total value around $576 million during 1998, to 352 million shares traded with total value around $206 million during 2002. The BSE continued its poor performance during the past few

years; the local index has declined gradually from 2188 points at the end of 1998 to 1812 at the end of 2002.

In 1999, the BSE was improved through new laws, regulations, and technology. First, the government opened the door to foreign investors, enabling them to invest in the local market. Nationals of other GCC countries are currently permitted to own stakes of up to 100 percent in Bahraini companies while non-GCC investors may own up to 49 percent (with a few exceptions). Second, the Bahrain Monetary Agency also allowed margin trading through which investors purchasing securities listed on the BSE may pay for them by borrowing a portion of the purchase price from a lending bank. Third, in order to enhance trading activity and facilitate operations, the BSE automated the trading mechanism, which replaced the manual "Written Auction System." The BSE shifted to the new "Automated Trading System" toward the end of 1999. Fourth, during 1999, a law allowing foreign companies to obtain brokerage licenses was passed, which permits them to act as brokers on the BSE.

4.2 Kuwait Stock Exchange

The Kuwaiti Stock Market is considered one of the oldest stock markets in the GCC area. The first Kuwaiti Joint Stock Company was established in 1952. The stock market as an organized market was established in 1977. At that time, there were 32 joint stock companies traded in the market. The Kuwaiti stock market has been through two crises, one in 1967, and the other one in 1982.

The second crisis was known as the Souk Almanakh Crisis, which cost about 92 to 100 billion dollars. By 1982, activity in Almanakh overshadowed the official

exchange market. The market specialized in the use of postdated checks and other forms of deferred payments. These postdated checks were a prime means of attracting investors in search of a "quick kill." The system worked as follows: A broker would arrange an immediate unsecured loan to a customer by finding someone in the market ready to sell shares to his customer in exchange for a postdated check. The broker would then buy back these shares for cash. The size of the profit in the transaction was reflected in the premium, often as high as 500 percent, demanded for accepting a future payment rather than cash. Until early 1982, checks belonging to prominent Kuwaiti dealers were discounted at Kuwaiti banks by the sellers of the shares, but the premium price the shares fetched more than offset the discount. There was usually no connection between a company's performance and the value of its shares. An index of Gulf shares jumped from about 275 at the beginning of May 1981 to 920 a couple of weeks later. This situation was very attractive to the Kuwaiti investor. The crisis erupted in July-August 1982, when a number of large dealers found it impossible to honor their postdated checks due other dramatic falls in share prices, high interest rates, and reckless forward trading. Because of lack of control, it was evident that it was only a matter of time until the stock market would crash (Kuwait Souk Crash, 1983).

The Kuwaiti government took different actions, including legislation, to resolve the crisis and its effects. A high level committee, called The Stock Market Committee, was created by an Amiri Decree issued on August 14, 1983. The committee is responsible for enacting the laws of trading in the market and also for supervising how this law has been implemented. Furthermore, the committee reviews the brokers' and companies' applications to be listed at the market. The market is supervised by the

Stock Exchange Commission, which consists of 11 members appointed by the Ministry of Commerce, the Kuwait Investment Authority, the Central Bank of Kuwait, and the Chamber of Commerce.

The Kuwait Stock Exchange (KSE) has grown since the early 1970s. By the end of 2002, its capitalization reached approximately $35 billion, which amounts to slightly above 106 percent of GDP, with 95 companies traded. The volume of trading at the KSE is twice as large as in other GCC countries taken together, but is second to Saudi Arabia in terms of capitalization. Since 1998, activity on the KSE has expanded. Total shares traded reached over 42 billion during 2002 compared to 14 billion in 1998, as large shares of government enterprises were sold to the private sector. Value of shares traded reached about $22 billion. Institutional investors execute 60 percent of transactions. The KSE is one of the most dynamic markets in the world, with a turnover ratio that exceeds ratios in some developed markets[8]. At the end of 2002, the turnover ratio reached 63 percent. The Kuwaiti market gained 26.1 percent in value in year 2001, after investors almost lost hope due to the 52 percent continuous fall from November 1997 to January 2001.

4.3 Muscat Securities Market

The structure of the stock market in Oman changed in 1998 after the issuing of the new Capital Market Law. The new law provided for the establishment of two separate entities. First, a regulator, to be named The Capital Market Authority (CMA), became the governmental authority responsible for organizing and overseeing the issue

[8] Turnover ratio measures the liquidity of the stock market. It is defined as the value of the total annual traded shares divided by market capitalization.

and trading of securities in the country. Second, an exchange, the Muscat Securities Market (MSM), where all listed securities are traded, was established. The exchange also was deemed to be a governmental entity, financially and administratively independent from the authority but subject to its supervision. The board of directors were to be elected from among members of public (governmental commercially oriented) corporations, listed companies, intermediaries, and the Central Bank of Oman (Capital Market Authority, 2003).

The Muscat Securities Market (MSM) was established in 1989. Its capitalization in 2002 stood at $5.2 billion (26 percent of GDP) with nearly 140 companies traded. The removal of restrictions to GCC citizens' investment in 1992 contributed significantly to the increase in capitalization of the MSM. The MSM is the most stable market in the region. Market index has moved in a narrow range during the last five years, with a maximum value of 300 points and a minimum value of 150 points.

4.4 Doha Securities Market

Before 1995, Qatar had no organized stock exchange. The stock market was primitive and there was no law controlling trading. The Doha Securities Market (DSM) was established by the Decree Law No. 14 of 1995. The market started its activities in May 1997. Trading started manually, then turned semi-electronic with the implementation of the Central Registration Project. It became fully electronic when the Electronic Trading Project was implemented in March 2002.

The market is regulated and supervised by a committee of 11 members. It is headed by a representative of the Ministry of Economy and Commerce. Other members

are: the General Manager of DSM as Deputy Chairman, another representative of the Ministry of Economy and Commerce, a representative of the Qatar Central Bank, a representative of the Qatar Chamber of Commerce and Industry, two representatives of authorized brokers, two representatives of listed companies, and two representatives with experience from the private sector.

The DSM started operations with 17 companies listed, which rose to 25 companies listed by the end of 2002. Market capitalization has grown rapidly, reaching $10.5 billion in 2002, which accounts for 57 percent of GDP. The growth in the volume and value of trading has been remarkable. During 2002, about 80 million shares were traded, with total value of $883 million. As the year 2002 came to an end, it became clear that the DSM had made the highest gains compared to other Gulf stock markets during the year. The DSM General Index (QSI), which leapt an incredible 39.13 percent in 2002 compared with a 37 percent increase a year earlier, has witnessed an increase from 1,000 points in 1998 to 2,323.84 points by the end of 2002.

4.5 Saudi Stock Market

The history of the Saudi Arabian stock market began in the 1930s. The first joint stock company, the Arab Automobile Company, was established in 1934. In 1954, the Arabian Cement Company went public and was followed by the privatization of three electricity companies by the Saudi government. In response to the needs of the economic development of that period, more joint companies were established. The stock market itself did not begin to emerge until the late 1970s. Due to the lack of trading regulation at the time, stock trading was fairly limited through the early 1980s.

As a result of not having laws regarding the stock market and not having an independent stock exchange or an independent legal body to regulate the market, the Saudi government issued a royal decree in April 1983 to establish a joint committee. The committee's mission was to draft regulations for the stock trading. The members of the Ministerial Committee were the Minister of Finance, the Minister of Commerce, and the Governor of the Saudi Arabian Monetary Agency (SAMA). In 1985, the Saudi government placed all stock trading under the supervision and control of SAMA. In 1984, the Saudi Share Registration Company (SSRC) was established. The SSRC is responsible for managing the records of shareholders and share certificates, as well as providing support facilities for transactions and transferring and registering ownership of transactions automatically.

In June 2003, the Council of Ministers approved the final draft of the Capital Market Law. According to the new law, a stock market commission will be set up with judicial powers to regulate the market, and an independent stock exchange will be established to manage and facilitate stock exchange activities and set out and execute the criteria for middlemen and agents.

The Saudi Stock Market (SSM) is an over-the-counter (OTC) market, where trading does not take a place on an exchange basis. Commercial banks trade in shares through an electronic system established by SAMA, which also monitors activities. The first stock trading system in the Kingdom was the Electronic Securities Information System (ESIS), which was introduced to the Saudi market gradually in the second half of 1990. It is an electronic screen-based system using a central host computer in the

SAMA head office in Riyadh. The system is connected to many trading lounges of local banks in the kingdom.

SAMA launched a new share-trading system, called Tadawul, which involves a move to instantaneous real-time trading. ESIS was replaced by the new trading system in October 2001. The main difference is that the new system will allow real-time delivery against payment; it will transfer shares as soon as the transaction takes place rather than later in the day or the week, which reduces settlements risk.

Tadawul is linked with the systems of the commercial banks that help in rapid direct dissemination of prices to investors and adding sale and purchase orders. The system also enables commercial banks to provide extra services, the most important being trading through the Internet and managing investment portfolios adequately. The most important features of this system may be summarized as below:

1. Settling transactions immediately and accurately
2. Linking directly with banks' systems
3. Providing transparency to the market through publishing prices and companies' information and their advertisements directly through the Internet
4. Adding new types of orders with characteristics similar to those existing in international markets
5. Applying the principle of share accounts instead of advice notes (Isha'ar i.e., a temporary document of ownership)

Several additional services and features of Tadawul are currently under assessment. The most prominent are trading of different investment instruments, linking the system with

regional markets that will be added to the trading system in succession, and other services resulting from technological developments in the domestic trading system (Saudi Arabian Monetary Agency, 2002).

In terms of market capitalization, the Saudi Stock Market is the largest in the Middle East. Relative to 109 markets around the world, both developed and emerging, the Saudi market ranked number 30 in terms of market capitalization in 2001. With market capitalization of US$ 74.8 billion in 2002, which accounts for almost 40 percent of GDP, it had shown an increase of almost 75 percent relative to 1998 market capitalization of US$ 46.2 billion. The market capitalization increased by more than 70 percent in the first half of 2003 to reach US$ 127 billion due to privatizing of Saudi Telecommunication Company (STC).

Within five years (from 1998 to 2002), the volume of shares traded has increased from 295 million in 1998 to more than 1.7 billion in 2002. In addition, the dollar value of shares changing hands in the Saudi market has increased within the same period from US$ 13.7 billion to approximately US$ 31 billion. Currently, there are 68 companies traded in the market. The Saudi market had a relatively modest performance in the last five years with an average rate of return of 7.6 percent.

4.6 Stock Markets of United Arab Emirates

Until 2000, there was no official stock market in the UAE. Trading used to be carried out through personal public relations and small real estate brokers. Moreover, there was no regulation for the market, although the central bank had some control over the stock market by regulating the stock brokers. As a result of not having an organized

stock exchange, excessive volatility existed, with prices going up and down for no reasonable reason. There could be a big difference in the price of similar shares being traded on the same day. Moreover, because the UAE stock market was a very shallow, seasonable, and sensitive market, there was even greater cause for concern about the lack of regulation.

The government approved preliminary plans in October 1999 for the establishment of a stock exchange in Dubai and Abu Dhabi. The Emirates Securities and Commodities Authority (ESCA) was formally established in 2000 as the regulatory and licensing body responsible for market integrity and transparency. The ESCA requires that all public shareholding companies must be listed on one (or both) of the two bourses in UAE. As a result of this regulation, the number of listed companies is expected to more than double.

In early 2000, the Dubai Financial Market (DFM) officially opened for trading in securities only. Initially, the Dubai Financial Market operated as a secondary market for trading of securities issued by public shareholding companies, bonds issued by the local or federal governments, public institutions, and financial and investment institutions. An electronic trading system has been used that will fully disclose amounts of stocks in order to encourage market stability

In late 2000, another market was found in the country, called Abu Dhabi Securities Market (ADSM), located in Abu Dhabi. ADSM is a governmental entity that was established to organize trading in securities in order to increase liquidity and to create opportunities through an ideal investment environment. The establishment of ADSM will enhance completing the institutional framework of the financial sector and

further strengthen the country's economic position. As a step to expand all over the country, ADSM opened its first branch in Ras Al-Khaimah.

By the end of 2002, there were 36 companies listed in the two markets with total market capitalization of about $30 billion, which accounts for 42 percent of GDP. The growth in the volume and value of trading was obvious. During 2002, over 208 million shares were traded in both markets with a total value of $1.05 billion.

Indicators of stock market development in the GCC countries from 1998 to 2002 are summarized in Tables 4.2 through 4.6 and Figures 4.1 and 4.2.

Table 4.2: Market Capitalization 1998-2002 (Million US$)

Market	1998	1999	2000	2001	2002
Abu Dhabi Securities Market	-	-	-	-	20,375.76
Bahrain Stock Exchange	6,771.80	7,160.73	6,624.35	6,601.27	7,716.39
Doha Securities Market	3,823.11	5,502.96	5,166.40	7,340.92	10,567.22
Dubai Financial Market	-	-	-	-	9,469.52
Kuwait Stock Exchange	18,423.92	19,598.67	19,847.98	26,661.70	35,098.89
Muscat Securities Market	4,536.72	4,303.14	3,518.13	2,634.37	5,268.05
Saudi stock Market	42,630.63	60,952.94	67,166.04	73,201.35	74,851.38
Total	76,186.18	97,518.44	102,322.9	116,439.6	163,347.21

Source: AMF-Arab Markets Data Base (AMDB) and Doha Securities Market

Table 4.3: Number of Listed Companies 1998-2002

Market	1998	1999	2000	2001	2002
Abu Dhabi Securities Market	-	-	-	-	24
Bahrain Stock Exchange	42	41	41	42	40
Doha Securities Market	19	20	22	23	25
Dubai Financial Market	-	-	-	-	12
Kuwait Stock Exchange	78	85	86	88	95
Muscat Securities Market	137	140	131	96	140
Saudi Stock Market	74	72	75	76	68
Total	350	358	355	325	404

Source: AMF-Arab Markets Data Base (AMDB) and Doha Securities Market

Table 4.4: Volume of Shares Traded 1998-2002 (Million Shares).

Market	1998	1999	2000	2001	2002
Abu Dhabi Securities Market	-	-	-	-	61.28
Bahrain Stock Exchange	619.84	534.25	422.07	313.10	352.91
Doha Securities Market	1.83	28.17	31.61	51.01	79.61
Dubai Financial Market	-	-	-	-	147.95
Kuwait Stock Exchange	13,917.09	9,495.86	6,758.29	20,825.32	42,163.28
Muscat Securities Market	283.50	138.43	144.34	123.56	191.11
Saudi Stock Market	294.97	527.51	552.07	689.59	1,735.84
Total	15,117.23	10,724.22	7,908.38	22,002.59	44,731.96

Source: AMF-Arab Markets Data Base (AMDB) and Doha Securities Market

Table 4.5: Value of Shares Traded 1998-2002 (Million $)

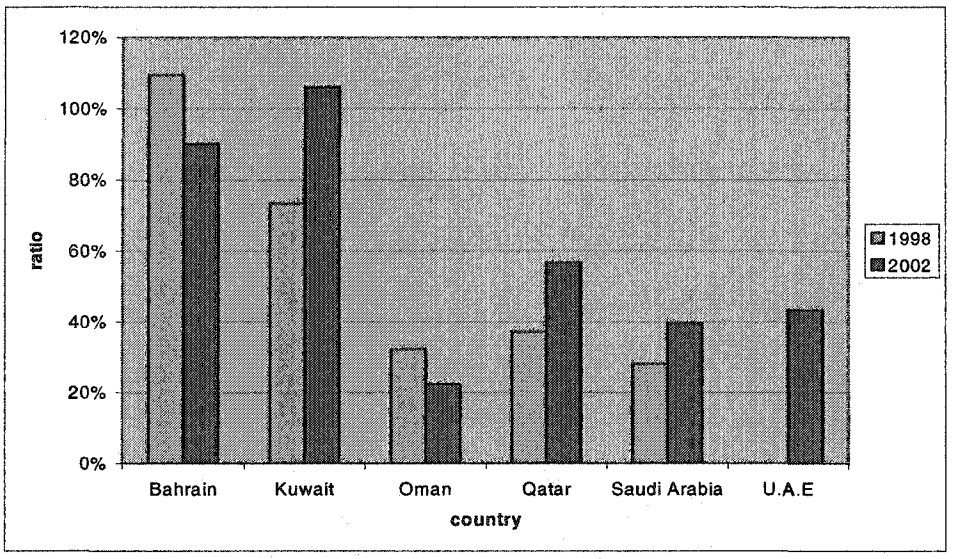
Market	1998	1999	2000	2001	2002
Abu Dhabi Securities Market	-	-	-	-	363.08
Bahrain Stock Exchange	576.64	444.46	245.44	250.38	206.28
Doha Securities Market	147.28	338.55	238.64	412.94	883.07
Dubai Financial Market	-	-	-	-	687.8
Kuwait Stock Exchange	10,918.24	6001.01	4,208.45	11,711.16	22,123.49
Muscat Securities Market	2,371.30	714.34	551.41	419.85	581.67
Saudi Stock Market	13,744.93	15,086.79	17,313.45	22,223.44	30,974.47
TOTAL	27,758.38	22,585.15	22,557.39	35,017.77	55,819.85

Source: AMF-Arab Markets Data Base (AMDB) and Doha Securities Market

Table 4.6: Turnover Ratio 1998-2002

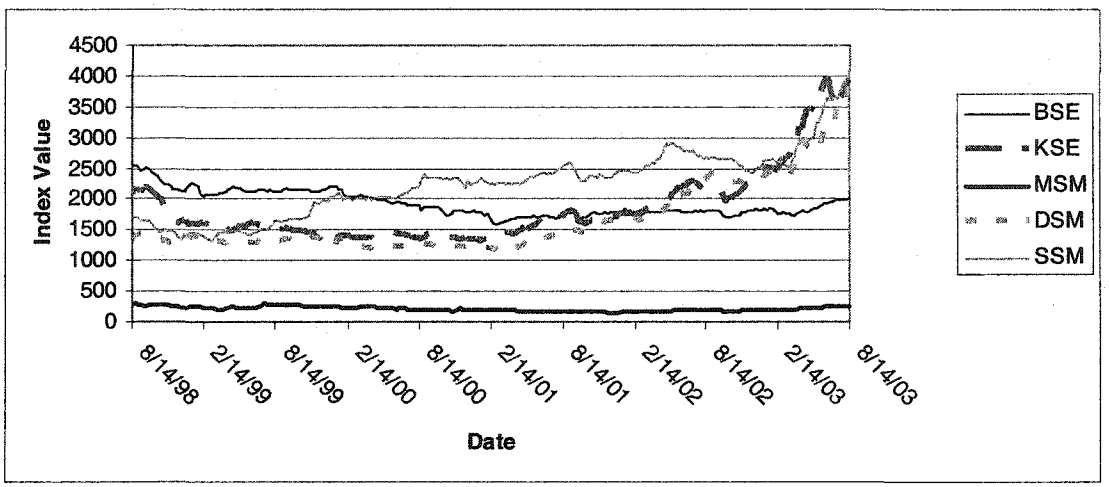
Market	1998	1999	2000	2001	2002
Abu Dhabi Securities Market	-	-	-	-	1.78
Bahrain Stock Exchange	8.52	6.21	3.71	3.79	2.67
Doha Securities Market	3.85	6.15	4.62	5.62	8.36
Dubai Financial Market	-	-	-	-	7.26
Kuwait Stock Exchange	59.26	30.62	21.20	43.93	63.03
Muscat Securities Market	52.27	16.60	15.67	15.94	11.04
Saudi Stock Market	32.24	24.75	25.78	30.36	41.38
Average	22.31	12.05	10.14	14.23	19.36

Source: AMF-Arab Markets Data Base (AMDB) and Doha Securities Market



Source: IMF, AMF, and Doha Securities Market

Figure 4.1: Market Capitalization as a Percentage of GDP (1998 and 2002)



Source: BSE, KSE, MSM, DSM and SAMA

Figure 4.2: Weekly Performance of GCC Stock Markets from August 1998 to August 2003

CHAPTER V

METHODOLOGY

Stock market integration is usually studied in term of three different models: degree of price equality; speed and duration of price interaction; and degree of price co-movement. Efforts to analyze degree of price equality by using asset pricing models have led to inconclusive results. The model of speed and duration of price interaction examines the adjustment from short-run to long-run equilibrium in the price after a disturbance. The degree of price co-movement model, which has been widely used in recent studies, has a superior tool for estimation of long-term linkages between markets. The model has been studied through utilization of non-asset pricing models such as correlation, cointegration, variance, Granger-causality, and impulse response analyses (Roca, 2000).

5.1 The Model

The amount of price equality among markets is one way to measure equity market integration. If risk-adjusted asset return models on the international level are equal among markets, then those markets are integrated. The two models that have been most widely used are the capital asset pricing model (CAPM) and the arbitrage pricing model (APT). Although the CAPM is a popular tool for measuring market integration, there have been problems in constructing market indices and meeting its assumptions (i.e., no imperfections among markets and quadratic utility function) (Roll, 1977).

Many researchers prefer the APT model, largely because it does not use the market index. The APT requires the identification of different sources of risk that have not yet been positively identified. This is considered to be the main weakness of the model. In general, both models have problems of validity. Therefore, many researchers avoid using asset pricing models entirely because it is difficult to find assets with similar risks (Marr et al., 1991).

The second model deals with speed and duration of price interaction. When markets are integrated there is a speedy adjustment of prices among them. Error correction models (ECM) can be used to detect the adjustment from the short run to the long run in the assets return after a disturbance. The impact of one market on others can be determined by the impulse response multiplier, whereas the accumulated impact over an extended period of time can be determined by vector autoregression (VAR). However, the model requires large amounts of data, and tends to be more of a theoretical than a practical tool of evaluation (Roca, 2000).

The third model of analysis is co-movement of prices, which requires measurement of correlation, cointegration, and Granger-causality. If assets returns in different stock markets are correlated, then these markets are considered to be integrated. Correlation, however, does not necessarily indicate causality, and this measurement has been criticized for this reason. In addition, it might give misleading results. For instance, two markets might be correlated not because they are integrated but because they are subject to common factors. Cointegration, on the other hand, makes it possible to use different levels of data to find long-term market relationships. It is regarded as an important tool for the scientific study of price co-movement

(Charemza and Deadman, 1992), and has been used in many equity market integration studies. The direction of interaction among markets can be determined using Granger-causality.

The study is based on the latter model to investigate for market integration. The research design for the study provides for the measure of integration between each pairing among the five stock exchanges in the Gulf region of the Middle East that will be included in the investigation (Bahrain, Kuwait, Oman, Qatar, and Saudi Arabia). The research design also will provide for the measure of integration between all five of the stock exchanges and selected developed stock markets. Correlation is a preliminary indication of market integration. Cointegration of the values of comparable equity indices across the five exchanges will provide the basis for determining the level of integration of the five stock markets included in the investigation. Another cointegration test will be used to measure the level of integration between GCC stock markets and major world markets. The Granger causality test will determine direction of relationship among stock markets included in the study. Relevant theories of correlation, cointegration, and Granger-causality are introduced in the following parts of this chapter.

5.2 Correlation

The most commonly used measure for linear relationship between two variables is the Pearson correlation coefficient. The two variables must be measured by interval or ratio scale. The values of the coefficient can range from –1 to +1. If there is no linear

relationship between two variables, the value of the coefficient is 0. If there is a perfect positive relationship, the value is +1. If there is a perfect negative relationship, the value is –1. The Pearson correlation coefficient (r) is calculated by the following formula:

$$r = \frac{N\sum XY - (\sum X)(\sum Y)}{\sqrt{[N\sum X^2 - (\sum X)^2][N\sum Y^2 - (\sum Y)^2]}} \qquad (5\text{-}1)$$

Where X and Y are two variables and N is the number of observations.

Many studies have indicated that the higher the degree of correlation between returns in stock markets, the greater the integration of those stock markets. Within that context, Pearson product moment correlation analyses will be performed to assess the level of integration among the GCC stock markets. A five-year correlation matrix of the five stock markets indices will be performed to determine the level of bilateral relationship among the GCC markets. The minimum level of correlation to infer integration will be a Pearson correlation coefficient of $r = .6$.

5.3 Unit Root Test

Economic series data often show structural changes that affect both unit root and stationarity tests. In the first case, Perron (1989) demonstrated that the estimator of the autoregressive parameter goes asymptotically to values close to 1 when the series exhibits stationary fluctuations around a level or a trend with a shift.

Unit root tests are important in examining the stationarity of a time series. Stationarity is an important issue in three contexts. First, a crucial question in the autoregressive integrated moving average (ARIMA) modelling of a single time series is the number of times the series needs to be first differenced before an autoregressive

moving average (ARMA) model is fit. Each unit root requires a differencing operation. Second, stationarity of regressors is assumed in the derivation of standard inference procedures for regression models. Nonstationary regressors invalidate many standard results and require special treatment. Third, in cointegration analysis, an important question is whether the disturbance term in the cointegrating vector has a unit root (Perron, 1989).

Time series data reflect a process that also involves trend, cycle, and seasonality. By removing these deterministic patterns, the remaining data become stationary. Regressions with high R-squares but near-zero Durbin-Watson statistics frequently occur in time series analyses. Such regressions typically are associated with the analysis of nonstationary data. The unit root tests determine the stationarity characteristics of series data. When stationarity problems surface in series data, the original data are differenced and retested. Through this process, the order of the integrated process for each data series is established. Once each data series has completed this process, the series are regressed together and tested for a cointegration relationship.

If a variable is stationary, i.e., it does not have unit roots, it is said to be integrated of order zero or I(0). If a variable is not stationary in its level form but stationary in its first-differenced form, it is said to be integrated of order one or I(1). More generally, the series x_t will be integrated of order d, that is, x_t ~I (d), if it is stationary after differencing d times, so x_t contains d unit roots (Dickey and Fuller, 1981).

To test for stationarity in the study, the application of the Augmented Dickey-Fuller (ADF) test in an ARMA framework will be applied to the appropriate data sets.

The ADF test is a unit-root test of stationarity that involves running regression analyses. In fact, the Augmented Dickey-Fuller tests are variants of the Dickey-Fuller test. The equation for the standard Dickey-Fuller test regression analysis is as follows:

$$y_t = \rho \ y_{t-1} + u_t \qquad (5\text{-}2)$$

Where y_t is the value of stochastic variable, y at time t, y_{t-1} value of y at time t-1, u_t is the stochastic error term. Parameter of y_{t-1} , ρ determines the presence of unit root. If ρ=1, then y has a unit root.

The problem associated with the DF test is that it requires that u_t be a white noise process. Therefore the standard Dickey-Fuller regression equation is adjusted to improve the accuracy and reliability of the analysis of longitudinal data. The Augmented Dickey-Fuller test adjusts the model and permits the researcher to test for stationarity in difference with intercept only or with intercept and trend. It allows differentiation of a unit root data series from a deterministic trend data series. The ADF test is conducted within the context of three distinct models of generating processes of a series y as follows:

Model (1): without any constant and trend

$$\Delta y_t = \rho y_{t-1} + \sum_{i=1}^{p} \delta_i \Delta y_{t-i} + u_t \qquad (5\text{-}3)$$

Model (2): with constant but no trend

$$\Delta y_t = \alpha + \rho y_{t-1} + \sum_{i=1}^{p} \delta_i \Delta y_{t-i} + u_t \qquad (5\text{-}4)$$

Model (3): with constant and trend

$$\Delta y_t = \alpha + \beta t + \rho y_{t-1} + \sum_{i=1}^{p} \delta_i \Delta y_{t-i} + u_t \qquad (5\text{-}5)$$

Where Δy_t is the first difference of the series, α is an intercept, βt is a time trend, p is the number of lagged difference terms, which is determined empirically when error term, u_t becomes white noise process. A widely used method is to choose the value of p that minimises Akaike information criterion (AIC). Parameter of y_{t-1}, ρ determines the presence of unit root. The null hypothesis is:

Ho: $\rho = 0$, a unit root exists in y (i.e., y is nonstationary)

And the alternative hypothesis is:

H_1: $\rho \neq 0$, a unit root doesn't exist in y (i.e., y is stationary)

The research design for the study relies on the use of unit root analysis to establish stationarity of the data sets for the stock markets included in the study. The stationarity determinations for each of the exchanges will involve the performance of a unit root test. The ADF test then will be run separately for each exchange index as stated in previous equations, where y_t is the country index (in log), and the order of p is determined by AIC. The rejection of the null hypothesis (Ho: $\rho = 0$) at 5 percent implies the absence of a unit root, which in turn implies stationarity.

5.4 Cointegration

The theory of cointegration, which was developed by Engle and Granger (1987), has powerful statistical and economic implications. From an economic point of view, it is known that some pairs of data tend to move closely and systematically over time (for example, inflation and nominal interest rates), even though these series are individually non-stationary. Economic theory provides explanation of this equilibrium. Cointegration supports economic theory by representing a statistical characterization of

such equilibrium. Therefore, cointegration is the statistical implications of the existence of a long-run relationship between economic variables (Pindyck and Rubinfeld, 1991). Moreover cointegration allows us to capture the equilibrium relationship between non-stationary series within a stationary model. It is therefore a method of avoiding both the spurious and inconsistent regression problems that otherwise occur with regression of non-stationary data series.

The definition of cointegration states that if y_t~ I (d) and x_t~ I(c) but if $z_t = (y_t - \hat{\alpha} + \hat{\beta} x_t)$ ~ I (d-c) then x_t and y_t are said to be cointegrated. In other words, if y and x are I(1) then the residuals from the regression of those series would be also I(1), unless they are cointegrated. Thus if the residuals are distributed I(0), we reject the null hypothesis of no cointegration, while if the residuals are I(1), then we don't reject the null hypothesis, which implies that y and x are not cointegrated.

The Engle-Granger (1987) cointegration method involves the application of ordinary least squares (OLS) to the data, and then applying the Augmented Dickey-Fuller test to the residuals. If the null hypothesis of no cointegration is valid, the residuals are I(1) and should approximate zero. Under the alternative hypothesis of stationarity, the value should be negative to a statistically significant extent.

The Engle-Granger methodology of testing for cointegration involves two steps: In the first step, a researcher should proceed with cointegration if both variables turn out to be I(1) (integrated of order one). We estimate the long-run equilibrium relationship in the following form:

$$y_t = \beta_0 + \beta_1 x_t + e_t \qquad (5\text{-}6)$$

In the second step, the estimated residuals ($\hat{e}_t$) will be tested for stationarity. We could perform ADF test on the residuals to determine their order of integration as follows:

$$\Delta e_t = \alpha + \beta t + \rho e_{t-1} + \sum_{i=1}^{p} \delta_i \Delta e_{t-i} + u_t \qquad (5\text{-}7)$$

The null hypothesis is $\rho = 0$ if it is not rejected; one concludes that the e_t contains a unit root. Thus, y_t and x_t are not cointegrated. A determination of cointegration is made (Enders, 1995).

There are several problems with the Engle-Granger procedure. One problem is that it is two-step procedure, so any error in estimating the error term leads to misleading results. Moreover, the results of one regression may indicate that the variables are cointegrated, while the other one suggests no cointegration. The Johansen (1988) approach avoids the use of a two-step procedure and estimates for the presence of multiple cointegrating vectors based on the relationship between the rank of a matrix and its characteristic root or eigenvalues (Gilmore and McManus, 2002).

The methodology developed by Johansen (1991, 1995) involves a multivariate test that is based on the specification of an initial VAR and the establishment of a corresponding vector error correction model (VECM). For any set of n variables, each of which is I(1), there can be up to n-1 separate independent relationships among these variables. The approach is to consider the VAR model of the form:

$$y_t = u + A_1 y_{t-1} + ... + A_p y_{t-p} + \varepsilon_t \qquad (5\text{-}8)$$

Where y_t is nx1 vector of n time series variables, each of which is integrated of order one, u is nx1 vector of intercept, ε_t is nx1 vector of error terms at time t, and p is order of VAR. This VAR model can be represented in VECM as follows:

$$\Delta y_t = u + \Pi\ A_1 y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + \varepsilon_t \qquad (5\text{-}9)$$

Where $\Pi = \sum_{i=1}^{p} A_i - I$ and $\Gamma_i = -\sum_{j=i+1}^{p} A_j$

The number of cointegrating vectors can be obtained by determining the significance of the characteristic roots Π, which can be identified by trace and maximum eigenvalue tests as follows:

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^{k} \ln(1 - \lambda_i) \qquad (5\text{-}10)$$

$$\lambda_{\max}(r, r+1) = -T \ln(1 - \lambda_{r+1}) \qquad (5\text{-}11)$$

Where λ_i equals the estimated values of the characteristic roots (eigenvalues) obtained from the estimated Π matrix, r is number of cointegrating relations (r=0, 1, k-1), k is number of variables in the system, and T is number of observations. The trace test evaluates the null hypothesis that the number of cointegrating vectors is less than or equal to r against the alternative hypothesis (Johansen, 1995).

Assuming that stock prices are determined to be I(1), the Johansen (1988) cointegration test will be applied to measure bivariate and multivariate cointegration among stock markets included in the study. The vector autoregression (VAR) element of the cointegration analysis will be lagged by finding the optimum number of lags empirically. The null hypothesis holds that no cointegration exists. The criterion for the rejection of the null hypothesis in all instances will be a determination of statistical significance at .05.

Cointegration will be tested for each pair of markets among the five GCC stock markets included in the analysis and between each market in the Gulf and selected

developed stock markets. When the stationarity tests permit the rejection of the null hypothesis (non stationarity) for both markets in a pair, it will be feasible to proceed to cointegration testing, which will be performed through the application of vector autoregression (VAR) analysis testing the relationship between the two stock markets. The vectors tested for cointegration will be (z (t, 1)) for market one in a pair and (z (t, 2)) for market two in a pair. If the null hypothesis holds, then no cointegration exists between the vectors, while if the alternative hypothesis holds, then cointegration does exist. Cointegrated variables, if disturbed, will not drift apart from each other and thus possess a long–run equilibrium relationship. A finding of cointegration of stock markets implies that the values of the markets will not vary greatly over the long term.

5.5 Granger Causality Test

The rejection of the null hypothesis will establish the cointegration of the vectors of the weekly market-value weighted values of the two exchanges in the pair tested. Establishing the presence of cointegration, however, does not establish a causal relationship between the two indices.

Determining the presence or absence of a causal relationship between movements in the two indices in a pair will rely on the application of the Granger causality test. The Granger test for causality involves using F-tests to test whether lagged information on a variable *Y* provides any statistically significant information about a variable *X* in the presence of lagged *X*. If not, then "*Y* does not Granger-cause *X*."

To test whether X causes Y, we thus proceed as follows. First, we test the null hypothesis "X does not Granger-cause Y" by running two regressions:

Unrestricted regression: $$Y = \sum_{i=1}^{m} \alpha_i Y_{t-i} + \sum_{i=1}^{m} \beta_i X_{t-i} + \varepsilon_t \qquad (5\text{-}12)$$

Restricted regression: $$Y = \sum_{i=1}^{m} \alpha_i Y_{t-i} + \varepsilon_t \qquad (5\text{-}13)$$

Then, we use the sum of squared residuals to calculate an F statistics as follows:

$$F = (n-k)\frac{(RSS_R - RSS_{UR})}{q(RSS_{UR})}$$

Where RSS_R and RSS_{UR} are the sum of squared residuals in the restricted and unrestricted models respectively; n is number of observations, k is the number of estimated parameters in the unrestricted regression, and q is the number of parameter restrictions. If calculated F is larger than critical F with k-1 and n-k degrees of freedom, we can reject the null hypothesis that "X does not cause Y" (Pindyck and Rubinfeld, 1991).

The same procedure will be applied to our data in order to test for causality. Two procedures will be done. First, we will test the causal relationship between each pair of the GCC stock markets. Second, the Granger causality test will be used to test for causality relationships between each one of GCC stock markets and world developed markets. Our concern here is to see if leading stock markets can drive emerging markets in the Gulf. The presence of a causal relationship between the two indices in a pair will indicate the existence of market integration.

CHAPTER VI

INVESTIGATING THE INTEGRATION OF THE GCC STOCK MARKETS

The purpose of this study was to establish the level of integration that exists (a) among GCC financial markets and (b) between GCC financial markets and major international markets. The specific focus of this chapter is the investigation of bilateral and multilateral integration among five GCC financial markets. The five GCC stock markets included in the analyses represent the five GCC states—Bahrain, Kuwait, Oman, Qatar, and Saudi Arabia. The five GCC financial markets analyzed are as follows:

- Bahrain Stock Exchange (BSE) in Bahrain
- Kuwait Stock Exchange (KSE) in Kuwait
- Muscat Securities market (MSM) in Oman
- Doha Securities Market (DSM) in Qatar
- Saudi Stock Market (SSM) in Saudi Arabia

Three statistical procedures were applied in the investigation of the bilateral integration of the five GCC financial markets. The statistical procedures were as follows:

- Correlation Test: Correlation matrices were developed for each of the 10 bilateral pairs among the five GCC stock markets analyzed.

- Johansen Cointegration Analysis: Johansen Cointegration tests were performed for each of the 10 bilateral pairs among the five GCC financial markets. In order to test for cointegration, the Augmented Dickey-Fuller test was performed first to establish the stationarity (determination of the presence of unit roots) of the data for each of the five GCC stock markets.
- Granger Causality Test: Granger Causality tests were performed for each of the 10 bilateral pairs among the five GCC stock markets

6.1 Correlation Test

A preliminary indication of the relationship among GCC stock markets is provided by a correlation matrix of markets indices, which is given in Table 6.1. The correlation coefficients (two-tailed) for the 10 bilateral pairs of the five GCC financial markets are calculated in the table. As a general rule, correlation coefficients below r= 0.60 are not considered to be strong even if they are statistically significant.

Table 6.1: Correlation Matrix for Market Index among the GCC Markets for the period 8/14/1998 to 8/15/2003.

Market	BSE	DSM	KSE	MSM	SSM
BSE	1				
DSM	-0.245*	1			
KSE	-0.080	0.939*	1		
MSM	0.871*	-0.112*	0.045	1	
SSM	-0.626*	0.784*	0.699*	-0.483*	1

Note: * indicates that correlation is significant at 1%.

First, Bahrain's interactions with each of the other four GCC stock markets included in this study are illustrated in Table 6.1. As the illustration presented in the table indicates, market variations in the Bahrain stock exchange correlate positively with market variations in Oman, but correlate negatively with market variations in Kuwait, Qatar, and Saudi Arabia. The BSE has a strong positive relationship with MSM with correlation coefficient r=.87. On the other hand, the Bahraini market has a strong negative linkage with the SSM, with correlation coefficient r=-.62. Two weak negative correlations were found between the BSE and the KSE as well as between the BSE and the DSM, giving the fact that correlation with the KSE was found to be statistically insignificant at 1 percent.

The Doha Securities Market is correlated positively with the markets of Kuwait and Saudi Arabia and negatively with the markets of Bahrain and Oman. As illustrated in Table 6.1, the relevant correlations are the positive correlation with Kuwaiti and Saudi markets with $r= 0.94$ *and* $r= 0.78$, respectively. Data illustrated in the table also indicate that variations in the Qatari market show a weak negative correlation with market variations in Bahrain and Oman.

The KSE's relations with other GCC stock markets are illustrated in Table 6.1 as well. The Kuwaiti market correlates negatively with the Bahraini market and positively with each of the other three GCC stock markets, while the KSE has strong and significant correlations with the DSM and the SSM with correlation coefficients of .93 and .7 respectively, it has a weak and statistically insignificant (at 1 percent) correlation with the MSM.

As illustrated in Table 6.1, variations in the Omani market correlate positively with market variations in Bahrain and Kuwait and negatively with Qatar and Saudi Arabia. The relevant correlation is the positive correlation with Bahrain (r= 0.87). The MSM correlates weakly with the DSM and the SSM.

Finally, market variations in Saudi Arabia correlate, at a statistically significant level, positively with market variations in Kuwait and Qatar, and negatively with market variations in Bahrain and Oman. The relevant correlations are the positive correlation with KSE (r =0.7), the positive correlation with DSM (r= 0.78), and the negative correlation with BSE (r= – 0.63)

It can be concluded from previous analysis that there are five bilateral correlations. The relevant correlations are as follows:

- The positive correlation between the Bahrain Stock Exchange and the Muscat Securities Market (r= 0.871 [statistically significant at p .01])
- The negative correlation between the Bahrain Stock Exchange and the Saudi Stock Market (r= – 0.626 [statistically significant at p .01])
- The positive correlation between the Kuwait Stock Exchange and the Doha Securities Market (r= 0.939 [statistically significant at p .01])
- The positive correlation between the Kuwait Stock Exchange and the Saudi Stock Market (r= 0.699 [statistically significant at p .01])
- The positive correlation between the Doha Securities Market and the Saudi Stock Market (r =0.784 [statistically significant at p .01])

The correlation analysis provides a preliminary indication that, among the group of five GCC stock markets included in this analysis, there may be two clusters within

which the integration within the clusters is more meaningful than the integration across the five GCC stock markets. The positive and statistically significant correlation between markets indicates that these markets might be integrated. On the other hand, a negative correlation between two markets may indicate that the two stock market clusters are tied in different ways to major international markets, or common characteristics of the markets within the separate clusters cause them to react differently to stimuli. Figure 6.1 illustrates the potential cluster structure of the five GCC markets included in this study.

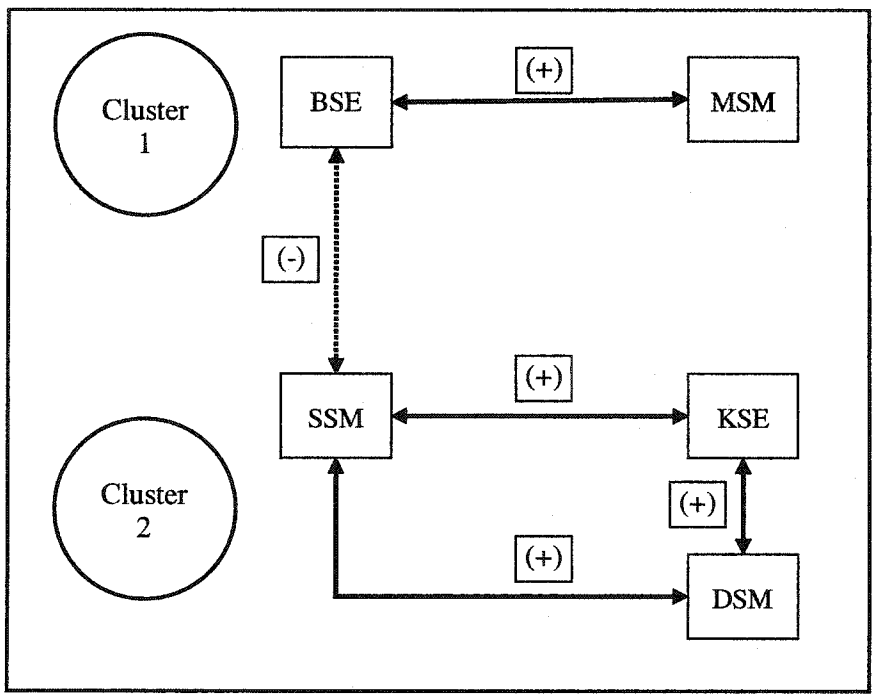


Figure 6.1: GCC Market Clusters

Taken as a dataset, the bilateral correlations provide evidence of two separate and distinct clusters within the group of five GCC markets included in this study as demonstrated in Figure 6.1. The correlation evidence indicates (a) that the stock markets

in Kuwait, Qatar, and Saudi Arabia may be integrated, (b) that the stock markets in Bahrain and Oman may be integrated, (c) that the two market clusters may be tied in different ways to major international markets, and (d) that common (shared) characteristics of the markets within the separate clusters cause them to react differently to stimuli.

Within each of the clusters, the correlation analysis indicates that the possibility exists that the clustered markets are integrated. Between the clusters, however, the correlation analyses indicate that the clusters react differently to stimuli. Further analyses are necessary to determine which, if either, of these alternative scenarios is valid. More analyses follow in this chapter.

6.2 Cointegration Analysis

This section of the chapter examines if there is a long-run statistical relationship among the Gulf stock markets that depends on the method of cointegration. Cointegration investigates linkages between non-stationary variables, so testing for stationarity of the data is necessary to permit the determination of cointegration. The approach of cointegration consists of two parts: (1) testing for a unit root in each stock exchange index by using an Augmented Dickey-Fuller test and (2) testing for bivariate and multivariate cointegration based on Johansen's cointegration analysis.

6.2.1 Augmented Dickey-Fuller Test

Before testing for cointegration, the order of integration of the national indices must be determined. Tests for unit root are performed by using Augmented Dickey-

Fuller (ADF) test. The null hypothesis (H_0) is that the national stock index has a unit root, against the alternative that it does not. The presence of a unit root implies that data are non-stationary, while the absence of a unit root implies that data are stationary.

The ADF test was performed for each of the five GCC stock markets included in this study by using an E-Views application. The test with a constant was applied to both the level series (weekly index in log) and the first difference of the series. The null hypothesis of a unit root is rejected if the t-statistic is less than (lies to the left of) the critical values. Within the context of the ADF test, rejection of H_0 reflects the absence of a unit root (stationarity), while the failure to reject H_0 indicates non-stationarity. The results of the ADF tests to establish stationarity or non-stationarity for GCC stock market indices are summarised in Tables 6.2 and 6.3.

Table 6.2: ADF Findings for Level for GCC Stock Markets

Factor	Market Index				
	BSE	DSM	KSE	MSM	SSM
ADF t-value	-2.84	3.38	0.55	-2.03	0.49
Critical value of t (1%)	-3.46	-3.46	-3.46	-3.46	-3.46
Critical value of t (5%)	-2.87	-2.87	-2.87	-2.87	-2.87
Lag Length	4	0	7	1	2
H_0	Cannot be rejected				
Data Character	Non-stationarity				

The results of the unit root tests based on ADF t-statistics are presented in the two tables. The critical values of the tests are obtained from the table of critical values tabulated by Mackinnon. Lag lengths were chosen according to the Akaike Information Criterion (AIC). For the level series, Table 6.2 shows that the null hypothesis of unit root cannot be rejected at the 5 percent and 1 percent confidence levels in any of the GCC markets. As illustrated in the table, ADF t-values for all GCC markets are larger than critical values, implying that the series are non-stationary. The null hypothesis of a unit root in first difference is rejected for all five stock price index series, as shown in Table 6.3. Statistics of ADF lie to the left of critical values, implying that series are stationary in first difference. These results are broadly consistent with the hypothesis that the national stock indices series are individually integrated of order one, I(1). Since all the series are integrated of the same order, there is a possible chance of cointegration among these series. We proceed through cointegration analysis in the next section.

Table 6.3: ADF Findings for First Difference for GCC Stock Markets

Factor	Market Index				
	BSE	DSM	KSE	MSM	SSM
ADF t-value	-8.53	-13.93	-3.68	-13.19	-9.19
Critical value of t (1%)	-3.46	-3.46	-3.46	-3.46	-3.46
Critical value of t (5%)	-2.87	-2.87	-2.87	-2.87	-2.87
Lag Length	3	0	6	0	1
H_0	Rejected				
Data Character	Integrated of order one I(1)				

6.2.2 Bilateral Cointegration

The Johansen (1991, 1995) efficient maximum likelihood test is used to examine the existence of a long-term relationship among individual Gulf markets. A model of the Johansen procedure was used: the one with a linear trend in level and intercept in the cointegrating equations (CE). This version is more appropriate to our data since we have trending series with stochastic trends. The test is performed using a formulation of a VAR model with lag length determined according to AIC and Akaike's Final Prediction Error (FPE). Determination of cointegration rank (r) depends on values of eigenvalue and trace statistics.

Johansen cointegration tests were performed for each of the 10 bilateral pairs identified within the group of five GCC stock markets. For each pair, cointegration rank of 0 and 1 is examined by comparing the trace statistic to the corresponding critical values at 5 percent and 1 percent. If trace value is higher than critical values, then cointegration exists at that level, and vice versa. The null hypothesis in the test holds that $r = 0$ (no cointegration exists), while the alternative hypothesis holds that $r = 1$ (cointegration exists). The failure to reject the null hypothesis implies that variables are not cointegrated, while the rejection implies that there is at least one cointegrated equation. The results of the Johansen cointegration testing for each of the 10 bilateral pairs of the five GCC financial markets are summarised in Table 6.4.

The Johansen cointegration test outcome indicated that no cointegration exists between the Bahrain Stock Exchange and the Doha Securities Market at both levels of significance as the trace statistic is less than critical values. The correlation analysis showed that the relationship between movements in the two stock markets is weak. The

findings of the cointegration test of the BSE and the DSM are consistent with the finding of the correlation analysis involving these two stock markets.

Table 6.4: Findings of Bilateral Cointegration among GCC Stock Markets

Series	Hypothesized Number of Cointegrated Equations	Trace Statistic	5 % Critical Value	1 % Critical Value
BSE & DSM	None	14.60	15.41	20.04
BSE & KSE	None *	19.59	15.41	20.04
BSE & MSM	None *	16.75	15.41	20.04
BSE & SSM	None	10.96	15.41	20.04
DSM & KSE	None **	23.91	15.41	20.04
DSM & MSM	None	14.49	15.41	20.04
DSM & SSM	None	11.98	15.41	20.04
KSE & MSM	None	11.93	15.41	20.04
KSE & SSM	None	14.35	15.41	20.04
MSM & SSM	None	5.39	15.41	20.04

Note: * and ** denote rejection of the null hypothesis at the 5% and 1% level, respectively.

Table 6.4 shows that cointegration exists between the Bahrain Stock Exchange and the Kuwait Stock Exchange. At r=o, trace statistic (19.6) is higher than critical value at 5 percent; therefore the null hypothesis of no cointegration is rejected. The result implies that there is at most one cointegrating equation between the two variables. The correlation analysis showed that the relationship between movements in the two

stock markets was inverse (negative). Negative cointegration is not compatible with the concept of stock market integration, which assumes a similarity in securities offerings and the ability of investors from each market to hold investment in all securities. The findings of the Johansen cointegration test on the BSE and the KSE are not consistent with the result of the correlation analysis involving these two stock markets.

The findings of the Johansen test point out that cointegration exists between the stock markets in Bahrain and Oman. The hypothesis of no cointegration is rejected at 5 percent, indicating that there is at most one cointegrating equation between the two variables. The findings of the cointegration test of BSE and MSM are consistent with the finding of the correlation analysis, which determined that the relationship between movements in the two stock markets was strongly positive. Positive cointegration is compatible with the concept of stock market integration, which assumes a similarity in securities offerings and the ability of investors from each market to hold investments in all securities

The markets of Bahrain and Saudi Arabia are not cointegrated, as shown by the Johansen cointegration test outcome. The result is surprising because the two countries are relatively integrated economically and financially. The correlation analysis showed that the relationship between movements in the BSE and the SSM was inverse (negative), which is consistent with the findings of the Johansen test.

The strongest level of cointegration was found between markets in Qatar and Kuwait. The Johansen test outcomes illustrate clearly that the null hypothesis of no cointegration is rejected at the 5 percent and 1 percent confidence levels, indicating that there is at most one cointegrating vector. The result is supported by correlation analysis,

which showed that the relationship between movements in the two stock markets was strongly positive. Cointegration as a measurement of market integration suggests that a similarity in securities offerings exists in the DSM and the KSE.

The Doha Securities Market in Qatar is not cointegrated with the stock markets in Oman and Saudi Arabia. Trace statistics of the Johansen test were found to be less than critical values at both levels of significance. Although the correlation analysis showed that the relationship between movements in the DSM and the SSM are positive, cointegration does not support such a result. In the case of the DSM and the MSM, the findings of the Johansen test are consistent with the finding of the correlation analysis.

The results of the Johansen cointegration procedure indicate that no cointegration exists between the Kuwait Stock Exchange and other markets in Oman and Saudi Arabia. In the case of the KSE and the MSM, correlation analysis showed that the relationship between movements in the two markets was positive but weak. However, cointegration does not of necessity exist when correlations are weak. On the other hand, the KSE and the SSM were found to be highly positively correlated, which is not consistent with the findings of the cointegration analysis.

Finally, the Johansen cointegration test outcome indicated that no cointegration exists between the stock markets in Oman and Saudi Arabia. No evidence of correlation was found between movements in the two markets. The findings of the Johansen test of the MSM and the SSM are consistent with the finding of the correlation analysis involving these two stock markets.

The results of the Johansen bilateral cointegration testing show that integration among GCC stock markets is minimal. Out of 10 bilateral pairs of five GCC stock

markets, three pairs were found to be cointegrated. According to the findings of cointegration, market integration exists between the following market pairs:

- Bahrain Stock Exchange and Kuwait Stock Exchange.
- Bahrain Stock Exchange and Muscat Securities Market.
- Doha Securities Market and Kuwait Stock Exchange.

6.2.3 Multilateral Cointegration

The Johansen cointegration test was performed for the set of five GCC stock exchanges to investigate integration of these markets as a group. Analysis using the multiple equations is based on a VAR model, which is required before constructing a related VECM system. The VAR model of order 2, which was chosen according to AIC, contains a 5x1 vector that contains logarithms of share price index of the five markets. The multivariate approach examines the existence of a cointegrating vector in the stochastic matrix, and a sequence of hypotheses test using maximum likelihood methods, establishing the greatest possible number of vectors within the system.

The analysis of the Johansen multivariate approach is a test of a null hypothesis of r cointegrated vectors against the alternative that r+1 cointegrated vectors are present, where r is the number of hypothesized cointegrating equations. In our model, the null hypotheses assume for each row of numbers: zero, at most one, at most two, at most three, and at most four cointegrating equations. The alternative hypothesis states one, two, three, and four cointegrating equations, respectively, for each row. As long as trace statistics exceed critical values at 5 or 1 percent, the alternative hypothesis is

accepted. The results of the Johansen cointegration test for the group of five GCC stock markets are presented in Table 6.5.

As illustrated in the table, trace statistics indicate one cointegrating vector at the 5 percent significance level among the GCC markets. Since the trace statistic of 74.08 exceeds the 5 percent critical value, it is possible to reject the null hypothesis of no cointegrating vectors, indicating that there are one or more cointegrating equations. For the second null hypothesis, trace value (38.14) is less than the 5 and 1 percent critical values, which implies that the null hypothesis can not be rejected, indicating that there is at most one cointegrating vector.

Table 6.5: Findings of Multilateral Cointegration among GCC Stock Markets

Null hypothesis	Trace Statistic	5% Critical Value	1% Critical Value
$r = 0$*	74.08	68.52	76.07
$r \leq 1$	38.14	47.21	54.46
$r \leq 2$	18.92	29.68	35.65
$r \leq 3$	8.63	15.41	20.04
$r \leq 4$	1.45	3.7	6.65

Note: * and ** denote rejection of the mull hypothesis at the 5 percent and 1 percent level, respectively.

Findings of the multilateral cointegration indicate that the level of integration with respect to the group of five GCC financial markets is low because only one

cointegrated vector was found. The results of the Johansen multivariate test of the five GCC stock markets included in this study as a group, however, support the proposition of integration across all five GCC markets on a bilateral basis because only three pairs were found to be integrated. The result of minimum integration, however, is not surprising since GCC countries did not remove all the barriers to the flow of capital among member countries.

6.2.4 Vector Error Correction Model

Because cointegration exists among stock price indices in the GCC countries, a Vector Error Correction Model (VECM) can be estimated. The VECM describes the adjustment of the system toward its long-run equilibrium. Cointegrated variables deviate from a long-run position; therefore, they have an error correction representation such that each responds to deviation from the long-run equilibrium. The VECM is performed for the group of GCC markets based on the VAR model that has been constructed to investigate for multivariate cointegration.

Table 6.6 presents the estimation of VECM, which, in our study, includes five equations. At the top of the table, the model has ΔLBSE, ΔLDSM, ΔLKSE, ΔLMSM and ΔLSSM as dependent variables. On the right-hand side of each equation, independent variables and coefficients attached to them appear in the rows of the table. The coefficient of cointegrating equation (CE) is considered to be the adjustment parameter. The adjustment coefficient associated with all dependent variables is negative, which supports our result of rejection of no cointegration in all cases. On the other hand, these coefficients are relatively low, indicating a small response to the

previous period's deviation from the long-run equilibrium. Other coefficients of independent variables represent the short-run parameters. A majority of cross-coefficients of lagged first and second difference terms were found to be statistically insignificant.

Table 6.6: Results of VECM for GCC Stock Markets

Independent Variables	Dependent Variables				
	Δ *LBSE*	Δ *LDSM*	Δ *LKSE*	Δ *LMSM*	Δ *LSSM*
CE	-0.041* [-3.81]	-0.058* [-3.02]	-0.072* [-4.04]	-0.026 [-1.20]	-0.041* [-2.27]
$\Delta LBSE_{t-1}$	0.209* [3.24]	0.169 [1.50]	0.059 [0.56]	0.377* [2.93]	-0.056 [-0.53]
$\Delta LBSE_{t-2}$	0.144* [2.23]	0.037 [0.32]	0.065 [0.61]	0.259* [2.00]	0.313* [2.92]
$\Delta LDSM_{t-1}$	0.053 [1.42]	0.014 [0.22]	0.102 [1.67]	-0.147 [-1.97]	-0.023 [-0.38]
$\Delta LDSM_{t-2}$	-0.052 [-1.41]	0.006 [0.087]	-0.013 [-0.21]	-0.029 [-0.39]	-0.038 [-0.61]
$\Delta LKSE_{t-1}$	0.046 [1.13]	0.054 [0.77]	0.072 [1.09]	-0.017 [-0.21]	-0.046 [-0.69]
$\Delta LKSE_{t-2}$	-0.100* [-2.49]	-0.042 [-0.60]	-0.043 [-0.67]	-0.047 [-0.59]	-0.038 [-0.58]
$\Delta LMSM_{t-1}$	-0.031 [-0.97]	0.026 [0.47]	0.006 [0.12]	0.087 [1.37]	-0.092 [-1.76]
$\Delta LMSM_{t-2}$	-0.036 [-1.17]	-0.063 [-1.18]	0.006 [0.11]	0.083 [1.36]	-0.067 [-1.33]
$\Delta LSSM_{t-1}$	0.075 [1.90]	0.118 [1.70]	0.106 [1.65]	0.196* [2.49]	0.160* [2.44]
$\Delta LSSM_{t-2}$	0.079 [1.96]	0.123 [1.75]	0.079 [1.20]	0.068 [0.84]	0.134* [2.01]
C	-0.001 [-1.31]	0.003* [2.30]	0.001 [1.08]	0.000 [0.06]	0.003* [2.17]

Notes:

1. The cointegrating equation can be written as:

$$CE = -3.78 + LBSE_{t-1} - .0078LDSM_{t-1} - .205LKSE_{t-1} - .104LMSM_{t-1} + .176LSSM_{t-1}$$

2. * denotes statistically significant at 5%.

6.3 Test for Causality

Findings of cointegration testing do not indicate the direction of relationship among GCC markets; therefore, Granger causality test was performed to examine the causal relationship among these markets. Since cointegration—at any level—exists, the Granger causality testing is appropriate for bilateral pairs of GCC markets. As Granger (1988) pointed out, if two variables are cointegrated, Granger causality must exist at least in one direction.

As discussed in Chapter five, the Granger causality approach seeks to determine how much of a current variable, *y*, can be explained by past values of *y* and lagged values of another variable *x*. There are four possible patterns of the test. First, there is unconditional causality from *x* to *y*. Second, unconditional causality occurs from y to x. Third, there is bidirectional causality. Fourth, no causality exists between *x* and *y*.

The Granger test is applied to log values for the five GCC stock indices. Table 6.7 presents the output of the test, which includes calculated F-statistics and probability for each pair of the five markets. As probability of non-causality is less than 0.25, the hypothesis of non-causality is rejected, indicating that a causal relationship exists. Findings of the Granger causality test show clearly that causality in terms of co-dependencies on each other's lagged indices runs from the Saudi market to all other GCC markets. Thus, the Saudi stock market has a leading position with respect to other markets in Bahrain, Kuwait, Qatar, and Oman, and therefore prices on the SSM influence those in other markets, while the reverse does not hold. As illustrated in Table 6.7, the probability of accepting the null hypothesis that LSSM does not cause LBSE is only around 2.7 percent, which means that the SSM affects the BSE by around 97.3

percent. By the same token, the results indicate that the SSM causes the DSM, the KSE, and the MSM by approximately 99.3 percent, 99.9 percent, and 99.2 percent, respectively. Although the SSM was not found to be cointegrated with any GCC market, the causality test indicates that the presence of SSM's prices as an independent variable is essential to improve explanation of other GCC markets.

Table 6.7: Results of Granger Causality Test for GCC Stock Markets

Null Hypothesis:	Observations	F-Statistic	Probability
BSE does not cause DSM	260	3.80707	0.02349
DSM does not cause BSE		2.5389	0.08095
BSE does not cause KSE	260	8.03859	0.00041
KSE does not cause BSE		1.89848	0.15191
BSE does not cause MSM	260	8.97463	0.00017
MSM does not cause BSE		0.78492	0.45726
BSE does not cause SSM	260	0.20495	0.81482
SSM does not cause BSE		3.63095	0.02787
DSM does not cause KSE	260	8.84058	0.00019
KSE does not cause DSM		5.24166	0.00588
DSM does not cause MSM	260	2.00497	0.13678
MSM does not cause DSM		1.11671	0.32895
DSM does not cause SSM	260	0.65887	0.51832
SSM does not cause DSM		5.04056	0.00713
KSE does not cause MSM	260	2.10166	0.12437
MSM does not cause KSE		5.11412	0.00664
KSE does not cause SSM	260	0.41435	0.66121
SSM does not cause KSE		7.10992	0.00099
MSM does not cause SSM	260	0.58578	0.55742
SSM does not cause MSM		4.91779	0.00802

The results suggest a Granger causality running from the Bahraini market to markets in Qatar, Kuwait, and Oman, while the BSE is affected by movements on the DSM and the KSE. The BSE causes the DSM, the KSE, and the MSM by around 97.6 percent, 99.96 percent, and 99.98 percent respectively. On the other hand, the DSM and

the KSE cause the BSE by approximately 91.9 percent and 84.8 percent, in that order. Therefore, bidirectional causal relationships exist between the Bahraini market and those in Qatar and Kuwait, and unidirectional causality exists from the Bahraini market to the Omani market. Given the result that the BSE is cointegrated with the KSE and the MSM, the Granger causality test supports cointegration analysis by finding at least a one-direction causal relationship among cointegrated markets.

Movement on the stock market in Qatar was found to affect markets in Kuwait and Oman by around 99.9 percent and 86.3 percent respectively, while only the Kuwaiti market causes the Qatari market by 99.4 percent. The cross-effects between the DSM and the KSE were approximately equal, and there is only one-direction causality from the DSM to the MSM. Bidirectional causality between the DSM and the KSE supports the bilateral cointegration test, which found that the two markets are cointegrated.

Bidirectional causality was found between the markets in Kuwait and Oman, as shown in Table 6.7, even though no cointegration exists between the two markets. The probability of accepting the null hypothesis that the KSE does not cause the MSM is 12.4 percent, while the probability of accepting the null hypothesis that the MSM does not cause the KSE is less than 1 percent. That means the KSE causes the MSM by 87.5 percent and the MSM causes the KSE by 99.3 percent.

CHAPTER VII

INTEGRATION OF THE GCC STOCK MARKETS AND MAJOR INTERNATIONAL STOCK MARKETS

The GCC stock markets, as emerging markets, might be affected by movements in markets of developed countries. Several studies conclude that there is volatility spill-over from stock markets in developed countries to emerging markets in developing countries.[9] The purpose of this chapter is to establish the level of integration that exists between GCC stock markets and those in developed countries. The specific focus of this chapter is the investigation of the bilateral integration of the five GCC stock markets individually with markets in the United States, the United Kingdom, Japan, and other developed markets represented by the Morgan Stanley Capital International index. For this purpose, four major stock market indices have been selected:

- S&P 500 Index (United States)
- FTSE 100 Index (United Kingdom)
- Nikkei 225 Index (Japan)
- MSCI World (in US $) Index, which reflects stock markets in 23 developed countries.

The scope and method of investigation is similar to the one in Chapter 6. Statistical analysis is applied in the investigation of the bilateral integration of the five GCC stock markets and the major markets in developed countries represented by the

[9] For example, see Fischer and Palasvirta (1990) and To. et al. (1994).

S&P 500, FTSE 100, Nikkei 225, and MSCI. Statistical procedures contain correlation analysis, test for cointegration, including test for stationarity, and Granger causality test.

7.1 Correlation Test

Correlation coefficients are calculated between each market in the GCC and developed markets as a preliminary indication of integration among these markets. The correlation matrix for 20 bilateral pairs of the five GCC stock price indices with each of the four international indices is presented in Table 7.1. Data presented in the table include bilateral correlation coefficients (two-tailed) for price index level in the five Gulf markets and the S&P 500, FTSE 100, Nikkei 225, and MSCI. Again, as a general rule, correlation coefficients (r) below 0.60 are not considered to be strong even if they are statistically significant.

Table 7.1: Correlation Matrix for Market Index among GCC and Developed Stock Markets for the period from 8/14/1998 to 8/15/2003

Market Index	S&P 500	FTSE 100	NIKKEI 225	MSCI
BSE	0.28	0.35	0.56	0.45
DSM	-0.77	-0.86	-0.74	-0.71
KSE	-0.73	-0.80	-0.68	-0.68
MSM	0.27	0.30	0.55	0.44
SSM	-0.54	-0.66	-0.69	-0.60

Note: all coefficients are statistically significant at 1%.

Bahraini and Omani markets' interactions with each of the four major international stock market measures included in this study are similar in terms of

strength and direction. As the illustration presented in Table 7.1 indicates, market variations in stock exchanges in Bahrain and Oman correlate positively with variations in major international stock markets. The bilateral correlations involving the BSE and the four international indices were all positive but weak, since all four coefficients were below 0.60 (ranging from 0.28 to 0.56). The lowest bilateral correlation involved the S&P 500, while the highest bilateral correlation involved the Nikkei 225. In the case of the MSM, as was true of the BSE, all four coefficients were less than 0.60 as well (ranging from 0.27 to 0.55). The lowest bilateral correlation involved the S&P 500, while the highest bilateral correlation involved the Nikkei 225.

Interactions of stock markets in Qatar, Kuwait, and Saudi Arabia with each of the four major international stock markets are demonstrated in Table 7.1 as well. As illustrated in the table, market variations in Qatari, Kuwaiti and Saudi stock exchanges correlate negatively with variations in each of the four measures of major international stock markets. With the exception of one coefficient that involves the SSM and S&P 500, all bilateral correlations relating the DSM, the KSE, and the SSM with developed markets were considered to be strong (r above 0.60). Negative correlations involving the stock market in Qatar are similar in strength to those correlations that characterize the stock market in Kuwait with the four major markets. For both markets, the strongest negative correlation was found with the FTSE 100 index, while the weakest correlation was found with the MSCI. For the Saudi market, the strongest and weakest correlations were with the Nikkei 225 and S&P 500, respectively. However, highly negative, statistically significant bilateral correlations are incompatible with the assumptions of stock market integration.

From correlation analysis, two clusters of GCC stock markets can be clearly distinguished in terms of linkage with major financial markets. The first cluster, which includes Bahrain and Oman, has a positive relationship with developed stock markets. The second cluster, which includes Qatar, Kuwait, and Saudi Arabia, correlates negatively with major stock markets. Further, negative correlations in cluster two are much stronger than the positive correlations that characterize the relationship in the first cluster. The results of cointegration analyses in the following section provide additional information relative to the influence of the main international stock markets on the stocks market in the Gulf region.

7.2 Cointegration Analysis

A cointegration approach was applied to investigate the existence of long-run relationships between the GCC stock markets and major markets in developed countries. Testing for stationarity is required to proceed through cointegration analysis since cointegration investigates linkage between non-stationary variables. Using a similar procedure to the one in Chapter 6, the approach of cointegration consists of two steps: (1) testing for stationarity in each stock exchange index of the four major markets by using the ADF test and (2) testing for cointegration between markets in the Gulf region and those in developed countries based on the Johansen cointegration analysis.

7.2.1 Augmented Dickey-Fuller Test

In the previous chapter, we concluded that the GCC stock price index series are non-stationary and integrated at order one I(1). Similar results are needed for stock

market index series of developed markets to be able to investigate for cointegration among the GCC and the major markets. The series of price index in developed markets must be I(1) since cointegration exists only among series of the same order of integration.

The ADF test was performed for each of the four indices of developed financial markets included in this study. The test with a constant was applied to both the level series (weekly index in log) and the first difference of the series. The null hypothesis of a unit root is rejected if the t-statistic is less than (lies to the left of) the critical values. Within the context of the ADF test, rejection of H_0 reflects the absence of a unit root (stationarity), while the acceptance of H_0 indicates non-stationarity. Findings of the ADF test for level and first difference are summarized in Tables 7.2 and 7.3.

Table 7.2: ADF Findings for Level
for Developed Stock Markets

Factor	Market Index			
	S&P 500	FTSE 1000	NIKKEI 225	MSCI
ADF t-value	-1.09	-0.79	-.74	-.62
Critical value of t (1%)	-3.46	-3.46	-3.46	-3.46
Critical value of t (5%)	-2.87	-2.87	-2.87	-2.87
Lag Length	1	0	0	0
H_0	Cannot be rejected			
Data Character	Non-stationary			

Table 7.3: ADF Findings for First Difference for Developed Stock Markets.

Factor	Market Index			
	S&P 500	FTSE 1000	NIKKEI 225	MSCI
ADF t-value	-17.65	-15.81	-16.13	-16.12
Critical value of t (1%)	-3.46	-3.46	-3.46	-3.46
Critical value of t (5%)	-2.87	-2.87	-2.87	-2.87
Lag Length	0	0	0	0
H_0	Rejected			
Data Character	I(1)			

Tables 7.2 and 7.3 present ADF t-statistics associated with critical values and lag length, which was chosen according to AIC for the level and first-difference series of stock price index in developed markets. All series are non-stationary in level, as shown in Table 7.3, as ADF t-values for all price index series are larger than critical values. For the first-difference series, the null hypothesis of a unit root is rejected for all four stock price index series because statistics of the ADF lie to the left of critical values, implying that the series are stationary in first difference as demonstrated in Table 7.3. Since all the series are integrated of order one, there is a possible chance of cointegration between stock markets in the Gulf area and those in developed countries. We proceed through cointegration analysis in the next section.

7.2.2 Test for Cointegration

A version of the Johansen model similar to that used in Chapter 6, which is the one with a linear trend in level and intercept in cointegrating equation, was used to test for the presence of a long-term relationship between stock markets in the Gulf region and in developed countries. Again, the test is performed by using a VAR framework with an order determined according to AIC and FPE. Determination of cointegration rank (r) depends on values of eigenvalue and trace statistic.

Johansen cointegration tests were performed for each of the 20 bilateral pairs involving the five GCC financial markets and the four major international markets. The null hypothesis in the test holds that $r = 0$ (no cointegration exists), while the alternative hypothesis holds that $r = 1$ (cointegration exists). The rejection of the null hypothesis depends on trace statistics compared to the corresponding critical values at 5 percent and 1 percent. If the trace value is higher than the critical values, then cointegration exists at that level, and vice versa.

The trace statistics for each pair are presented in Table 7.4. The table shows that cointegration exists between the Bahrain Stock Exchange and all major international stock markets included in the study. In the case of the S&P 500 and the MSCI, trace statistics (20.52, 25.84) are higher than critical values at 5 percent and 1 percent; therefore, the null hypothesis of no cointegration is rejected at both levels of significance. The hypothesis of no cointegration is rejected at 5 percent in the case of the FTSE 100 and the Nikkei 225. Trace statistics (16.62, 18.17) are higher than the critical value at 5 percent. These results imply that there is at most one cointegrating equation between the BSE and each one of the four measures of developed markets.

Although the correlation analysis found a positive correlation between the BSE and these markets, the correlation was not particularly strong. Therefore, the finding of cointegration among these markets is inconsistent with the correlation analysis. The positive correlation associated with cointegration is compatible with the concept of stock market integration, which assumes a similarity in securities offerings and the ability of investors from each market to hold investment in all securities.

Table 7.4: Bilateral Cointegration Findings for GCC and Developed Stock Markets

Market Index	S&P 500	FTSE 100	NIKKEI 225	MSCI
BSE	20.52**	16.62*	18.17*	25.84**
DSM	13.95	14.08	10.76	11.25
KSE	5.34	9.59	9.32	8.05
MSM	10.44	8.04	8.19	12.34
SSM	11.99	8.71	7.21	11.02

Notes:
(1) critical values at 5% and 1% are 15.41 and 20.04 respectively.
(2)* and ** indicate rejection of significance of trace statistic at 5% and 1% and therefore indicate the presence of a cointegrating vector.

The findings of the Johansen test point out that there is no evidence of cointegration among other markets in the Gulf region and major stock markets. The hypothesis of no cointegration cannot be rejected at both levels of significance. With respect to the stock markets in Qatar, Kuwait, and Saudi Arabia, the finding of no cointegration is not surprising, as the correlation analyses found that each of these three GCC markets moved inversely with changes in each of the four measures of major

international stock markets. With respect to the Muscat Securities Market of Oman, the correlation analysis found a weak positive correlation between the MSM and the major markets; therefore, the finding of no cointegration is consistent with correlation analysis.

7.3 Test for Causality

In order to investigate for causal relationships among GCC and developed markets, Granger causality test was performed. Although the test provides the possibility of two directions of relationship, our main concern here is to focus on unidirectional causality from developed markets to GCC markets. Because the GCC stock markets are extremely small compared to the developed markets, it is assumed here that these markets do not have the capability to affect leading world stock markets. The Granger test was applied to log values for the five GCC stock indices and the four measures of developed markets as well. Output of the test is presented in the following tables, which include calculated F-statistics and probability for each pair in the two blocks. The hypothesis of non-causality is rejected because probability of non-causality is below 25 percent, indicating that a causal relationship exists.

Findings of the Granger causality test show clearly that causality runs from major stock markets to the Bahraini market. Movements in stock markets in the US, the UK, Japan, and other developed countries influence the BSE. As illustrated in Table 7.5, S&P 500, FTSE 100, Nikkei 225, and MSCI cause the BSE by 99.93 percent, 99.98 percent, 75 percent and 99.99 percent, respectively. These results reinforce

cointegration findings, since it was found that the BSE was cointegrated with all developed markets included in the study.

Table 7.5: Results of Granger Causality Test for BSE and Developed Markets

Null Hypothesis	F-Statistic	Probability
S&P 500 does not cause BSE	7.50318	0.00068
FTSE 100 does not cause BSE	8.95196	0.00017
NIKKEI 225 does not cause BSE	1.38343	0.25259
MSCI does not cause BSE	9.0531	0.00016

The results reported in Table 7.6 suggest a Granger causality running from stock markets in the UK, Japan, and other developed countries to the stock market in Qatar, while the US market does not have an effect over the Qatari market. In spite of lack of cointegration between the DSM and developed markets, fluctuations of the FTSE 100, Nikkei 225, and MSCI affect the DSM price index by around 99.24 percent, 80.06 percent and 90.15 percent, respectively.

With the exception of the US market, all developed markets included in the study had significant influence on the stock market in Kuwait, as illustrated in Table 7.7. Fluctuations of the FTSE 100, Nikkei, and MSCI had an impact on the index of the KSE by around 82 percent, 98 percent and 86.4 percent, respectively. Although no cointegration was found between the KSE and the developed markets, results of the

Granger test indicate that leading markets need to be included to explain changes in the Kuwaiti market

Table 7.6: Results of Granger Causality Test for DSM and Developed Markets

Null Hypothesis	F-Statistic	Probability
S&P 500 does not cause DSM	1.22445	0.29564
FTSE 100 does not cause DSM	4.9795	0.00756
NIKKEI 225 does not cause DSM	1.62282	0.19937
MSCI does not cause DSM	2.33863	0.09853

Table 7.7: Results of Granger Causality Test for KSE and Developed Markets

Null Hypothesis	F-Statistic	Probability
S&P 500 does not cause KSE	0.88976	0.41202
FTSE 100 does not cause KSE	1.72038	0.18107
NIKKEI 225 does not cause KSE	3.94088	0.02063
MSCI does not cause KSE	2.0111	0.13596

Movements on the Omani market were caused only by those on the UK market, as suggested by the results of the Granger test shown in Table 7.8. Even though no cointegration exists between the two markets, the probability of accepting the null hypothesis that the FTSE 100 index does not cause the index of the MSM is 16 percent, implying that the UK market causes the Omani market by around 84 percent.

Table 7.8: Results of Granger Causality Test for MSM and Developed Markets

Null Hypothesis	F-Statistic	Probability
S&P 500 does not cause MSM	0.46341	0.62966
FTSE 100 does not cause MSM	1.84051	0.16084
NIKKEI 225 does not cause MSM	0.71823	0.4886
MSCI does not cause MSM	0.31278	0.73169

Finally, results of the Granger causality test indicate that major markets had a significant impact on the Saudi Stock Market. As shown in Table 7.9, movements on stock markets in the US, the UK, Japan, and other developed countries represented by the MSCI cause the stock market in Saudi Arabia by 98.2 percent, 99.8 percent, 92.3 percent and 99.1 percent, respectively. With lack of cointegration between the SSM and developed markets, the results of the Granger test indicate that the presence of measures of developed markets will improve explanation of changes in the Saudi market.

Table 7.9: Results of Granger Causality Test for SSM and Developed Stock Markets

Null Hypothesis	F-Statistic	Probability
S&P 500 does not cause SSM	4.07527	0.01811
FTSE 100 does not cause SSM	6.57489	0.00164
NIKKEI 225 does not cause SSM	2.58974	0.07701
MSCI does not cause SSM	4.83059	0.00873

CHAPTER VIII

SUMMARY, CONCLUSIONS, AND POLICY RECOMMENDATIONS

8.1 Summary of the Study

The purpose of this study was to establish the level of integration that exists among the GCC stock markets and between the GCC stock markets and major international markets. Chapter one is an introductory chapter, which states the problem, purpose, motivation, and organization of the study. Stock market integration is defined in different contexts. Theoretically, stock markets are integrated if expected rate of return on a stock is equal among markets. Operationally, integration is defined in terms of price interdependence between markets. Within the context of the operational definition, the study establishes the level of integration that exists among stock markets in the GCC area and between the GCC stock markets and developed international markets. As GCC stock markets vary from one to another in different aspects, it has been suggested that the integration of these markets would promote economic integration in the region. Closing weekly data for the stock price index were collected for the period from August 1998 to August 2003.

The second chapter provides a review of relevant theoretical literature of stock market integration. Since Grubel introduced his work in 1968, stock market integration has been the subject of extensive research. Research results differ according to methodology, model, and data used. Major studies can be divided into three categories.

First, studies of stock markets in developed countries concluded different results; some concluded a relationship among markets, while other found that developed markets are segmented. Second, studies focused on integration between developed and emerging markets. Findings also differ. While some studies concluded that interdependence exists, while others found a low correlation, giving substantial benefits to invest in emerging markets. Third, some studies focused on a specific geographic region. Results in these studies varied as well, from a high level to a low level of integration among markets within a region.

Chapter three begins with an economic overview of the GCC countries. It is obvious that these countries have oil-based and very open economies. In the last decade, member countries had an average of 4 percent economic growth. Inflation rates have been low, with an average of 1.6 percent. Fiscal accounts have improved as budget deficit/ GDP ratio has declined in all countries. Current accounts moved from deficit to surplus in most countries.

The second part of the chapter reviews efforts toward economic integration in the Gulf region. As stated in the Charter of the Gulf Cooperation Council in 1981, economic cooperation is one of the main objectives of the council. Therefore, the GCC countries have worked toward economic integration since creation of the council. The Unified Economic Agreement implemented in 1981 represented a general framework for economic integration. Member countries recently completed implementation of a customs union, with a common external tariff of 5 percent in 2003. The year 2010 is set as the target date for monetary union and a single currency in an effort to achieve a

strong economic bloc. The currencies of all GCC member states are already pegged to the US dollar as a step toward a common currency.

Facts of financial integration and capital liberalization among member countries are discussed in the last part of the chapter. Degree of openness of financial systems varies from one country to another. Bahrain has the most liberalized system across the GCC countries. With respect to openness of stock markets, the stock markets in Bahrain and Oman were found to have the most open markets to both GCC country and foreign investors. Other markets still impose some restrictions on participation in the local stock markets by non-nationals. The market accessibility and cross-trading are still lacking. Direct investment across member countries is still below expected levels. GCC countries are poorly integrated globally in terms of FDI flows, as these countries receive very small amounts of FDI.

Chapter four explores the historical development of the GCC stock markets. Stock markets in the Gulf region are of fairly recent origin in comparison with well-established markets in the Western world. The stock market in Kuwait, the oldest in the region, dates back only to the late 1960s, while other GCC markets were not established until the late 1980s and 1990s. By world standards, the capitalization of the GCC stock markets is small. Nevertheless, when the economic size of the GCC countries is taken into consideration, their markets seem to be well capitalized. With respect to activity, the Kuwaiti market is the most dynamic market. The stock market in Qatar has made the highest gains compared to other Gulf stock markets in the last five years. Market regulation varies from country to another—while some countries have an independent market authority, other markets are regulated by a common committee.

Methodology of the study is presented in Chapter five. The model used to investigate for market integration depends on degree of price co-movement. Greater degrees of co-movements generally reflect greater stock market integration. The study requires measurement of correlation, cointegration, and use of the Granger causality test. The Pearson correlation coefficient, which measures a linear relationship between two variables, was calculated as a preliminary indication of stock market integration. Testing for stationarity needs to be done as a prior step to cointegration. For this purpose, a model of ADF test with intercept was applied to logarithmic values of each country's stock index. The theory of cointegration, which was developed by Engle and Granger (1987), has powerful statistical and economic implications. The definition of cointegration states that if y and x are I(1), then the residuals from the regression of those series would be also I(1), unless they are cointegrated. Johansen (1988) extended the model for any set of n variables based on a VAR framework. A finding of cointegration of stock markets implies that these markets will not vary greatly over the long term. The Granger causality test measures the causal relationship between two variables. It involves using F-tests to test whether lagged information on a variable X provides any statistically significant information about a variable Y in the presence of lagged Y. If not, then "X does not Granger-cause Y." In our study, the presence of a causal relationship between two indices in a pair will indicate the existence of market integration.

Chapter six presents the investigation of integration among the five GCC member state stock markets. The investigation of integration determines that linkage exists among these markets in different contexts. Correlation analysis differentiates

markets in two clusters. Cluster one involves positive correlation between the BSE and the MSM, while the second one embraces positive correlation among the DSM, the KSE and the SSM. The two clusters link negatively as represented by a negative correlation between the BSE and the SSM. After finding that GCC stock price series are nonstationary and integrated of the same order, a bilateral cointegration test was performed among the 10 GCC stock market pairs. The results show that cointegration exists between the BSE and the KSE, the BSE and the MSM, and the DSM and the KSE. As a group, one cointegrating equation was found among the five markets. The VECM predicts negative coefficients of adjustment, which supports evidence of cointegration. Finally, the Granger test indicated that causal relationships occur among the five markets, and that the Saudi stock market is the most influential market in the region.

The findings of analysis of the relationships between the five GCC stock markets and major international markets included in this study are presented in Chapter seven. Correlation analysis concludes that the GCC markets can be divided into two groups in terms of linkage with major markets. The first group, represented by the BSE and the MSM, has weak positive relationships with developed stock markets, while the second group, which includes the DSM, the KSE, and the SSM, reflects strong negative correlations with these markets. By running ADF test on stock price series of developed markets, it was found that theses data are stationary in the first difference. With the exception of the BSE, no evidence of bilateral cointegration was found between any of the five GCC stock markets and any of the four developed markets. Findings of the Granger causality test show clearly that causality runs from major stock markets to the

Bahraini and Saudi markets. The results also indicate that, with the exception of the US market, all developed markets included in the study had significant influence on stock markets in Kuwait and Qatar, while movements on the Omani market were caused only by those on the UK market.

8.2 Conclusions

Despite a strong commitment to integration, the GCC members' pace has been slower than planned. Due to political unrest in the region since creation of the council, most GCC cooperation was focused on defence and military cooperation rather than economic cooperation. Other factors such as similarity in economic structure, bureaucratic processes of implementing rules and regulations, and lack of coordination of economic policies led to a slow path of economic integration. As a result, capital mobility among member countries has been low, and far below expectations. These factors have had a negative effect on financial integration among member countries. These factors also have played a major role in lack of integration and FDI. Moreover, member counties still impose restrictions on FDI and foreign investors who want to invest in the local stock market. Variation in governmental policies applying trading on these exchanges led to different degrees of openness of these markets. As a result, stock markets in the Gulf region were less integrated with markets in the rest of the world.

Empirical findings provide several conclusions with respect to integration among GCC stock markets and between them and developed stock markets. A main conclusion drawn from the study is that integration among the five GCC financial markets exists in different contexts. Correlation analysis concludes that two distinct

stock market clusters exist. Cluster one includes the BSE and the MSM, while the second one includes the DSM, the KSE, and the SSM. Cointegration exists clearly within the two clusters, thus, it indicates the presence of two distinct market clusters within the framework of the five GCC stock markets included in this study.

In terms of co-dependencies on each other, the Saudi Stock Market is the most influential market, while the Omani market is the least influential market in the region. The findings of the study suggest that Saudi stock market has the most causal linkages with the other GCC markets, and that market can explain and predict the movements of all other GCC equity markets.

With respect to relationships between each market in the GCC area and the four measures of major international stock markets, correlation analysis concludes that GCC markets can be divided into two groups. The first group, which includes stock markets in Bahrain and Oman, shows some weak positive relationships with major markets, while the second group, which includes the stock markets of Qatar, Kuwait, and Saudi Arabia, reflects strong negative correlations with developed markets. The correlation is much stronger among markets in the cluster of GCC stock markets that is not moving in the direction of major stock markets than it is among the markets in the cluster of GCC markets that is moving in the same direction with major markets. The findings, however, provide additional support for the possibility that two separate market clusters exist within the framework of the five GCC stock markets.

Another conclusion drawn from the study was that, at present, the GCC stock markets included in this study (with the exception of the BSE) are not cointegrated with the major international stock markets. That can be attributed to the high degree of

openness of the Bahraini market to foreign investors compared to other capital markets in the region. The implication of lack of cointegration is that investors in developed countries can enjoy long-run diversification benefits when their funds are allowd across the Gulf area.

The Granger causality test results conclude that causality runs from major stock markets to emerging stock markets in the Gulf area. However, with lack of cointegration (except in the case of the BSE) between the GCC markets and developed markets, the results of the Granger test indicate that the presence of measures of developed markets will improve escalation of changes in the GCC markets.

8.3 Policy Recommendations

The integration of the GCC stock markets would be beneficial for the GCC member countries. The GCC countries face challenges of developing integrated stock markets. These challenges require specific modifications as part of their economic structural reforms. We identify a number of policy recommendations needed to integrate the GCC financial system, with a particular focus on the need for strengthening stock market integration.

First, the development of integrated stock markets in the GCC region would require completely free capital movement. Restrictions on capital, including participation in local stock markets, must be removed, at least for GCC nationals. That would improve efficiency of markets and transfer back large amounts of GCC capital currently invested overseas. Liberalization of stock markets will provide an opportunity for GCC investors to diversify their portfolios and benefit from information available in

other markets, especially among cointegrated markets. Moreover, liberalization is needed to adopt a single market as countries move toward monetary union in 2010.

Second, foreign investment, including FDI, should be attracted. This will lead to more development of stock markets and to a greater level of integration with developed markets. This implies removing barriers to the participation of international investors and brokers in the stock markets in the GCC countries. As concluded in the study, the GCC markets are not cointegrated with developed markets, which would give foreign investors substantial benefits from diversification.

Third, high-speed communications and advanced technology should be implemented in the GCC stock markets for integrated trading platforms. For example, trading on the Internet or over the phone would increase market accessibility for GCC and international investors and promote market integration.

Fourth, allowance of multiple listing of stocks among the GCC stock markets would help companies to raise capital easily. Large corporations in Saudi Arabia, such as Saudi Basic Industries Company (SABIC), need to be listed in other GCC markets to get access to other countries' investors with large pools of savings and to increase the level of participation in companies' capital. This is consistent with privatization programs in all countries, since governments of the Gulf countries still own a high proportion of their nations' stock companies.

Fifth, coordination of financial policies, laws, and regulations among member countries are required to help move toward financial integration in the region. Authorities in the GCC countries should agree on common standards for accounting,

disclosure, listing requirements, and settlements of shares. Effective financial regulation and supervision would be largely beneficial to market integration in the Gulf region.

All members are implementing some economic reforms intended to liberalise capital among member countries, attract foreign investment, and accelerate the growth of the non-oil sectors. These reforms will pave the way for expansion of trade and flow of capital within the GCC. The future success of the GCC countries depends on stabilization, diversification, privatization, rapid change of laws and regulation, and an increased role in the global marketplace.

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APPENDICES

Appendices A1 and A2 provide output of the ADF test in level and first difference, respectively, for all stock price index series included in the study. Appendix A3 presents detailed results of bilateral and multilateral cointegration among stock markets covered in the study.

Appendix A1

ADF Test in Level

A1.1: ADF in Level for BSE

Null Hypothesis: LBSE has a unit root				
Exogenous: Constant				
Lag Length: 4 (Automatic based on AIC, MAXLAG=15)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-2.839844	0.0542
Test critical values:	1% level		-3.455685	
	5% level		-2.872586	
	10% level		-2.572730	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LBSE)				
Method: Least Squares				
Sample(adjusted): 9/18/1998 8/15/2003				
Included observations: 257 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LBSE(-1)	-0.021248	0.007482	-2.839844	0.0049
D(LBSE(-1))	0.300891	0.061257	4.911954	0.0000
D(LBSE(-2))	0.157157	0.061309	2.563349	0.0110
D(LBSE(-3))	-0.172405	0.061051	-2.823965	0.0051
D(LBSE(-4))	-0.075434	0.059862	-1.260136	0.2088
C	0.159801	0.056523	2.827217	0.0051
R-squared	0.185163	Mean dependent var		-0.000868
Adjusted R-squared	0.168931	S.D. dependent var		0.012826
S.E. of regression	0.011693	Akaike info criterion		-6.036650
Sum squared resid	0.034316	Schwarz criterion		-5.953792
Log likelihood	781.7095	F-statistic		11.40742
Durbin-Watson stat	2.015923	Prob(F-statistic)		0.000000

A1.2: ADF in Level for DSM

Null Hypothesis: LDSM has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic based on AIC, MAXLAG=15)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			3.381081	1.0000
Test critical values:	1% level		-3.455289	
	5% level		-2.872413	
	10% level		-2.572638	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LDSM)				
Method: Least Squares				
Sample(adjusted): 8/21/1998 8/15/2003				
Included observations: 261 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDSM(-1)	0.015298	0.004524	3.381081	0.0008
C	-0.108508	0.033327	-3.255877	0.0013
R-squared	0.042272	Mean dependent var		0.004085
Adjusted R-squared	0.038574	S.D. dependent var		0.021675
S.E. of regression	0.021252	Akaike info criterion		-4.857056
Sum squared resid	0.116982	Schwarz criterion		-4.829742
Log likelihood	635.8459	F-statistic		11.43171
Durbin-Watson stat	1.832910	Prob(F-statistic)		0.000833

A1.3: ADF in Level for KSE

Null Hypothesis: LKSE has a unit root				
Exogenous: Constant				
Lag Length: 7 (Automatic based on AIC, MAXLAG=15)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			0.548418	0.9880
Test critical values:	1% level		-3.455990	
	5% level		-2.872720	
	10% level		-2.572802	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LKSE)				
Method: Least Squares				
Sample(adjusted): 10/09/1998 8/15/2003				
Included observations: 254 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LKSE(-1)	0.002870	0.005233	0.548418	0.5839
D(LKSE(-1))	0.168335	0.064212	2.621551	0.0093
D(LKSE(-2))	0.005216	0.064703	0.080615	0.9358
D(LKSE(-3))	0.196285	0.064532	3.041656	0.0026
D(LKSE(-4))	-0.012656	0.065687	-0.192665	0.8474
D(LKSE(-5))	-0.036725	0.064653	-0.568029	0.5705
D(LKSE(-6))	0.124930	0.065183	1.916596	0.0565
D(LKSE(-7))	0.106845	0.065869	1.622079	0.1061
C	-0.020274	0.039005	-0.519781	0.6037
R-squared	0.136726	Mean dependent var		0.002356
Adjusted R-squared	0.108537	S.D. dependent var		0.020530
S.E. of regression	0.019384	Akaike info criterion		-5.013964
Sum squared resid	0.092055	Schwarz criterion		-4.888625
Log likelihood	645.7734	F-statistic		4.850408
Durbin-Watson stat	1.978270	Prob(F-statistic)		0.000014

A1.4: ADF in Level for MSM

Null Hypothesis: LMSM has a unit root				
Exogenous: Constant				
Lag Length: 1 (Automatic based on AIC, MAXLAG=15)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-2.031782	0.2732
Test critical values:	1% level		-3.455387	
	5% level		-2.872455	
	10% level		-2.572660	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LMSM)				
Method: Least Squares				
Sample(adjusted): 8/28/1998 8/15/2003				
Included observations: 260 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LMSM(-1)	-0.017778	0.008750	-2.031782	0.0432
D(LMSM(-1))	0.200770	0.060605	3.312770	0.0011
C	0.094195	0.046677	2.018016	0.0446
R-squared	0.053876	Mean dependent var		-0.000711
Adjusted R-squared	0.046514	S.D. dependent var		0.025274
S.E. of regression	0.024679	Akaike info criterion		-4.554256
Sum squared resid	0.156527	Schwarz criterion		-4.513171
Log likelihood	595.0533	F-statistic		7.317360
Durbin-Watson stat	2.015893	Prob(F-statistic)		0.000812

A1.5: ADF in Level for SSM

Null Hypothesis: LSSM has a unit root				
Exogenous: Constant				
Lag Length: 2 (Automatic based on AIC, MAXLAG=15)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			0.488934	0.9861
Test critical values:	1% level		-3.455486	
	5% level		-2.872499	
	10% level		-2.572684	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LSSM)				
Method: Least Squares				
Sample(adjusted): 9/04/1998 8/15/2003				
Included observations: 259 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LSSM(-1)	0.002532	0.005179	0.488934	0.6253
D(LSSM(-1))	0.130563	0.062648	2.084075	0.0381
D(LSSM(-2))	0.119857	0.062770	1.909464	0.0573
C	-0.017017	0.039764	-0.427938	0.6691
R-squared	0.039729	Mean dependent var		0.003246
Adjusted R-squared	0.028431	S.D. dependent var		0.020208
S.E. of regression	0.019918	Akaike info criterion		-4.979038
Sum squared resid	0.101168	Schwarz criterion		-4.924106
Log likelihood	648.7854	F-statistic		3.516660
Durbin-Watson stat	2.004545	Prob(F-statistic)		0.015758

A1.6: ADF in Level for S&P 500

Null Hypothesis: LSP500 has a unit root				
Exogenous: Constant				
Lag Length: 1 (Automatic based on AIC, MAXLAG=15)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-1.085630	0.7220
Test critical values:	1% level		-3.455387	
	5% level		-2.872455	
	10% level		-2.572660	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LSP500)				
Method: Least Squares				
Sample(adjusted): 8/28/1998 8/15/2003				
Included observations: 260 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LSP500(-1)	-0.011332	0.010439	-1.085630	0.2787
D(LSP500(-1))	-0.087157	0.062214	-1.400929	0.1624
C	0.079687	0.073761	1.080341	0.2810
R-squared	0.013258	Mean dependent var		-0.000336
Adjusted R-squared	0.005579	S.D. dependent var		0.028958
S.E. of regression	0.028877	Akaike info criterion		-4.240065
Sum squared resid	0.214309	Schwarz criterion		-4.198980
Log likelihood	554.2085	F-statistic		1.726505
Durbin-Watson stat	1.975245	Prob(F-statistic)		0.179962

A1.7: ADF in Level for FTSE 100

Null Hypothesis: LFTSE100 has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic based on AIC, MAXLAG=15)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-0.790919	0.8196
Test critical values:	1% level		-3.455289	
	5% level		-2.872413	
	10% level		-2.572638	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LFTSE100)				
Method: Least Squares				
Sample(adjusted): 8/21/1998 8/15/2003				
Included observations: 261 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LFTSE100(-1)	-0.006945	0.008781	-0.790919	0.4297
C	0.058690	0.075435	0.778026	0.4373
R-squared	0.002409	Mean dependent var		-0.000959
Adjusted R-squared	-0.001442	S.D. dependent var		0.026205
S.E. of regression	0.026224	Akaike info criterion		-4.436685
Sum squared resid	0.178108	Schwarz criterion		-4.409371
Log likelihood	580.9874	F-statistic		0.625553
Durbin-Watson stat	1.959280	Prob(F-statistic)		0.429715

A1.8: ADF in Level for NIKKEI 225

Null Hypothesis: LNIKKEI225 has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic based on AIC, MAXLAG=15)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-0.743698	0.8324
Test critical values:	1% level		-3.455289	
	5% level		-2.872413	
	10% level		-2.572638	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LNIKKI225)				
Method: Least Squares				
Sample(adjusted): 8/21/1998 8/15/2003				
Included observations: 261 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNIKKI225(-1)	-0.005263	0.007077	-0.743698	0.4577
C	0.048185	0.067021	0.718959	0.4728
R-squared	0.002131	Mean dependent var		-0.001638
Adjusted R-squared	-0.001722	S.D. dependent var		0.030896
S.E. of regression	0.030923	Akaike info criterion		-4.107016
Sum squared resid	0.247660	Schwarz criterion		-4.079702
Log likelihood	537.9656	F-statistic		0.553086
Durbin-Watson stat	2.001274	Prob(F-statistic)		0.457734

A1.9: ADF in Level for MSCI

Null Hypothesis: LMSCI has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic based on AIC, MAXLAG=15)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-0.621514	0.8622
Test critical values:	1% level		-3.455289	
	5% level		-2.872413	
	10% level		-2.572638	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LMSCI)				
Method: Least Squares				
Sample(adjusted): 8/21/1998 8/15/2003				
Included observations: 261 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LMSCI(-1)	-0.004331	0.006969	-0.621514	0.5348
C	0.029741	0.049261	0.603736	0.5465
R-squared	0.001489	Mean dependent var		-0.000857
Adjusted R-squared	-0.002366	S.D. dependent var		0.027683
S.E. of regression	0.027716	Akaike info criterion		-4.326008
Sum squared resid	0.198952	Schwarz criterion		-4.298694
Log likelihood	566.5441	F-statistic		0.386279
Durbin-Watson stat	1.999332	Prob(F-statistic)		0.534808

Appendix A2

ADF Test for First Difference

A2.1: ADF in First Difference for BSE

Null Hypothesis: D(LBSE) has a unit root				
Exogenous: Constant				
Lag Length: 3 (Automatic based on AIC, MAXLAG=15)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-8.527801	0.0000
Test critical values:	1% level		-3.455685	
	5% level		-2.872586	
	10% level		-2.572730	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LBSE,2)				
Method: Least Squares				
Sample(adjusted): 9/18/1998 8/15/2003				
Included observations: 257 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LBSE(-1))	-0.784969	0.092048	-8.527801	0.0000
D(LBSE(-1),2)	0.090794	0.081166	1.118626	0.2644
D(LBSE(-2),2)	0.250502	0.073710	3.398488	0.0008
D(LBSE(-3),2)	0.074186	0.060694	1.222307	0.2227
C	-0.000700	0.000744	-0.940722	0.3477
R-squared	0.375339	Mean dependent var		-5.32E-05
Adjusted R-squared	0.365424	S.D. dependent var		0.014882
S.E. of regression	0.011855	Akaike info criterion		-6.012807
Sum squared resid	0.035419	Schwarz criterion		-5.943759
Log likelihood	777.6457	F-statistic		37.85473
Durbin-Watson stat	2.004947	Prob(F-statistic)		0.000000

A2.2: ADF in First Difference for DSM

Null Hypothesis: D(LDSM) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic based on AIC, MAXLAG=15)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-13.93339	0.0000
Test critical values:	1% level		-3.455387	
	5% level		-2.872455	
	10% level		-2.572660	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LDSM,2)				
Method: Least Squares				
Sample(adjusted): 8/28/1998 8/15/2003				
Included observations: 260 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LDSM(-1))	-0.890490	0.063910	-13.93339	0.0000
C	0.003617	0.001362	2.656166	0.0084
R-squared	0.429379	Mean dependent var		0.000281
Adjusted R-squared	0.427168	S.D. dependent var		0.028560
S.E. of regression	0.021616	Akaike info criterion		-4.823115
Sum squared resid	0.120550	Schwarz criterion		-4.795725
Log likelihood	629.0049	F-statistic		194.1394
Durbin-Watson stat	1.953363	Prob(F-statistic)		0.000000

A2.3: ADF in First Difference for KSE

Null Hypothesis: D(LKSE) has a unit root				
Exogenous: Constant				
Lag Length: 6 (Automatic based on AIC, MAXLAG=15)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-3.682159	0.0049
Test critical values:	1% level		-3.455990	
	5% level		-2.872720	
	10% level		-2.572802	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LKSE,2)				
Method: Least Squares				
Sample(adjusted): 10/09/1998 8/15/2003				
Included observations: 254 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LKSE(-1))	-0.412768	0.112099	-3.682159	0.0003
D(LKSE(-1),2)	-0.414880	0.113174	-3.665852	0.0003
D(LKSE(-2),2)	-0.405292	0.108216	-3.745207	0.0002
D(LKSE(-3),2)	-0.204897	0.103718	-1.975529	0.0493
D(LKSE(-4),2)	-0.213307	0.096699	-2.205879	0.0283
D(LKSE(-5),2)	-0.244005	0.081973	-2.976661	0.0032
D(LKSE(-6),2)	-0.114003	0.064471	-1.768289	0.0783
C	0.001106	0.001238	0.893519	0.3725
R-squared	0.447098	Mean dependent var		0.000144
Adjusted R-squared	0.431365	S.D. dependent var		0.025669
S.E. of regression	0.019356	Akaike info criterion		-5.020611
Sum squared resid	0.092168	Schwarz criterion		-4.909199
Log likelihood	645.6176	F-statistic		28.41785
Durbin-Watson stat	1.977610	Prob(F-statistic)		0.000000

A2.4: ADF in First Difference for MSM

Null Hypothesis: D(LMSM) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic based on AIC, MAXLAG=15)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-13.19006	0.0000
Test critical values:	1% level		-3.455387	
	5% level		-2.872455	
	10% level		-2.572660	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LMSM,2)				
Method: Least Squares				
Sample(adjusted): 8/28/1998 8/15/2003				
Included observations: 260 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LMSM(-1))	-0.803685	0.060931	-13.19006	0.0000
C	-0.000592	0.001540	-0.384082	0.7012
R-squared	0.402747	Mean dependent var		-0.000104
Adjusted R-squared	0.400432	S.D. dependent var		0.032065
S.E. of regression	0.024828	Akaike info criterion		-4.546013
Sum squared resid	0.159041	Schwarz criterion		-4.518623
Log likelihood	592.9817	F-statistic		173.9777
Durbin-Watson stat	2.009420	Prob(F-statistic)		0.000000

A2.5: ADF in First Difference for SSM

Null Hypothesis: D(LSSM) has a unit root				
Exogenous: Constant				
Lag Length: 1 (Automatic based on AIC, MAXLAG=15)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-9.190445	0.0000
Test critical values:	1% level		-3.455486	
	5% level		-2.872499	
	10% level		-2.572684	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LSSM,2)				
Method: Least Squares				
Sample(adjusted): 9/04/1998 8/15/2003				
Included observations: 259 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LSSM(-1))	-0.740900	0.080616	-9.190445	0.0000
D(LSSM(-1),2)	-0.124403	0.061985	-2.006972	0.0458
C	0.002416	0.001263	1.913368	0.0568
R-squared	0.432268	Mean dependent var		3.15E-05
Adjusted R-squared	0.427833	S.D. dependent var		0.026293
S.E. of regression	0.019889	Akaike info criterion		-4.985823
Sum squared resid	0.101263	Schwarz criterion		-4.944624
Log likelihood	648.6640	F-statistic		97.45866
Durbin-Watson stat	2.006160	Prob(F-statistic)		0.000000

A2.6: ADF in First Difference for S&P 500

Null Hypothesis: D(LSP500) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic based on AIC, MAXLAG=15)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-17.64515	0.0000
Test critical values:	1% level		-3.455387	
	5% level		-2.872455	
	10% level		-2.572660	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LSP500,2)				
Method: Least Squares				
Sample(adjusted): 8/28/1998 8/15/2003				
Included observations: 260 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LSP500(-1))	-1.093422	0.061967	-17.64515	0.0000
C	-0.000366	0.001792	-0.204554	0.8381
R-squared	0.546853	Mean dependent var		-1.52E-05
Adjusted R-squared	0.545096	S.D. dependent var		0.042830
S.E. of regression	0.028887	Akaike info criterion		-4.243182
Sum squared resid	0.215292	Schwarz criterion		-4.215792
Log likelihood	553.6137	F-statistic		311.3515
Durbin-Watson stat	1.976006	Prob(F-statistic)		0.000000

A2.7: ADF in First Difference for FTSE 100

Null Hypothesis: D(LFTSE100) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic based on AIC, MAXLAG=15)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-15.80999	0.0000
Test critical values:	1% level		-3.455387	
	5% level		-2.872455	
	10% level		-2.572660	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LFTSE100,2)				
Method: Least Squares				
Sample(adjusted): 8/28/1998 8/15/2003				
Included observations: 260 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LFTSE100(-1))	-0.985808	0.062354	-15.80999	0.0000
C	-0.000963	0.001632	-0.589894	0.5558
R-squared	0.492082	Mean dependent var		7.57E-05
Adjusted R-squared	0.490113	S.D. dependent var		0.036834
S.E. of regression	0.026302	Akaike info criterion		-4.430716
Sum squared resid	0.178477	Schwarz criterion		-4.403326
Log likelihood	577.9930	F-statistic		249.9557
Durbin-Watson stat	1.983518	Prob(F-statistic)		0.000000

A2.8: ADF in First Difference for NIKKEI 225

Null Hypothesis: D(LNIKKI225) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic based on AIC, MAXLAG=15)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-16.13516	0.0000
Test critical values:	1% level		-3.455387	
	5% level		-2.872455	
	10% level		-2.572660	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LNIKKI225,2)				
Method: Least Squares				
Sample(adjusted): 8/28/1998 8/15/2003				
Included observations: 260 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNIKKI225(-1))	-1.010907	0.062652	-16.13516	0.0000
C	-0.001708	0.001926	-0.886872	0.3760
R-squared	0.502260	Mean dependent var		0.000171
Adjusted R-squared	0.500331	S.D. dependent var		0.043860
S.E. of regression	0.031003	Akaike info criterion		-4.101797
Sum squared resid	0.247988	Schwarz criterion		-4.074407
Log likelihood	535.2336	F-statistic		260.3433
Durbin-Watson stat	1.942849	Prob(F-statistic)		0.000000

A2.9: ADF in First Difference for MSCI

Null Hypothesis: D(LMSCI) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic based on AIC, MAXLAG=15)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-16.11562	0.0000
Test critical values:	1% level		-3.455387	
	5% level		-2.872455	
	10% level		-2.572660	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LMSCI,2)				
Method: Least Squares				
Sample(adjusted): 8/28/1998 8/15/2003				
Included observations: 260 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LMSCI(-1))	-1.003741	0.062284	-16.11562	0.0000
C	-0.000909	0.001724	-0.527324	0.5984
R-squared	0.501655	Mean dependent var		2.14E-05
Adjusted R-squared	0.499723	S.D. dependent var		0.039274
S.E. of regression	0.027779	Akaike info criterion		-4.321430
Sum squared resid	0.199088	Schwarz criterion		-4.294041
Log likelihood	563.7860	F-statistic		259.7134
Durbin-Watson stat	1.986141	Prob(F-statistic)		0.000000

Appendix A3

Johansen Cointegration Test

A3.1: Bilateral Cointegration for BSE & KSE

Sample(adjusted): 9/18/1998 8/15/2003				
Included observations: 257 after adjusting endpoints				
Trend assumption: Linear deterministic trend				
Series: LBSE LKSE				
Lags interval (in first differences): 1 to 4				
Unrestricted Cointegration Rank Test				
Hypothesized		Trace	5 Percent	1 Percent
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Critical Value
None *	0.072347	19.58739	15.41	20.04
At most 1	0.001117	0.287249	3.76	6.65
*(**) denotes rejection of the hypothesis at the 5%(1%) level				
Trace test indicates 1 cointegrating equation(s) at the 5% level				
Trace test indicates no cointegration at the 1% level				
Hypothesized		Max-Eigen	5 Percent	1 Percent
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Critical Value
None **	0.072347	19.30014	14.07	18.63
At most 1	0.001117	0.287249	3.76	6.65
*(**) denotes rejection of the hypothesis at the 5%(1%) level				
Max-eigenvalue test indicates 1 cointegrating equation(s) at both 5% and 1% levels				
Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):				
LBSE	LKSE			
10.19293	-1.673284			
4.531841	3.743143			
Unrestricted Adjustment Coefficients (alpha):				
D(LBSE)	-0.002222	0.000267		
D(LKSE)	-0.004263	-0.000359		
1 Cointegrating Equation(s):		Log likelihood	1450.281	
Normalized cointegrating coefficients (std.err. in parentheses)				
LBSE	LKSE			
1.000000	-0.164161			
	(0.09165)			
Adjustment coefficients (std.err. in parentheses)				
D(LBSE)	-0.022646			
	(0.00731)			
D(LKSE)	-0.043453			
	(0.01210)			

A3.2: Bilateral Cointegration for BSE & MSM

Sample(adjusted): 9/18/1998 8/15/2003				
Included observations: 257 after adjusting endpoints				
Trend assumption: Linear deterministic trend				
Series: LBSE LMSM				
Lags interval (in first differences): 1 to 4				
Unrestricted Cointegration Rank Test				
Hypothesized		Trace	5 Percent	1 Percent
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Critical Value
None *	0.052625	16.75107	15.41	20.04
At most 1	0.011058	2.857617	3.76	6.65
*(**) denotes rejection of the hypothesis at the 5%(1%) level				
Trace test indicates 1 cointegrating equation(s) at the 5% level				
Trace test indicates no cointegration at the 1% level				
Hypothesized		Max-Eigen	5 Percent	1 Percent
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Critical Value
None	0.052625	13.89346	14.07	18.63
At most 1	0.011058	2.857617	3.76	6.65
*(**) denotes rejection of the hypothesis at the 5%(1%) level				
Max-eigenvalue test indicates no cointegration at both 5% and 1% levels				
Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):				
LBSE	LMSM			
20.02340	-8.378635			
-5.797980	8.570663			
Unrestricted Adjustment Coefficients (alpha):				
D(LBSE)	-0.002319	-0.000621		
D(LMSM)	0.002240	-0.002218		
1 Cointegrating Equation(s):		Log likelihood	1388.545	
Normalized cointegrating coefficients (std.err. in parentheses)				
LBSE	LMSM			
1.000000	-0.418442			
	(0.07958)			
Adjustment coefficients (std.err. in parentheses)				
D(LBSE)	-0.046435			
	(0.01462)			
D(LMSM)	0.044854			
	(0.02947)			

A3.3: Bilateral Cointegration for DSM & KSE

Sample(adjusted): 9/18/1998 8/15/2003				
Included observations: 257 after adjusting endpoints				
Trend assumption: Linear deterministic trend				
Series: LDSM LKSE				
Lags interval (in first differences): 1 to 4				
Unrestricted Cointegration Rank Test				
Hypothesized		Trace	5 Percent	1 Percent
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Critical Value
None **	0.054837	23.91545	15.41	20.04
At most 1 **	0.035995	9.421247	3.76	6.65
*(**) denotes rejection of the hypothesis at the 5%(1%) level				
Trace test indicates 2 cointegrating equation(s) at both 5% and 1% levels				
Hypothesized		Max-Eigen	5 Percent	1 Percent
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Critical Value
None *	0.054837	14.49420	14.07	18.63
At most 1 **	0.035995	9.421247	3.76	6.65
*(**) denotes rejection of the hypothesis at the 5%(1%) level				
Max-eigenvalue test indicates 2 cointegrating equation(s) at the 5% level				
Max-eigenvalue test indicates no cointegration at the 1% level				
Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):				
LDSM	LKSE			
-9.861447	10.92395			
2.485017	1.690078			
Unrestricted Adjustment Coefficients (alpha):				
D(LDSM)	0.002423	0.003501		
D(LKSE)	-0.003779	0.001872		
1 Cointegrating Equation(s):		Log likelihood	1288.729	
Normalized cointegrating coefficients (std.err. in parentheses)				
LDSM	LKSE			
1.000000	-1.107743			
	(0.11540)			
Adjustment coefficients (std.err. in parentheses)				
D(LDSM)	-0.023896			
	(0.01319)			
D(LKSE)	0.037268			
	(0.01163)			

A3.4: Multilateral Cointegration for GCC Stock Markets

Sample(adjusted): 9/04/1998 8/15/2003				
Included observations: 259 after adjusting endpoints				
Trend assumption: Linear deterministic trend				
Series: LBSE LDSM LKSE LMSM LSSM				
Lags interval (in first differences): 1 to 2				
Unrestricted Cointegration Rank Test				
Hypothesized		Trace	5 Percent	1 Percent
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Critical Value
None *	0.129593	74.08701	68.52	76.07
At most 1	0.071503	38.13914	47.21	54.46
At most 2	0.038980	18.92444	29.68	35.65
At most 3	0.027322	8.626494	15.41	20.04
At most 4	0.005589	1.451622	3.76	6.65
*(**) denotes rejection of the hypothesis at the 5%(1%) level				
Trace test indicates 1 cointegrating equation(s) at the 5% level				
Trace test indicates no cointegration at the 1% level				
Hypothesized		Max-Eigen	5 Percent	1 Percent
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Critical Value
None *	0.129593	35.94787	33.46	38.77
At most 1	0.071503	19.21469	27.07	32.24
At most 2	0.038980	10.29795	20.97	25.52
At most 3	0.027322	7.174873	14.07	18.63
At most 4	0.005589	1.451622	3.76	6.65
*(**) denotes rejection of the hypothesis at the 5%(1%) level				
Max-eigenvalue test indicates 1 cointegrating equation(s) at the 5% level				
Max-eigenvalue test indicates no cointegration at the 1% level				
Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):				
LBSE	LDSM	LKSE	LMSM	LSSM
14.77189	-0.115596	-3.030210	-1.541837	2.596509
-15.53878	5.859704	-6.738855	8.000506	-3.556477
10.77554	7.189304	-7.233968	-7.786740	-1.175907
-5.336614	-1.449494	4.989759	-2.992612	-7.612321
3.659689	6.834003	-3.717848	1.986323	-1.093900
Unrestricted Adjustment Coefficients (alpha):				
D(LBSE)	-0.002805	0.001160	-7.96E-05	0.001149
D(LDSM)	-0.003904	-0.003164	-0.002484	-0.000559
D(LKSE)	-0.004852	0.001157	0.001853	-0.001525
D(LMSM)	-0.001756	-0.003583	0.002403	0.001992
D(LSSM)	-0.002778	0.001532	-0.001030	0.000642

1 Cointegrating Equation(s):		Log likelihood	3371.607	
Normalized cointegrating coefficients (std.err. in parentheses)				
LBSE	LDSM	LKSE	LMSM	LSSM
1.000000	-0.007825	-0.205134	-0.104376	0.175774
	(0.12939)	(0.13216)	(0.09342)	(0.08468)
Adjustment coefficients (std.err. in parentheses)				
D(LBSE)	-0.041440			
	(0.01088)			
D(LDSM)	-0.057664			
	(0.01910)			
D(LKSE)	-0.071675			
	(0.01774)			
D(LMSM)	-0.025942			
	(0.02172)			
D(LSSM)	-0.041039			
	(0.01803)			
2 Cointegrating Equation(s):		Log likelihood	3381.215	
Normalized cointegrating coefficients (std.err. in parentheses)				
LBSE	LDSM	LKSE	LMSM	LSSM
1.000000	0.000000	-0.218671	-0.095678	0.174648
		(0.06153)	(0.09431)	(0.08154)
0.000000	1.000000	-1.729905	1.111625	-0.143805
		(0.27035)	(0.41436)	(0.35825)
Adjustment coefficients (std.err. in parentheses)				
D(LBSE)	-0.059463	0.007121		
	(0.01571)	(0.00429)		
D(LDSM)	-0.008493	-0.018091		
	(0.02738)	(0.00749)		
D(LKSE)	-0.089648	0.007339		
	(0.02571)	(0.00703)		
D(LMSM)	0.029728	-0.020790		
	(0.03115)	(0.00851)		
D(LSSM)	-0.064838	0.009296		
	(0.02609)	(0.00713)		
3 Cointegrating Equation(s):		Log likelihood	3386.364	
Normalized cointegrating coefficients (std.err. in parentheses)				
LBSE	LDSM	LKSE	LMSM	LSSM
1.000000	0.000000	0.000000	-0.522295	0.116099
			(0.08943)	(0.06718)
0.000000	1.000000	0.000000	-2.263348	-0.606992
			(0.65797)	(0.49430)
0.000000	0.000000	1.000000	-1.950959	-0.267753
			(0.52649)	(0.39552)
Adjustment coefficients (std.err. in parentheses)				
D(LBSE)	-0.060321	0.006548	0.001261	
	(0.01758)	(0.00680)	(0.00758)	
D(LDSM)	-0.035262	-0.035951	0.051124	
	(0.03041)	(0.01176)	(0.01311)	

D(LKSE)	-0.069683	0.020659	-0.006495	
	(0.02863)	(0.01107)	(0.01234)	
D(LMSM)	0.055623	-0.003513	0.012080	
	(0.03466)	(0.01340)	(0.01494)	
D(LSSM)	-0.075934	0.001893	0.005546	
	(0.02916)	(0.01127)	(0.01256)	
4 Cointegrating Equation(s):		Log likelihood	3389.951	
Normalized cointegrating coefficients (std.err. in parentheses)				
LBSE	LDSM	LKSE	LMSM	LSSM
1.000000	0.000000	0.000000	0.000000	-4.947671
				(1.51111)
0.000000	1.000000	0.000000	0.000000	-22.55066
				(6.45228)
0.000000	0.000000	1.000000	0.000000	-19.18274
				(5.54683)
0.000000	0.000000	0.000000	1.000000	-9.695225
				(2.91433)
Adjustment coefficients (std.err. in parentheses)				
D(LBSE)	-0.066452	0.004883	0.006993	0.010787
	(0.01792)	(0.00684)	(0.00837)	(0.00850)
D(LDSM)	-0.032280	-0.035141	0.048336	0.001719
	(0.03114)	(0.01189)	(0.01455)	(0.01477)
D(LKSE)	-0.061543	0.022870	-0.014106	0.006872
	(0.02923)	(0.01116)	(0.01365)	(0.01387)
D(LMSM)	0.044992	-0.006401	0.022020	-0.050629
	(0.03537)	(0.01351)	(0.01652)	(0.01678)
D(LSSM)	-0.079361	0.000962	0.008751	0.022633
	(0.02985)	(0.01140)	(0.01394)	(0.01416)

A3.5: Bilateral Cointegration for BSE & S&P 500

Sample(adjusted): 9/18/1998 8/15/2003				
Included observations: 257 after adjusting endpoints				
Trend assumption: Linear deterministic trend				
Series: LBSE LSP500				
Lags interval (in first differences): 1 to 4				
Unrestricted Cointegration Rank Test				
Hypothesized		Trace	5 Percent	1 Percent
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Critical Value
None **	0.066641	20.51789	15.41	20.04
At most 1	0.010812	2.793850	3.76	6.65
*(**) denotes rejection of the hypothesis at the 5%(1%) level				
Trace test indicates 1 cointegrating equation(s) at both 5% and 1% levels				
Hypothesized		Max-Eigen	5 Percent	1 Percent
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Critical Value
None *	0.066641	17.72404	14.07	18.63
At most 1	0.010812	2.793850	3.76	6.65
*(**) denotes rejection of the hypothesis at the 5%(1%) level				
Max-eigenvalue test indicates 1 cointegrating equation(s) at the 5% level				
Max-eigenvalue test indicates no cointegration at the 1% level				
Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):				
LBSE	LSP500			
11.14266	-1.287021			
-1.308426	6.123087			
Unrestricted Adjustment Coefficients (alpha):				
D(LBSE)	-0.002435	-0.000674		
D(LSP500)	0.003878	-0.002449		
1 Cointegrating Equation(s):		Log likelihood	1348.017	
Normalized cointegrating coefficients (std.err. in parentheses)				
LBSE	LSP500			
1.000000	-0.115504			
	(0.12675)			
Adjustment coefficients (std.err. in parentheses)				
D(LBSE)	-0.027134			
	(0.00793)			
D(LSP500)	0.043207			
	(0.01961)			

A3.6: Bilateral Cointegration for BSE & FTSE 100

Sample(adjusted): 9/18/1998 8/15/2003				
Included observations: 257 after adjusting endpoints				
Trend assumption: Linear deterministic trend				
Series: LBSE LFTSE100				
Lags interval (in first differences): 1 to 4				
Unrestricted Cointegration Rank Test				
Hypothesized		Trace	5 Percent	1 Percent
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Critical Value
None *	0.054722	16.62340	15.41	20.04
At most 1	0.008371	2.160309	3.76	6.65
*(**) denotes rejection of the hypothesis at the 5%(1%) level				
Trace test indicates 1 cointegrating equation(s) at the 5% level				
Trace test indicates no cointegration at the 1% level				
Hypothesized		Max-Eigen	5 Percent	1 Percent
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Critical Value
None *	0.054722	14.46309	14.07	18.63
At most 1	0.008371	2.160309	3.76	6.65
*(**) denotes rejection of the hypothesis at the 5%(1%) level				
Max-eigenvalue test indicates 1 cointegrating equation(s) at the 5% level				
Max-eigenvalue test indicates no cointegration at the 1% level				
Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):				
LBSE	LFTSE100			
10.53066	-0.100719			
-3.845417	5.947132			
Unrestricted Adjustment Coefficients (alpha):				
D(LBSE)	-0.002469	-0.000385		
D(LFTSE100)	0.001886	-0.002214		
1 Cointegrating Equation(s):		Log likelihood	1371.966	
Normalized cointegrating coefficients (std.err. in parentheses)				
LBSE	LFTSE100			
1.000000	-0.009564			
	(0.13942)			
Adjustment coefficients (std.err. in parentheses)				
D(LBSE)	-0.025997			
	(0.00743)			
D(LFTSE100)	0.019863			
	(0.01704)			

A3.7: Bilateral Cointegration for BSE & NIKKEI 225

Sample(adjusted): 9/18/1998 8/15/2003				
Included observations: 257 after adjusting endpoints				
Trend assumption: Linear deterministic trend				
Series: LBSE LNIKKI225				
Lags interval (in first differences): 1 to 4				
Unrestricted Cointegration Rank Test				
Hypothesized		Trace	5 Percent	1 Percent
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Critical Value
None *	0.056966	18.16647	15.41	20.04
At most 1	0.011962	3.092692	3.76	6.65
*(**) denotes rejection of the hypothesis at the 5%(1%) level				
Trace test indicates 1 cointegrating equation(s) at the 5% level				
Trace test indicates no cointegration at the 1% level				
Hypothesized		Max-Eigen	5 Percent	1 Percent
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Critical Value
None *	0.056966	15.07378	14.07	18.63
At most 1	0.011962	3.092692	3.76	6.65
*(**) denotes rejection of the hypothesis at the 5%(1%) level				
Max-eigenvalue test indicates 1 cointegrating equation(s) at the 5% level				
Max-eigenvalue test indicates no cointegration at the 1% level				
Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):				
LBSE	LNIKKI225			
11.83311	-1.027050			
-4.715845	4.495809			
Unrestricted Adjustment Coefficients (alpha):				
D(LBSE)	-0.002244	-0.000751		
D(LNIKKI225)	0.003351	-0.002943		
1 Cointegrating Equation(s):		Log likelihood	1323.746	
Normalized cointegrating coefficients (std.err. in parentheses)				
LBSE	LNIKKI225			
1.000000	-0.086795			
	(0.08305)			
Adjustment coefficients (std.err. in parentheses)				
D(LBSE)	-0.026555			
	(0.00860)			
D(LNIKKI225)	0.039650			
	(0.02271)			

A3.8: Bilateral Cointegration for BSE & MSCI

Sample(adjusted): 9/18/1998 8/15/2003				
Included observations: 257 after adjusting endpoints				
Trend assumption: Linear deterministic trend				
Series: LBSE LMSCI				
Lags interval (in first differences): 1 to 4				
Unrestricted Cointegration Rank Test				
Hypothesized		Trace	5 Percent	1 Percent
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Critical Value
None **	0.084740	25.84421	15.41	20.04
At most 1	0.011942	3.087546	3.76	6.65
*(**) denotes rejection of the hypothesis at the 5%(1%) level				
Trace test indicates 1 cointegrating equation(s) at both 5% and 1% levels				
Hypothesized		Max-Eigen	5 Percent	1 Percent
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Critical Value
None **	0.084740	22.75667	14.07	18.63
At most 1	0.011942	3.087546	3.76	6.65
*(**) denotes rejection of the hypothesis at the 5%(1%) level				
Max-eigenvalue test indicates 1 cointegrating equation(s) at both 5% and 1% levels				
Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):				
LBSE	LMSCI			
12.11534	-1.185760			
-3.289804	4.641903			
Unrestricted Adjustment Coefficients (alpha):				
D(LBSE)	-0.002720	-0.000705		
D(LMSCI)	0.004175	-0.002532		
1 Cointegrating Equation(s):		Log likelihood	1359.171	
Normalized cointegrating coefficients (std.err. in parentheses)				
LBSE	LMSCI			
1.000000	-0.097873			
	(0.07196)			
Adjustment coefficients (std.err. in parentheses)				
D(LBSE)	-0.032950			
	(0.00850)			
D(LMSCI)	0.050584			
	(0.02076)			