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Test for the existence of casualty relationships between the market indices of the United States and the Gulf Cooperation Council countries

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TEST FOR THE EXISTENCE OF CAUSALITY RELATIONSHIPS BETWEEN THE MARKET INDICES OF THE UNITED STATES AND THE GULF COOPERATION COUNCIL COUNTRIES

A Project

Presented to the

Faculty of

California State University,

San Bernardino

In Partial Fulfillment

of the Requirements for the Degree

Master of Business Administration:

Finance

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ABSTRACT

Recently, more and more countries realized the importance of integrating their markets internationally. Globalization and markets' liberalization have proved their benefits over the past couple of decades. As a result, more countries are opening and liberalizing their stock markets by lifting restrictions and allowing foreign investors into their markets. This trend has created many alternatives for investors who are seeking to diversify globally.

Diversification involves the task of balancing assets within each portfolio to meet the desired return and risk ratios. Therefore, it is imperative for investors when investing internationally to know how much risk is involved and if the foreign markets invested in are correlated with their own markets. If high correlations are found between markets, the benefits of investing globally will be reduced. Also, high correlations between markets indicate a violation of the efficient market hypothesis where investors in one market can profitably invest in another using the available information.

In the past few years, the member countries of the Gulf Cooperation Council (GCC) have started to follow the market liberty path and are becoming more open to outside

investors. The GCC's markets are very attractive to invest in due to the strong economies of their markets and the growth potential they hold. To find how the GCC markets are related to the world markets, this paper will study and test these markets against one of the world's leading economies: the United States (US). In addition, the two largest markets in the GCC will be tested among the rest of the GCC markets to find the leading market.

Correlation and regression analysis are performed to determine the degree of the relations and to test for any violation of the efficient market hypothesis. The analysis will not only determine the existence of relationships but will also investigate the causality relationships between the markets. The daily data for each market from the end of 2004 to the beginning of 2008 were collected to do the test. The results found that there were no significant relationships between the markets of the GCC and the US due to the too low correlations among the markets. Such findings support the efficient market hypothesis and suggest the existence of potential diversification benefits. Finally, the results of the two largest GCC markets' tests found significant relationships between the GCC markets; also, it found that the United Arab Emirates

is the leading market, as opposed to the previous study's findings of Saudi Arabia as the leading market.

ACKNOWLEDGMENTS

I would like to express my appreciation to the graduate committee: Dr. Mo Vaziri (Committee Chair), Dr. Rafiqul Bhuyan (Second Reader), and Dr. Ghulam Sarwar (Department Chair). I am most grateful to Dr. Vaziri for his guidance and advice throughout my study, which made this project possible. This project would never have been created otherwise. I would like to acknowledge Dr. Ardakani and Dr. Bhuyan for their assistance with this project. Additionally, my sincere gratitude to: Doha Exchange Market (Information & Market Relations Dept.) and Khalid Abdulla Alhajeri (the Bahraini Stock Exchange Market) for providing valuable data. My greatest recognition goes to the Cultural Mission of my country, Saudi Arabia.

DEDICATION

This project was done during the period I was expecting my son, Abdullah Yusef Alyusef, who motivated me to be the best I can be. The timing of my graduation, which will coincide with the great gift of fatherhood, is a blessing from God whom I am the most grateful to. To my beloved wife and mother of my child, Nazanin Madadifar, who was with me through thick and thin and whose unconditional love and encouragement made it possible for this project to see the light. This project has received plenty of help from her, whether editing or data gathering. Therefore, I cannot thank her enough for all she did. This project is devoted to my father, Abdullah Yusef Alyusef, and my mother, Hamdah Alawaji, who have always encouraged and supported me throughout my accomplishments. My sincere thanks go to my wife's parents, Mr. and Mrs. Madadifar, for their love and support. Special thanks go to my uncle, Saleh Alawaji, who has been my mentor and who I always look up to. His words of wisdom will always be valued and treasured. Also, I would like to take this opportunity to thank all my siblings and their families as well as my wife's for their encouragement.

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CHAPTER ONE

INTRODUCTION TO THE PROJECT

Purpose of the Project

To lower the risk involved, investors are always recommended to diversify their investment portfolio among different industries and companies within an economy. Yet, the diversification process is no longer limited to that traditional view. Many investors are becoming aware of the benefits of diversifying their portfolios among other international markets. The benefits of such strategy will lower the risk beyond what might be achieved by only diversifying domestically. Risk is higher when investing only in one market because returns in one market tend to move in tandem due to many reasons such as responses to political, economical, and regulatory changes. Therefore, diversifying ones portfolio domestically will not help in reducing non-systematic risk.

On the other hand, many international markets are realizing the benefits of liberalizing their markets and how eliminating restriction can be very rewarding. The new emerging markets in the global arena have benefitted greatly from foreign investments, which were injected in

their economies and helped in boosting growth. Such benefits are becoming hard to miss. As a result, many countries are loosening their policies against foreign investments. Accordingly, this trend had increased supplies to benefit from market liberalization and to meet the increased demands of foreign investments.

Due to technology, the pace of globalization is becoming faster and remarkably noticeable, pushing for more integration between all free markets. High integrations between markets lead to lower benefits of diversification as markets tend to move together. However, the level of integration differs between one market and another depending on the relation between the two. As a result, investors need to investigate the relationships before investing to determine the degree of the relations and how that might affect their return to risk ratios.

This project tests for such relations between the markets of the Gulf Cooperation Council (GCC) and the United States (US). The GCC countries include the six countries of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates (UAE). The GCC was founded on May 25, 1981 to develop and increase all the aspects of the relationships between the member countries. The GCC

countries are very important members in the international community due to their economical position as they control about 47% of the world's proven oil reserves.

In the past ten years, the GCC countries started the process of liberalizing their markets to certain degrees that vary from one member to another. All six countries' stock markets are put to the test to look for correlations and to determine the impact of any relationships between them and the US. On the other hand, the US is the largest economy of the world and is one of the most influential markets on the GCC economy, as it represents one of the largest energy consumers of their oil production. It was found in many studies that the US market is a world influencing factor not only on the developing market but on the developed markets as well. Therefore, the US was chosen to represents the international market in this study.

The stock markets representing each country are the Bahrain Stock Exchange (BSE) for Bahrain, the Kuwait Stock Exchange (KSE) for Kuwait, the Masqat Securities Market (MSM) for Oman, the Doha Securities Market (DSM) for Qatar, the New York Stock Exchange (NYSE), which is represented by the Standard and Poor's 500 Index (S&P 500) for the US, the Tadawul All Share Index (TASI) for Saudi Arabia, and the

Abu Dhabi Securities Market (ADSM) for the UAE. All of these markets will be examined for the existence of relationships to give the reader an idea of the potentials of investing in the GCC countries and in the US. Also, this test will determine if the relationships violate the efficient market hypothesis theory, which signifies that all available information in a market is already reflected into it as soon as the information is available. Also, this project will determine the relationships among the GCC markets and Saudi Arabia and the UAE who respectively represent the largest capitalization in the GCC.

Scope of the Project

This project will cover a period of three years starting in 2005 and ending in 2007. Daily opening and closing indices' values will be collected to conduct the statistical testing. The idea behind using daily opening and closing data over only daily closing, weekly, or monthly data is the degree of accuracy such data may allow when investigating daily or overnight changes. Correlation analysis was conducted among the return of all seven markets to identify the comovements among any pairs of the markets. Annualized returns for each year of the study

period and standard deviation for each market will be calculated to measure and compare performances.

Also, regression analysis will be conducted between the markets of the GCC and the US to test for interdependency and causality relationships. This analysis will test for the impact of the GCC markets on the S&P 500 and vice versa. Also when overnight returns are detected within a market then the regression analysis will test for any impact of daily returns of one market on the overnight returns of the others. In this study, overnight returns are only found for the KSE and the S&P 500. The other GCC markets had no afterhours trading detected. Additionally, regression analysis will be done between two of the largest capitalization markets in the GCC and the rest of the markets to determine the leader and the degree of influence.

Significance of the Project

The GCC markets do not share any common operation time interval with the US. This means when any one market of the GCC is open, the S&P 500 is closed and vice versa. The study this project follows as a model, which was done by Becker, Finnerty, and Gupta (1991), found that since there

was no time interval between the US and Japan, there was some possibility that investors who were aware of the influence of one market on the other, profitably traded using available public information. Such situations are clear violations of the efficient market hypothesis, which assumes no one should be able to use available public information to their advantage, since such information incorporates itself simultaneously once it becomes available in the market.

As a result, this project follows the leads of previous studies to determine if there is any violation of the efficient market hypothesis between the GCC and the S&P 500 markets. Also, markets' inefficiency will lead to high correlations between markets, which in turn will lead to a reduction of the benefits sought from investing globally. For these reasons, it is important and beneficial for investors to find the relationships between markets, which are susceptible to having high correlations. Due to the strong economical and political relationships between the GCC countries and the US, high correlations are suspected. As a result, tests of such relationships by employing statistical methods are important to disclose findings. In addition, this project will test the relationships among

the GCC countries and the two largest markets in the GCC to determine the leader and the degree of influence.

Limitations of the Project

This project has some limitations, which may have reduced the accuracy of the analysis or may decrease the viability of its findings, if the same study is done in the future. The major limitation is that there are so many variables that a person may consider when testing for relationships between markets. It is impossible to grasp hold of all variables that might cause or contribute to the changes in one variable.

This above fact holds ground in this project as only two major variables are used to test for the relationships, which are the comovement of indices' values and currency exchange rates. Other scholars tried to increase the accuracy of their studies by using other variables such as inflation, transaction and tax costs, trade interdependency, and many other variables. Yet there were always some parts of the movement within a variable, which were not explained by any known causes.

Another limitation is due to the discrepancies between the operation times of the markets in this project. As

mentioned earlier there was no common interval time between the GCC and the S&P 500 markets on a daily basis. The other major discrepancy is the weekly operation schedule of the GCC markets and the S&P 500. The NYSE opens Monday to Friday every week while the rest of the GCC markets open Sunday to Thursday, with the exception of Saudi Arabia, which opens Saturday to Wednesday.

Also national and religious holidays are another operation time discrepancy. The effect of such discrepancy is clear since many days of each market were eliminated due to no common daily operation time between any pair of markets. When only eliminating weekend holidays, there are 991 days in a three year study period. Here we will assume 45 days for national holidays since the national holidays vary between countries. This will give us 946 days that can be used to test for relationships. However, due to the variation of such operation times between the GCC and the S&P 500 markets, days eliminated ranged from 362 to 517 days in the study period. Such large elimination definitely has decreased the accuracy of the results, as potential or significant relationships may not be observed.

Stock market crashes such as the Black Monday crash of 1987 and the 1997 mini-crash had portrayed the effect they

might have on relationships between international markets. The GCC markets had experienced a large stock market crash in the beginning of 2006, which had affected all of the GCC markets at different levels. This market crash, which had occurred as an anticipated correction move to the overvalued market at the time is believed to have large consequences. Therefore, this crash may have masked the true relationships between the markets.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

The task of finding relationships between markets whether for investigational purposes or for the reasons of establishing successful investment strategies is a revolving work that never comes to an end. The reason behind the previous statement is the ever-changing circumstances under consideration when causality or interdependency tests are performed. This section of the project will shed light on a few of the previous studies that are related to this project. The literature review will illustrate the different methodologies, data, findings, and time frames used to conduct related studies for certain countries.

Becker et al. (1991) studied the relation between the American and Japanese stock markets from 1985 to 1988. The study's purpose was to determine whether there was a violation of the efficient market hypothesis and whether investors in either market are able to capitalize on predictable trends found between both markets. The study conducted by them was different from the previous related studies, as the authors had employed different

methodologies to test for causality or interdependency relationships. The relationships were tested using local and common currency for each market to test for the impact of currency exchange rates. Their work methodologies serve as a model for this project.

Becker et al. (1991) used the daily opening and closing prices of both stock markets represented by the S&P 500 index for the US and the Nikkei index for Japan. The reason behind choosing daily opening and closing prices over only daily closing prices was due to the attribute that such analysis produces; for example, the ability to investigate relationships between daily and overnight returns. Becker et al. employed correlation and regression analysis to examine the markets' data and had conducted simulated trading strategies as well. The findings of their study were that the US market had a large impact on the Japanese returns in the following day while the Japanese market had only a small impact on the US market. The trading simulation revealed that taxes and transaction costs offset any excess profits made in the Japanese market.

Cheung and Ho (1991) studied the stability of the correlations among seven of the Asian Emerging Countries

(AEMs) and four of the developed markets represented by Australia, Hong Kong, Japan, Korea, Malaysia, the Philippines, Singapore, Taiwan, Thailand, the United Kingdom (UK), and the US. This study covered a 10 year period from 1977 to 1988 using weekly data. The study's main emphasis was to test for the stability of the correlations between the markets over a period of time. If stable correlations are found between the markets over the life of the investment periods then those markets are good candidates for constructing optimal portfolios.

Cheung and Ho (1991) stated the fact that investing internationally in high growth countries, such as in the AEMs, has many advantages beside their high earnings, including diversifying risks when stable correlations exist. The data used in their analysis was based on the local currency of each market. Methodologies used in their study include the principle component, a test based on the normal distribution, the Box-Test, and cluster analysis. Average correlations among all markets of 0.14, among the AEMs of 0.12, and among the developed markets of 0.34 show a great benefit, which can be obtained by diversification. However, the intertemporal stability between the markets was found to vary over time yet in the same direction.

Wong, Penm, Terrell, and Lim (2004) studied the cointegration among six of the AEMs and three of the developed markets represented by Hong Kong, Japan, Korea, Malaysia, Singapore, Taiwan, Thailand, the UK, and the US. The study period was from January 1981 to December 2002 using weekly data. The study period was subdivided into three periods separated by the market crashes of the 1987 Black Monday crash and the 1997 mini-crash. Their study was conducted to confirm whether these markets move together or not, in order to find the best combination to construct a portfolio. Wong et al. found the relationships between the AEMS and the developed markets change over time and events such as financial crises tend to increase the cointegration between markets.

Alsuhaibani (2004) studied the level of cointegration among five of the GCC markets and the major international markets represented by the FTSE 100 (UK), the Nikkei (Japan), and the S&P 500 (US). Also, he tested the GCC markets for signs of cointegration with the Morgan Stanley Capital International Index (MSCI). The GCC countries covered were Bahrain, Kuwait, Oman, Qatar, and Saudi Arabia. The exclusion of the UAE was due to the insufficient data history for the study period. Alsuhaibani

tested for cointegration using weekly data for the period starting in August 1998 and ending in 2003.

Alsuhaibani (2004) employed correlation, cointegration analysis, and Granger causality tests to investigate the markets' cointegrations. Based on the correlation analysis, the author found that among the GCC countries there seems to be market clusters. The Bahraini and the Omani markets represented one cluster, while the other three countries in the study represented the second cluster. Cointegration was found clearly among the markets of each distinctive cluster. The author also found that Saudi Arabia is the most influential market in the GCC, while the Omani market was the least influential.

Alsuhaibani (2004) found that when it comes to the relation between the GCC markets and the four major indices a similar market cluster pattern existed. The Bahraini and the Omani markets showed weak positive correlations with the major markets, while the other three countries showed strong negative correlations. The overall cointegration analysis between the GCC and the other markets found to be not cointegrated except for the Bahraini market.

CHAPTER THREE

ECONOMY AND STOCK MARKET OVERVIEW OF THE GULF COOPERATION COUNCIL COUNTRIES

Bahrain

Economy Overview

Bahrain possesses 130 million barrels of the world's proven oil reserves and is a current producer of 180,000 barrels a day. As a result, crude oil represents 30% of the country's growth domestic product (GDP) and 60% of exports earnings. The country continues to pursue economical diversification policies that lessen the reliance on the depletion oil reserves. Tourism and financial services are the two major economical tools that the Bahraini government is promoting aggressively.

Similar to the rest of the GCC countries, Bahrain has been enjoying low inflation rates and stable currency. The currency used in Bahrain is the Bahraini Dinar (BHD), which is maintained by a fixed exchange rate system. The BHD has been pegged to the United States' dollar (USD) since 1981. Figure 1 shows the small fluctuation of BHD to the USD in the three year study period.

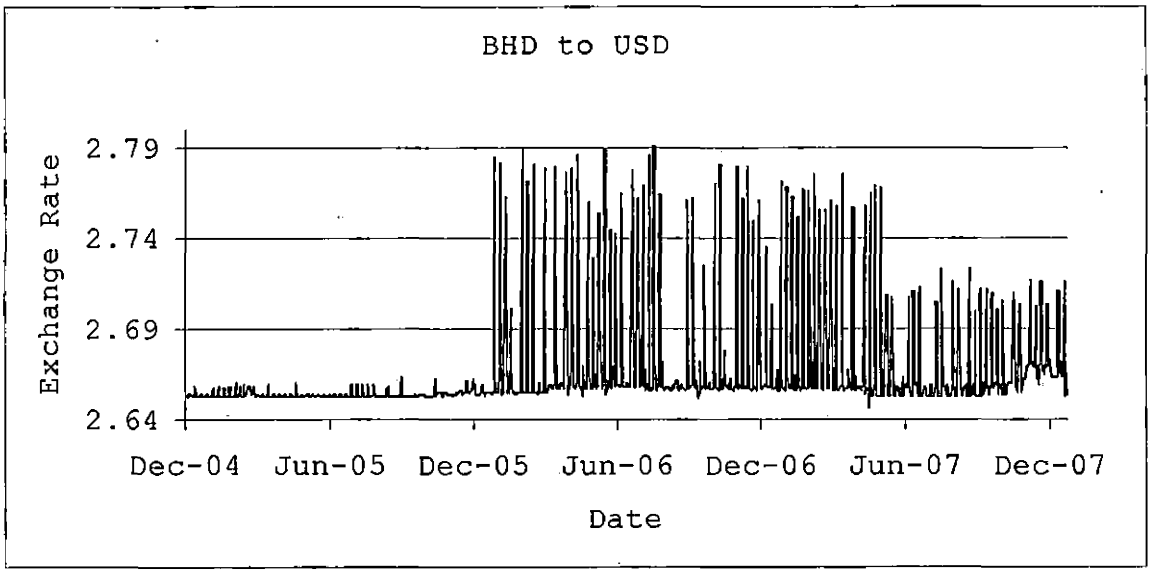

Figure 1. Currency exchange rates for BHD per USD

According to the latest statistics found on the Arab Monetary Fund's (AMF) website, Saudi Arabia, the US, and Japan , respectively, are the largest importers of the country's outputs. On the other hand, Japan, Saudi Arabia, and Germany are the largest exporters to the country.

Stock Market Overview

The Bahrain Stock Exchange was established in 1987. Since then, the BSE has attracted foreign investors who currently own about 50% worth of shares. By the end of 2007, fifty-one companies from all sectors were listed. The BSE operates every week from Sunday to Thursday. Figure 2 illustrates the daily operation time for the BSE in both

local and Eastern Standard Time (EST) and compares it to the NYSE operation time.

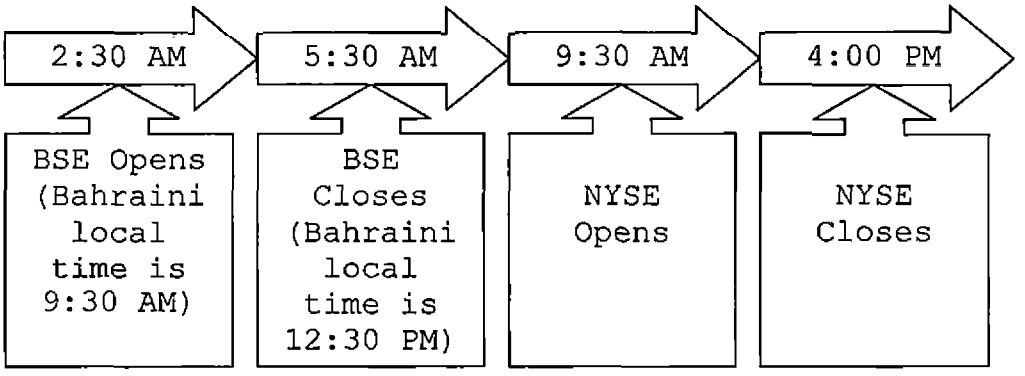

Figure 2. Trading Hours for BSE and NYSE at Time t (Eastern Standard Time)

Figure 3 below, shows the movement of the BSE index throughout the study period. Representing a constant growth, the index reached its highest point at the end of 2007 and was at its lowest point at the beginning of 2005. During the study period, the BSE's highest daily return of 3.68% was in January 2006, while the lowest daily return of -2.55% was in November 2007.

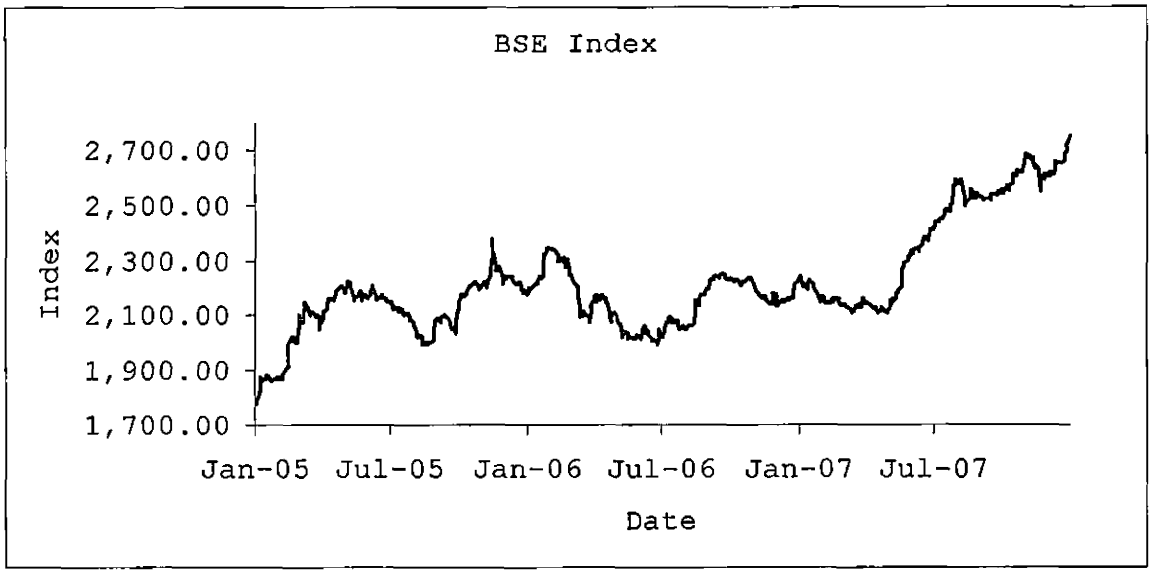

Figure 3. BSE Index

Kuwait

Economy Overview

Kuwait possesses 96.5 billion barrels of the world's proven oil, which represents 9.2% of the world's crude oil reserves. The country is a current producer of 2.38 million barrels a day. As a result, crude oil represents about 50% of the country's GDP and 95% of exports earnings. The country's income has tremendously increased in the past 3 years as oil prices are spiking up. This, in return, has prompted the government to increase spending on the development of non-oil sectors.

Similar to the rest of the GCC countries, Kuwait has been enjoying low inflation rates and stable currency. The currency used in Kuwait is the Kuwaiti Dinar (KWD), which has been pegged to a currency basket dominated by the USD. Figure 4 shows the small fluctuation of KWD to the USD in the three year study period.

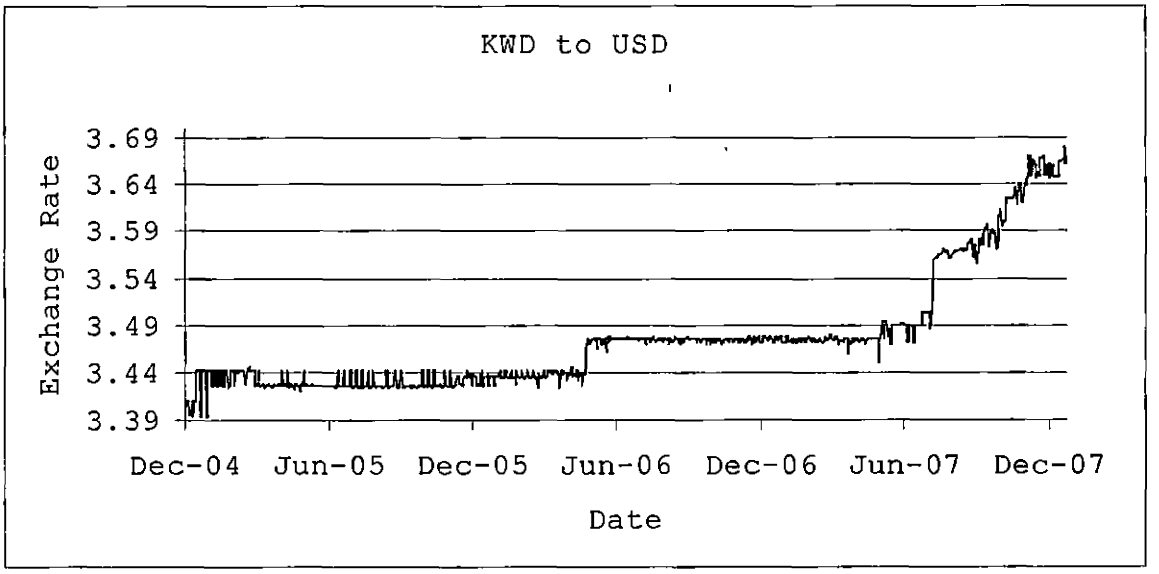

Figure 4. Currency exchange rates for KWD per USD

According to the latest statistics found on the AMF's website, Japan, South Korea, and the US, respectively, are the largest importers of the country's outputs. On the other hand, Germany, the US, and Japan are the largest exporters to the country.

Stock Market Overview

The Kuwait Stock Exchange was officially established in 1977. As a result of the Iraqi invasion in 1990, the KSE operations were halted for 28 months and the number of listed firms had dropped from 54 to 28 companies. The KSE's recent policies are tailored to liberalize the market and to allow foreign investments to take a better role in supporting the economy. At the moment, there are 113 companies listed in the KSE across 9 distinct sectors. The KSE operates every week from Sunday to Thursday. Figure 5 illustrates the daily operation time for the KSE in both local and Eastern Standard Time (EST) and compares it to the NYSE operation time.

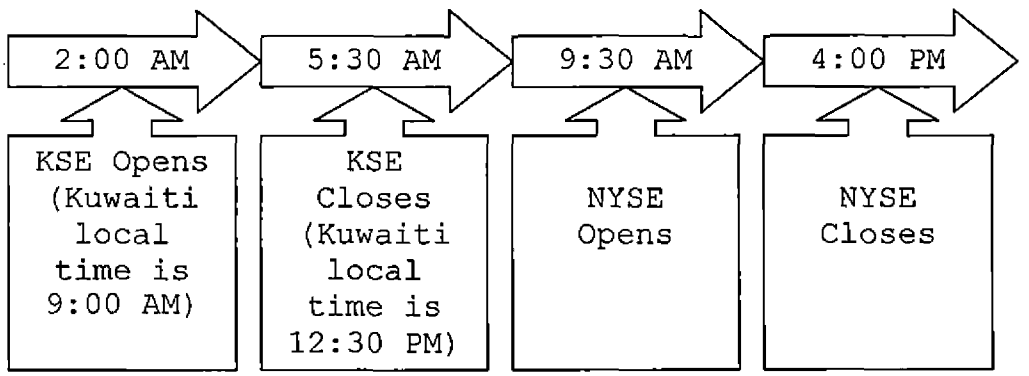

Figure 5. Trading Hours for KSE and NYSE at Time t (Eastern Standard Time)

Figure 6 below, shows the movement of the KSE index throughout the study period. The index reached its highest point in October 2007 and was at its lowest point in February 2005. During the study period, the KSE's highest daily return of 3.63% was in March 2006, while the lowest daily return of -3.09% was in November 2006.

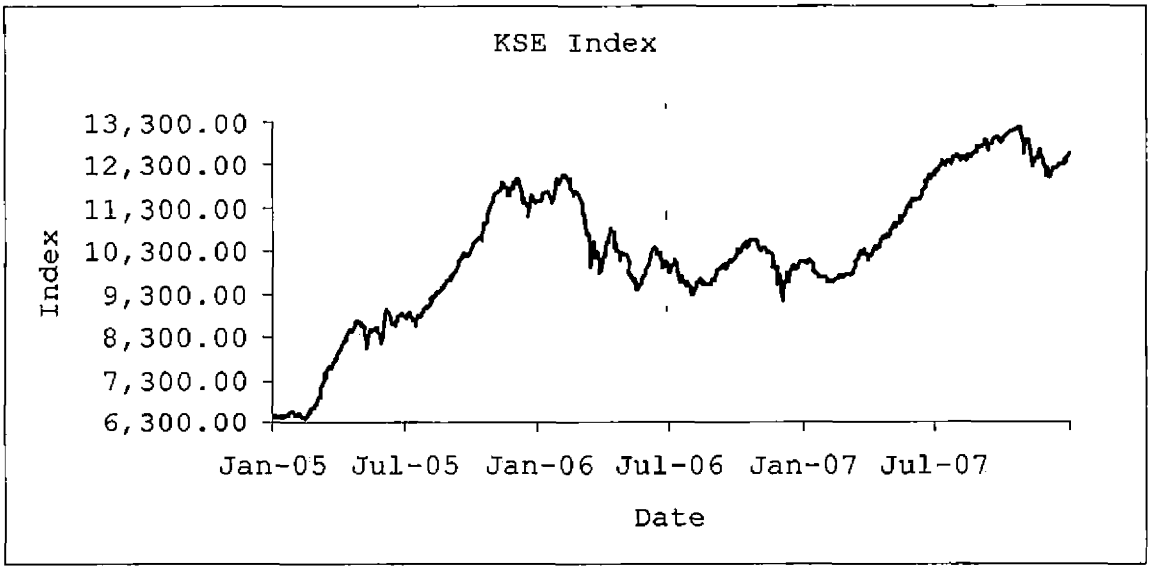

Figure 6. KSE Index

Oman

Economy Overview

Oman possesses 5.7 billion barrels of the world's proven oil reserves and is a current producer of 0.9 billion barrels a day. As a result, crude oil represents 45% of the country's GDP and 76% of exports earnings. The country has sound diversified economical tools represented by strong agriculture, textile, retail, and tourism sectors. The country maintains growth policies that boost the growth of non-oil industries, while closely watching its expenditure.

Similar to the rest of the GCC countries, Oman has been enjoying low inflation rates and stable currency. The currency used in Oman is the Omani Riyal (OMR), which is maintained by a fixed exchange rate system. The OMR has been pegged to the USD since 1973. Figure 7 shows the small fluctuation of OMR to the USD in the three year study period.

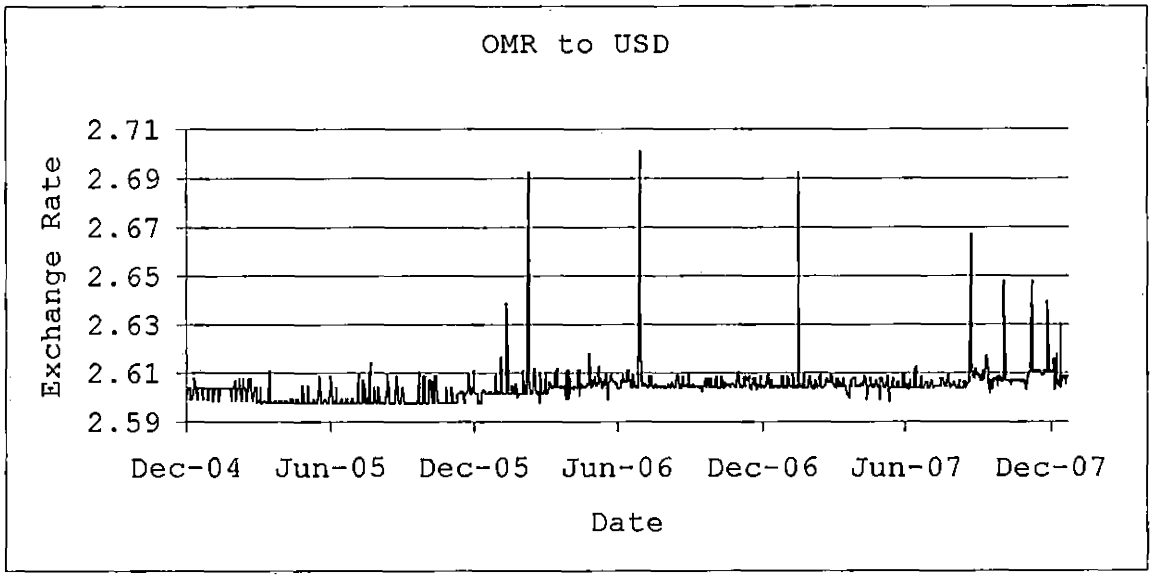

Figure 7. Currency exchange rates for OMR per USD

According to the latest statistics found on the AMF's website, China, South Korea, and Japan, respectively, are the largest importers of the country's outputs. On the other hand, the UAE, Japan, and the UK are the largest exporters to the country.

Stock Market Overview

The Masqat Securities Market was officially established in 1992. The MSM index is comprised of 30 companies from all listed companies. The 30 companies are selected from the three major sectors of bank and investment, industry, and service and insurance, each representing 10 companies for each sector. The MSM operates

every week from Sunday to Thursday. Figure 8 illustrates the daily operation time for the MSM in both local and Eastern Standard Time (EST) and compares it to the NYSE operation time.

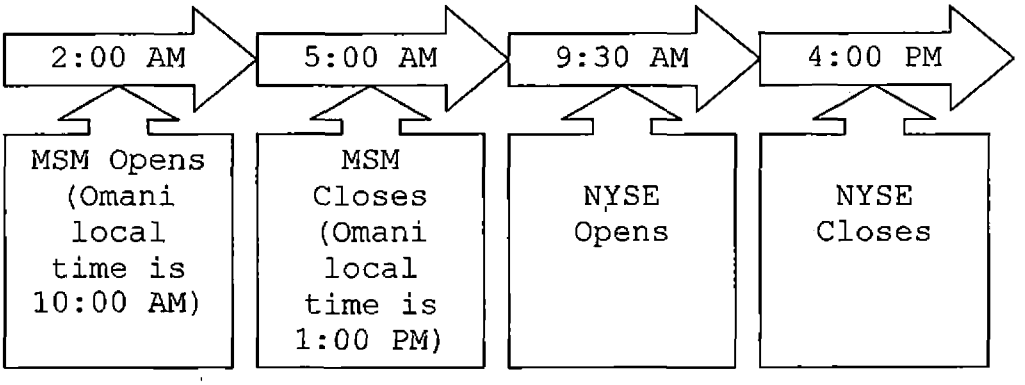

Figure 8. Trading Hours for MSM and NYSE at Time t (Eastern Standard Time)

Figure 9 below, shows the movement of the MSM index throughout the study period. Representing a constant growth, the index reached its highest point at the end of 2007 and was at its lowest point at the beginning of 2005. During the study period, the MSM's highest daily return of 3.99% was in May 2005, while the lowest daily return of -3.13% was in June 2007.

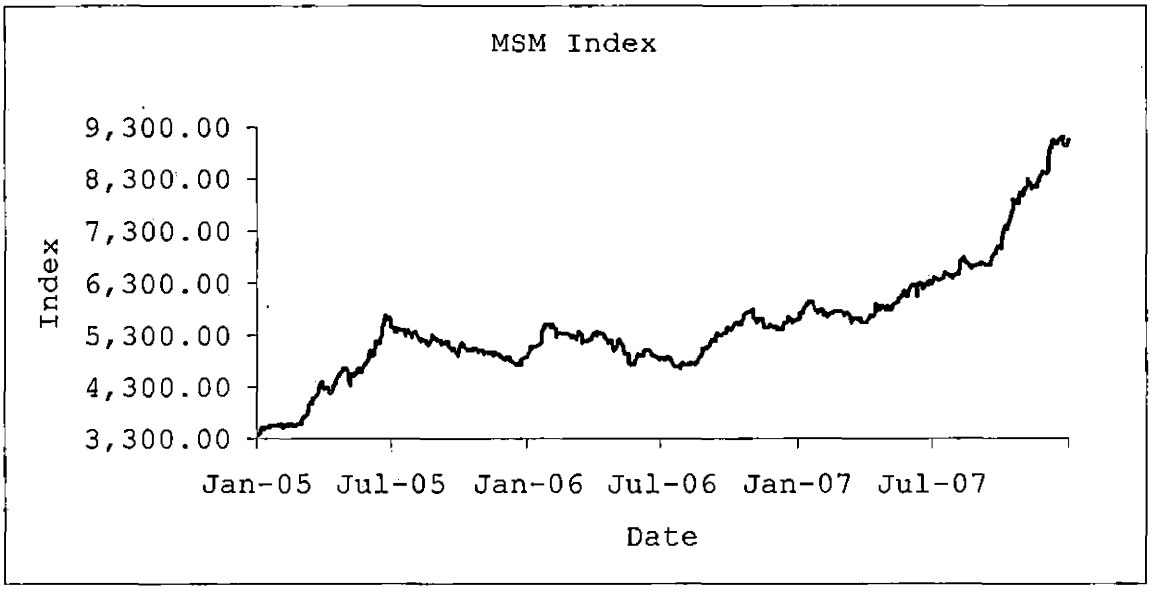

Figure 9. MSM Index

Qatar

Economy Overview

Qatar possesses 16 billion barrels of the world's proven oil reserves and is a current producer of 800,000 barrels a day. Crude oil and natural gas represent 55% of the country's GDP and 85% of exports earnings. Qatar is the largest natural gas holder among the GCC countries, representing about 50% of the GCC's reserves. Worldwide, Qatar is the third largest natural gas reserves holder. As a result, Qatar is considered one of the richest countries in the world as it has $37,600 GDP per capita.

Similar to the rest of the GCC countries, Qatar has been enjoying low inflation rates and stable currency. The currency used in Qatar is the Qatari Riyal (QAR), which is maintained by a fixed exchange rate system. The QAR has been pegged to the USD since the early 1980s. Figure 10 shows the small fluctuation of QAR to the USD in the three year study period.

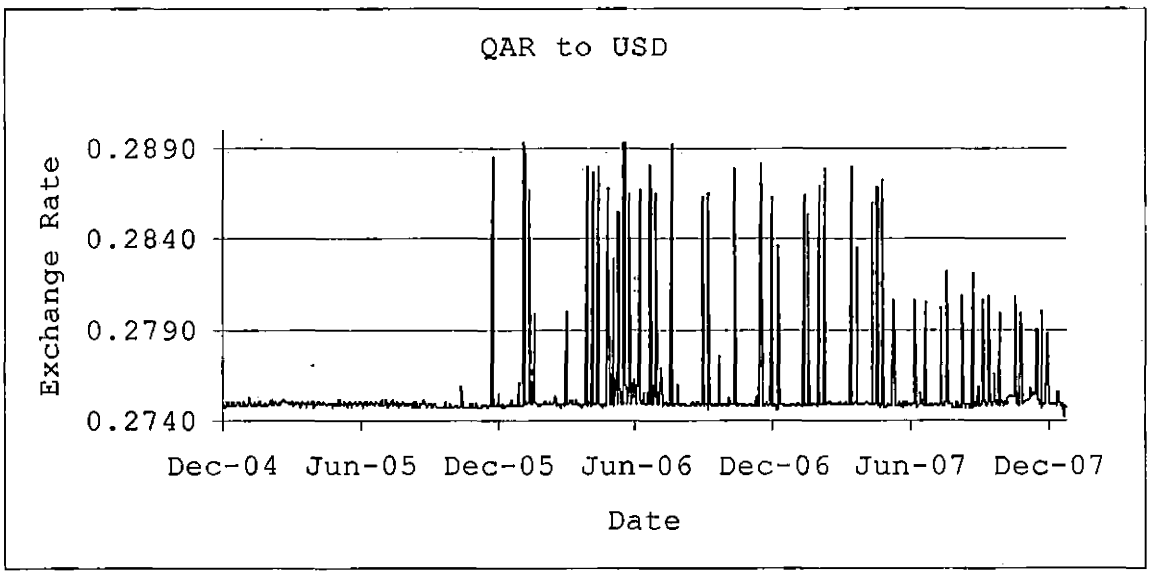

Figure 10. Currency exchange rates for QAR per USD

According to the latest statistics found on the AMF's website, Japan, South Korea, and Singapore, respectively, are the largest importers of the country's outputs. On the

other hand, France, the US, and Saudi Arabia are the largest exporters to the country.

Stock Market Overview

The Doha Securities Market was established in 1995. The DSM index is comprised of 20 companies from all listed companies. The 20 companies are selected from the 4 major sectors of banking and financial, insurance, industrial, and services. The DSM operates every week from Sunday to Thursday. Figure 11 illustrates the daily operation time for the DSM in both local and Eastern Standard Time (EST) and compares it to the NYSE operation time.

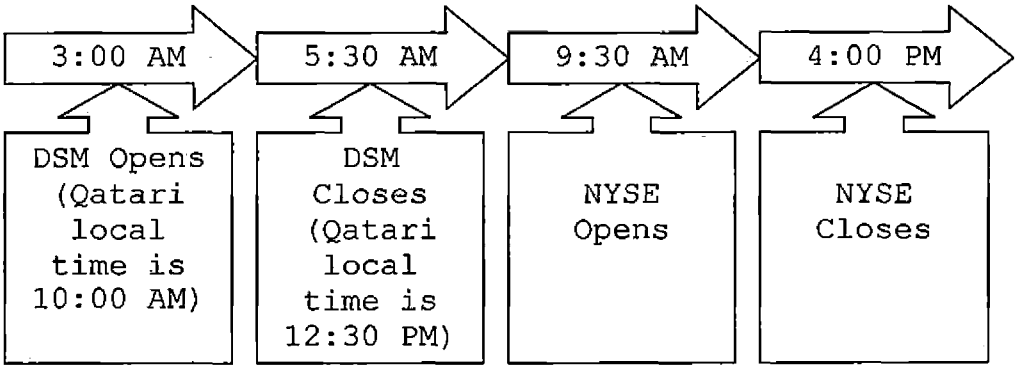

Figure 11. Trading Hours for DSM and NYSE at Time t (Eastern Standard Time)

Figure 12 below, shows the movement of the DSM index throughout the study period. The index reached its highest point in September 2005 and was at its lowest point in December 2006. During the study period, the DSM's highest daily return of 5.99% was in February 2005, while the lowest daily return of -6.08% was in July 2006.

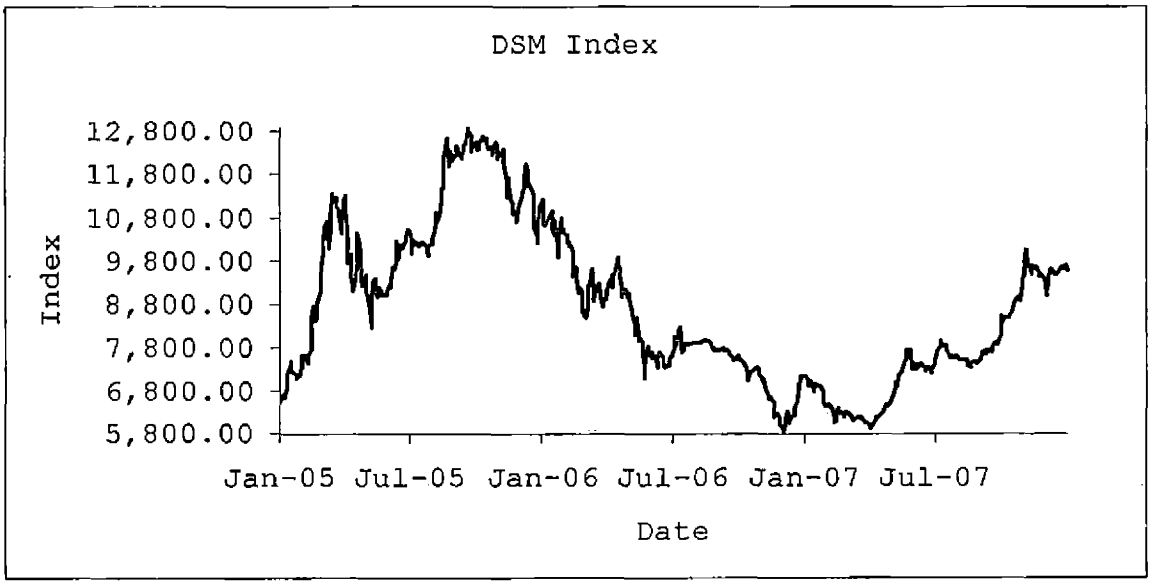

Figure 12. DSM Index

Saudi Arabia

Economy Overview

Saudi Arabia possesses 261.7 billion barrels of the world's proven oil, which represents 25.5% of the world's crude oil reserves. The country is a current producer of 9.47 million barrels a day. As a result, crude oil represents about 45% of the country's GDP and 90% of exports earnings. Saudi Arabia plays a leading role in the Organization of the Petroleum Exporting Countries (OPEC), producing about 32% of OPEC's production. The country is pursuing aggressive economical policies that promote and attract foreign direct investments.

Similar to the rest of the GCC countries, Saudi Arabia has been enjoying low inflation rates and stable currency. The currency used in Saudi Arabia is the Saudi Riyal (SAR), which is maintained by a fixed exchange rate system. The SAR has been pegged to the USD since 1986. Figure 13 shows the small fluctuation of SAR to the USD in the three year study period.

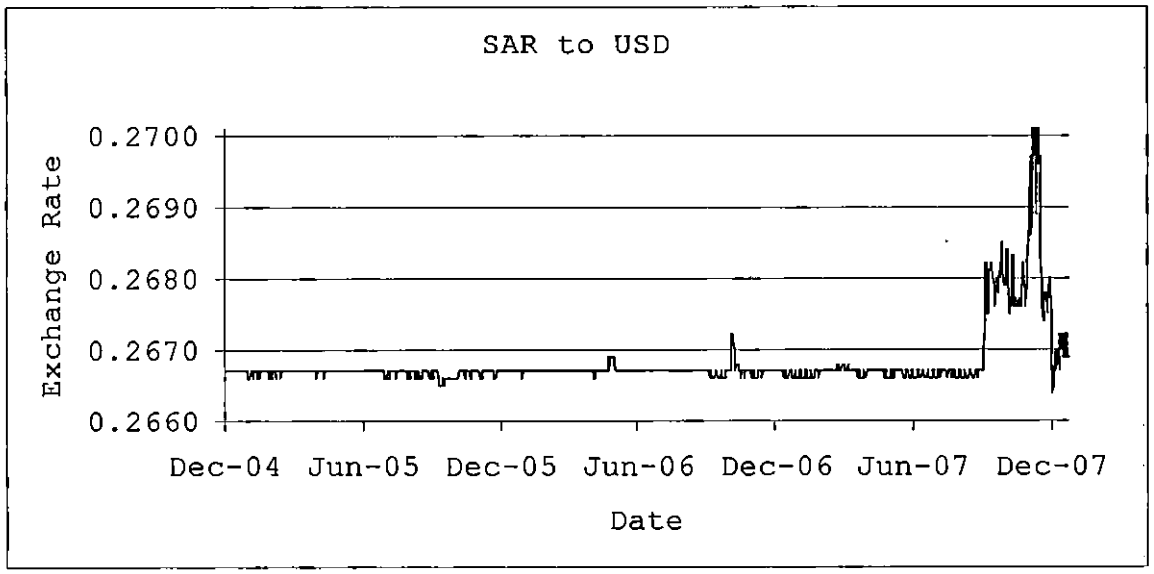

Figure 13. Currency exchange rates for SAR per USD

According to the latest statistics found on the AMF's website, the US, Japan, and South Korea, respectively, are the largest importers of the country's outputs. On the other hand, the US, Japan, and Germany are the largest exporters to the country.

Stock Market Overview

The Tadawul All Share Index (TASI) was established officially in 1984. The TASI is the only market among the GCC markets with the most restrictions against foreign investments in its market. But in the past couple of years the TASI had allowed minimal foreign investments to take place especially from investors from the GCC as the country

is trying to open up its market to foreign investors gradually. The TASI operates every week from Saturday to Wednesday. Figure 14 illustrates the daily operation time for the TASI in both local and Eastern Standard Time (EST) and compares it to the NYSE operation time.

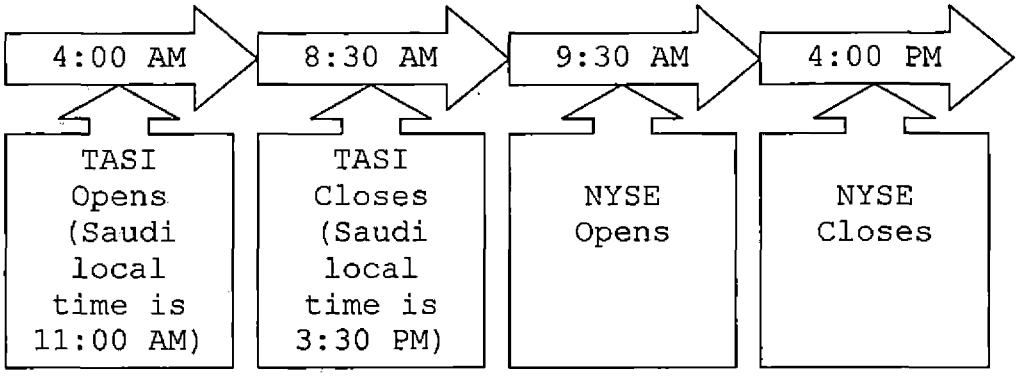

Figure 14. Trading Hours for TASI and NYSE at Time t (Eastern Standard Time)

Figure 15 below, shows the movement of the TASI index throughout the study period. The index reached its highest point in February 2006 and was at its lowest point in June 2007. During the study period, the TASI's highest daily return of 9.85% was in May 2006, while the lowest daily return of -9.60% was in May 2006.

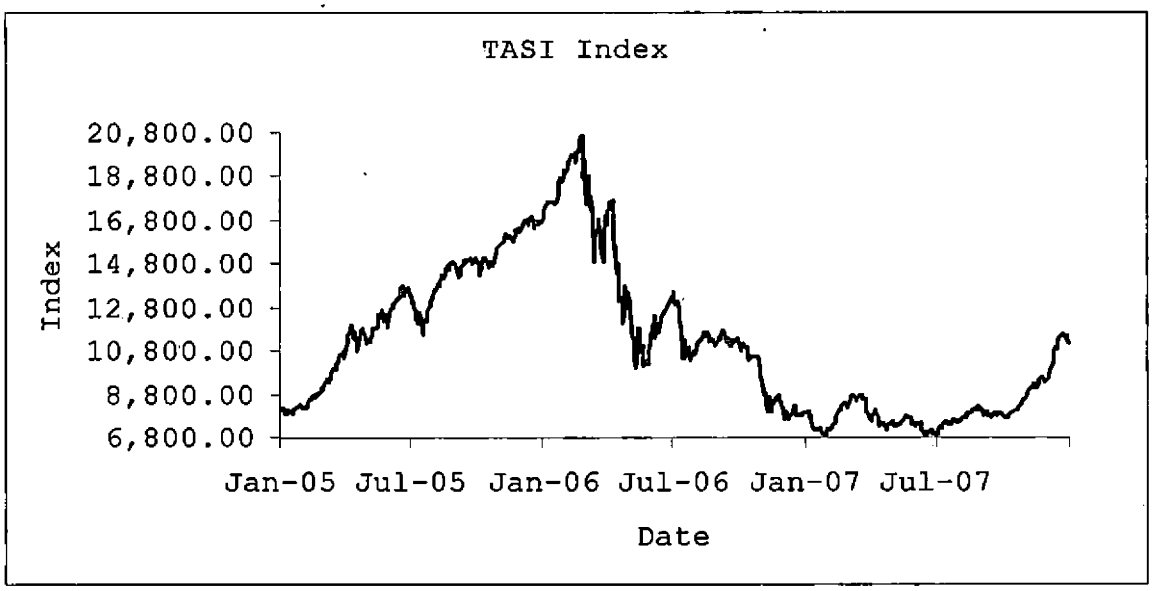

Figure 15. TASI Index

The United Arab Emirates

Economy Overview

The UAE possesses 97.8 billion barrels of the world's proven oil, which represents 9.5% of the world's crude oil reserves. The country is a current producer of 2.45 million barrels a day. As a result, crude oil represents about 30% of the country's GDP and 42% of exports earnings. The UAE is one of the countries with the highest GDP per capita. The country's income has tremendously increased in the past 3 years as oil prices are spiking up. This, in return, has prompted the government to increase spending on the development of non-oil sectors.

Similar to the rest of the GCC countries, the UAE has been enjoying low inflation rates and stable currency. The currency used in the UAE is the Emirati Dirham (AED), which is maintained by a fixed exchange rate system. The AED has been pegged to the USD since 1980. Figure 16 shows the small fluctuation of AED to the USD in the three year study period.

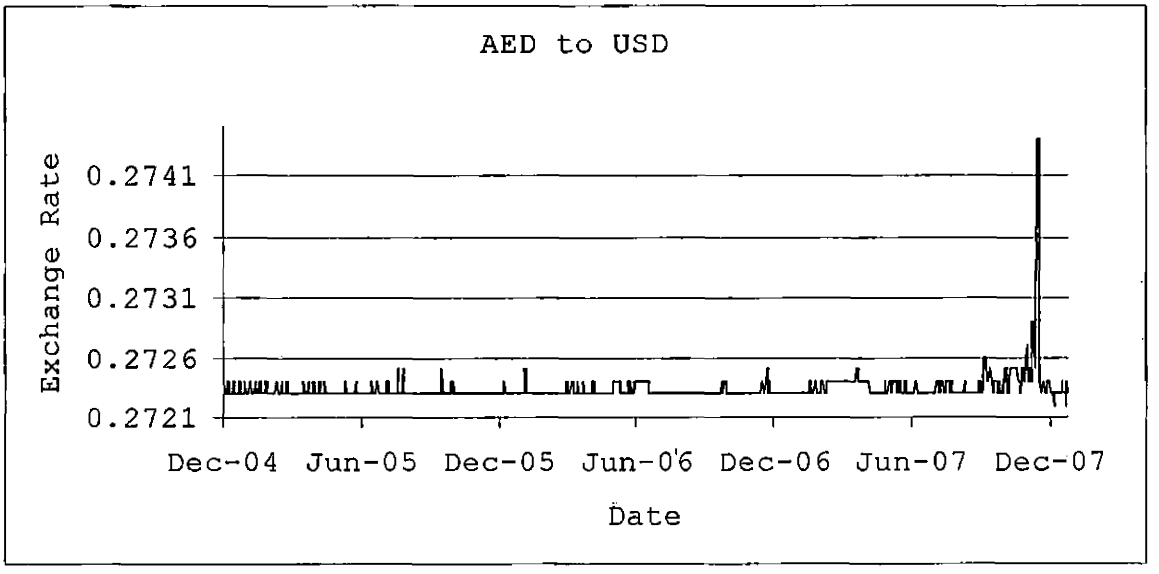

Figure 16. Currency exchange rates for AED per USD

According to the latest statistics found on the AMF's website, Japan, South Korea, and India, respectively, are the largest importers of the country's outputs. On the

other hand, China, India, and Japan are the largest exporters to the country.

Stock Market Overview

The Abu Dhabi Securities Market (ADSM) and the Dubai Financial Market (DFM) were established officially in 2000. A total of 65 companies are listed in the ADSM. The ADSM allows for foreign investments on certain companies for up to 50% of all shares. The ADSM operates every week from Sunday to Thursday. Figure 17 illustrates the daily operation time for the ADSM in both local and Eastern Standard Time (EST) and compares it to the NYSE operation time.

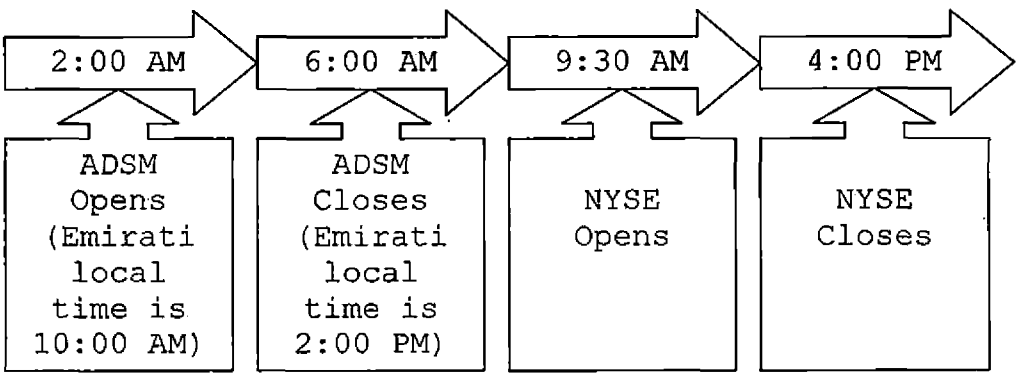

Figure 17. Trading Hours for ADSM and NYSE at Time t (Eastern Standard Time)

Figure 18 below, shows the movement of the ADSM index throughout the study period. The index reached its highest point in May 2005 and was at its lowest point in April 2007. During the study period, the ADSM's highest daily return of 6.79% was in May 2005, while the lowest daily return of -6.37% was in May 2005.

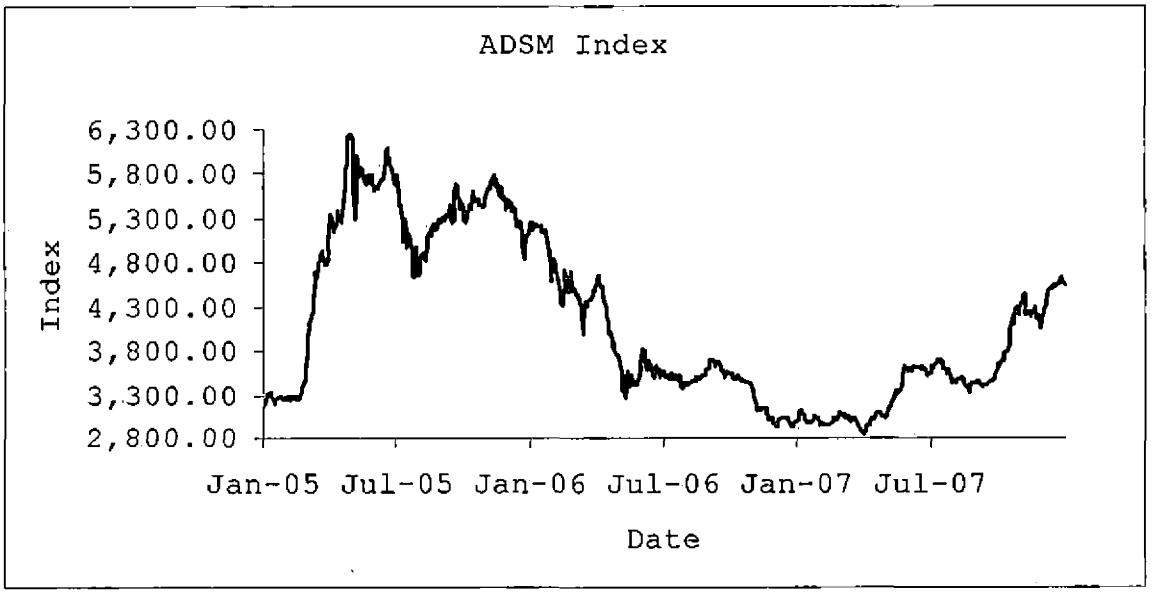

Figure 18. ADSM Index

CHAPTER FOUR

DATA AND METHODOLOGIES

The project's study period starting at the beginning of 2005 and ending at the end of 2007 represents a distinctive period for the GCC countries due to the Gulf market crash in 2006. Therefore, 2005 symbolizes a growth period that led the market downturn and 2007 symbolizes the recovery period. Hence, the study period will offer some insights of any possible trends in the relationships between the GCC countries and the US in different economical conditions. In order to calculate the daily and overnight returns for the study period, daily opening and closing data from the end of 2004 to the beginning of 2008 was obtained as follows:

- Daily data for the American stock market which is represented by the S&P 500 was obtained from Yahoo's Finance website.
- Daily data for the Bahraini stock market was obtained from the Bahrain Stock Exchange's website.
- Daily data for the Kuwaiti stock market was obtained from the Kuwait Stock Exchange's website.

- Daily data for the Omani stock market was obtained from Muscat Securities Market's website.
- Daily data for the Qatari stock market was obtained from the Doha Securities Market's website.
- Daily data for the Saudi stock market was obtained from the Saudi stock market's (Tadawul) website.
- Daily data for the Emirati stock market which is represented by the ADSM was obtained from the Abu Dhabi Securities Market's website.

Then local returns were calculated using the following formula:

$$R_t = [(P_t - P_{t-1})/P_{t-1}] * 100\%$$

Where,

R_t = Return for time t

P_t = Index Price at time t

P_{t-1} = Index Price at time t-1

Additionally, to test for any influence that the currency exchange rates might have on the relationships between the GCC countries and the US, historical daily interbank currency exchange rates for the USD were collected from OANDA.COM for the entire study period. Afterword, the common returns were calculated by converting

the local returns for the GCC markets to the USD equivalent. Annualized returns based on the local currency were computed for all countries for each year in the study period to measure and compare performances. Also, the annualized standard deviation for each country was computed to measure the volatility and the risk involved. Moreover, correlation coefficients between all markets were conducted based on the daily local returns in each market to test for the degree of comovements among the markets.

To test for the significance of the relationships between the GCC and the S&P 500 markets, regression analysis using the Simple Linear Regression Model was run using Microsoft Excel's data analysis tool. Also, the same analysis was done between two of the largest capitalization markets in the GCC and the rest of the markets to determine the significance of the relationships. To increase the accuracy of the analysis, all returns which fell on a holiday or on a day where only one of the markets operated were eliminated. The Simple Linear Regression Model is represented by the following formula:

$$Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$$

Where,

Y_i = The dependent variable

β_0 = Y intercept for the population

β_1 = Slope for the population

X_i = The independent variable

ε_i = Random error in Y for observation i

The model will test the linear relationships between the US represented by the S&P 500 and each market of the GCC countries. Also, the model will test the linear relationships between two of the largest capitalization markets in the GCC and the rest of the markets. The test will be conducted based on both local and common returns for each country as follows:

- A test for the influence of the daily return of one market on the daily return of the other using the following model:

  $Y_i^{o-c} = \beta_0 + \beta_1 X_i^{o-c} + \varepsilon_i$

  Where,

  Y_i^{o-c} = The daily dependent variable

  X_i^{o-c} = The daily independent variable

- A test for the influence of the daily return of one market on the overnight return of the other using the following model:

$$Y_i^{c-o} = \beta_0 + \beta_1 X_i^{o-c} + \varepsilon_i$$

Where,

Y_i^{c-o} = The overnight dependent variable

After-hours trading was only detected in the Kuwaiti stock market. Therefore, the KSE was the only market tested for any potential relationship between its overnight returns and the daily returns of the S&P 500. The following notations define the subscripts and superscripts used in the Simple Linear Regression Model formula for each country:

- B..... Bahraini Market
- C-O..... Open to Close returns (daily returns)
- K..... Kuwaiti Market
- O..... Omani Market
- O-C..... Open to Close returns (overnight returns)
- Q..... Qatari Market
- S&P..... S&P 500
- SA..... Saudi Market
- UAE..... Emirati Market
- US..... American Market

To test and determine whether any significant relationships exist among and between any of the GCC

markets and the S&P 500, we have set the level of significance alpha (α) at 0.05. Thus, the hypothesis used is described as follows:

- $H_0 : \beta_1 = 0$ (There is no linear relationship)
- $H_A : \beta_1 \neq 0$ (There is a linear relationship)

Where,

H_0 = Null hypothesis

H_A = Alternative hypothesis

P-Value is the smallest value of α for which H_0 will be rejected. Therefore, the following criteria will be used to determine the existence of a significant relationship:

- If P-Value $\geq \alpha$, the null hypothesis is not rejected.
- If P-Value $< \alpha$, the null hypothesis is rejected.

CHAPTER FIVE

RESULTS

Correlation Coefficient Matrix

The following matrix presents the correlation coefficient results between the GCC and the US markets. The first panel shows the correlation results for the entire study period, while the following three panels show the outcome for 2005, 2006, and 2007, respectively.

Table 1. Correlation Coefficient Matrix

ALL	BSE	KSE	MSM	DSM	TASI	ADSM
BSE	1					
KSE	0.15999	1				
MSM	0.09539	0.0038	1			
DSM	0.12675	0.08476	-0.009	1		
TASI	0.04163	0.13019	0.06093	0.01816	1	
ADSM	0.08489	0.18928	0.11432	0.16842	0.1552	1
S&P 500	0.02767	0.02125	-0.007	-0.0442	-0.0704	-0.0495

2005	BSE	KSE	MSM	DSM	TASI	ADSM
BSE	1					
KSE	0.03799	1				
MSM	0.00683	-0.0879	1			
DSM	0.07071	0.0162	-0.0471	1		
TASI	-0.0106	0.12163	-0.04	-0.024	1	
ADSM	-0.0269	0.06153	0.12852	0.06815	0.11865	1
S&P 500	0:07959	0.10839	-0.0569	-0.0988	0.04537	-0.104

2006	BSE	KSE	MSM	DSM	TASI	ADSM
BSE	1					
KSE	0.29219	1				
MSM	0.2979	0.09424	1			
DSM	0.15829	0.16128	-0.108	1		
TASI	0.05142	0.17279	0.10675	0.02865	1	
ADSM	0.2639	0.30235	0.01947	0.2116	0.21305	1
S&P 500	0.00383	0.02029	-0.0576	0.00427	-0.1432	0.01388

2007	BSE	KSE	MSM	DSM	TASI	ADSM
BSE	1					
KSE	0.09644	1				
MSM	0.03735	-0.0108	1			
DSM	0.178	-0.0078	0.11889	1		
TASI	0.08056	-0.0696	0.09762	0.00306	1	
ADSM	0.01558	0.15163	0.17721	0.28923	0.02194	1
S&P 500	0.01146	-0.0202	0.08207	-0.0255	-0.0744	-0.0462

Bahrain

The BSE's overall annual return for the entire study period was an average of 19.24%, compared to 8.31% for the S&P 500. The standard deviation for the same period for the BSE was 17.47%, compared to 21.08% for the S&P 500. On yearly basis, the annual returns for the BSE were 24.61% in 2005, 1.49% in 2006, and 24.71% in 2007. On the other hand, the S&P 500's annual returns were 3.50% in 2005, 14.64% in 2006, and 5.27% in 2007. Figure 19 below, shows returns for the BSE and the S&P 500 for the three year study period.

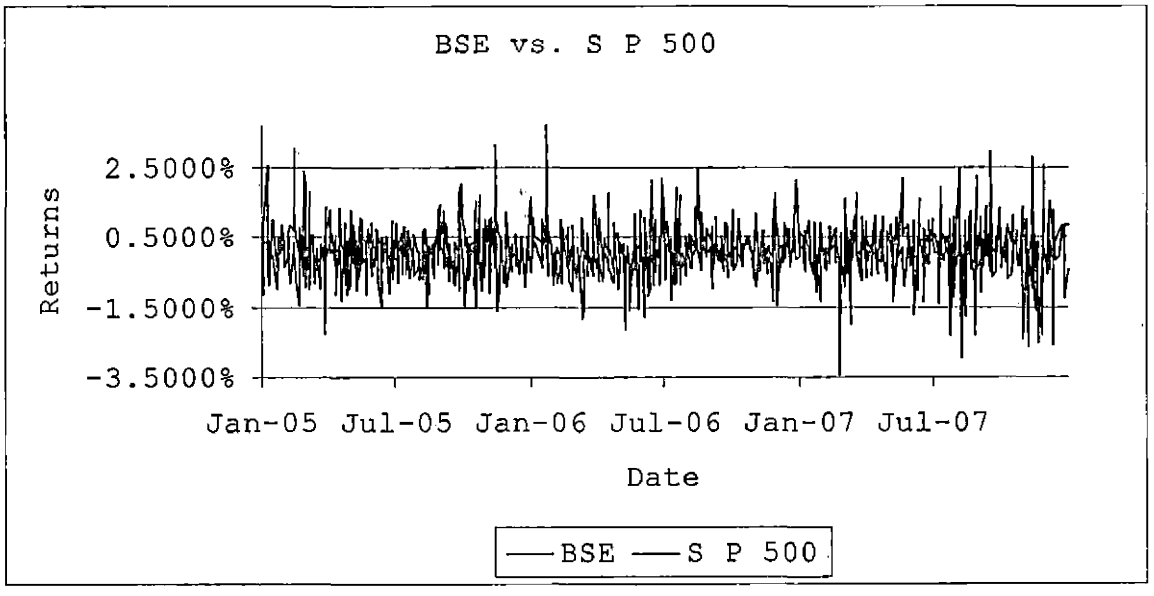

Figure 19. Returns for BSE and S&P 500 over the same time period

Analysis Outcome for BSE_t^{o-c} and $S\&P_t^{o-c}$

The regression analysis outcome in table 2 tests the relationship between the daily return for the BSE and the daily return for the S&P 500 in period t. In this test, the daily return for the BSE is the independent variable, while the daily return for the S&P 500 is the dependent variable. This analysis will test whether or not or not or not the Bahraini market's daily return leads the daily return in the American market. Additionally, the correlation coefficient between the two variables is calculated.

Table 2. Analysis of $S\&P_t^{o-c} = \alpha_B + \beta_B BSE_t^{o-c} + \varepsilon_B$

Local Currency		Common Currency	
Multiple R	0.02767	Multiple R	0.03323
R Square	0.00077	R Square	0.0011
Adjusted R Square	-0.001	Adjusted R Square	-0.0006
Standard Error	0.00777	Standard Error	0.00777
Observations	576	Observations	576
Intercept	0.00033	Intercept	0.00039
BSE_t^{o-c}	0.03299	BSE_t^{o-c}	0.01708
P-value	0.50746	P-value	0.42597
Correlation	0.02767	Correlation	0.03323

Analysis Outcome for $S\&P_{t-1}^{o-c}$ and BSE_t^{o-c}

The regression analysis outcome in table 3 tests the relationship between the daily return for the BSE in period

t and the daily return for the S&P 500 in period t-1. In this test, the daily return for the S&P 500 is the independent variable, while the daily return for the BSE is the dependent variable. This analysis will test whether or not or not the American market's daily return leads the daily return in the Bahraini market. Additionally, the correlation coefficient between the two variables is calculated.

Table 3. Analysis of $BSE_t^{o-c} = \alpha_{US} + \beta_{US} S\&P_{t-1}^{o-c} + \varepsilon_{US}$

Local Currency		Common Currency	
Multiple R	0.05612	Multiple R	0.01524
R Square	0.00315	R Square	0.00023
Adjusted R Square	0.00081	Adjusted R Square	-0.0021
Standard Error	0.00668	Standard Error	0.01419
Observations	429	Observations	429
Intercept	0.00107	Intercept	-0.0038
$S\&P_{t-1}^{o-c}$	-0.0481	$S\&P_{t-1}^{o-c}$	-0.0278
P-value	0.24612	P-value	0.75292
Correlation	-0.0561	Correlation	-0.0152

Analysis Outcome for BSE_t^{o-c} and $S\&P_t^{c-o}$

The regression analysis outcome in table 4 tests the relationship between the daily return for the BSE and the overnight return for the S&P 500 in period t. In this test,

the daily return for the BSE is the independent variable, while the overnight return for the S&P 500 is the dependent variable. This analysis will test whether or not the Bahraini market's daily return leads the overnight return in the American market. Additionally, the correlation coefficient between the two variables is calculated.

Table 4. Analysis of $S\&P_t^{c-o} = \alpha_B + \beta_B BSE_t^{o-c} + \varepsilon_B$

Local Currency		Common Currency	
Multiple R	0.07423	Multiple R	0.07423
R Square	0.00551	R Square	0.00551
Adjusted R Square	0.00378	Adjusted R Square	0.00378
Standard Error	0.00062	Standard Error	0.00062
Observations	576	Observations	576
Intercept	-4E-05	Intercept	-4E-05
BSE_t^{o-c}	0.00703	BSE_t^{o-c}	0.00703
P-value	0.07507	P-value	0.07507
Correlation	0.07423	Correlation	0.07354

Analysis Outcome for $TASI_t^{o-c}$ and BSE_t^{o-c}

The regression analysis outcome in table 5 tests the relationship between the daily return for the TASI and the daily return for the BSE in period t. In this test, the daily return for the TASI is the independent variable, while the daily return for the BSE is the dependent

variable. This analysis will test whether or not the Saudi market's daily return leads the daily return in the Bahraini market. Additionally, the correlation coefficient between the two variables is calculated.

Table 5. Analysis of $BSE_t^{o-c} = \alpha_{SA} + \beta_{SA}TASI_t^{o-c} + \varepsilon_{SA}$

Local Currency		Common Currency	
Multiple R	0.04163	Multiple R	0.03431
R Square	0.00173	R Square	0.00118
Adjusted R Square	0.00018	Adjusted R Square	-0.0004
Standard Error	0.00648	Standard Error	0.01761
Observations	643	Observations	643
Intercept	0.00031	Intercept	0.00049
$TASI_t^{o-c}$	0.01397	$TASI_t^{o-c}$	0.03128
P-value	0.29186	P-value	0.38504
Correlation	0.04163	Correlation	0.03431

Analysis Outcome for $ADSM_t^{o-c}$ and BSE_t^{o-c}

The regression analysis outcome in table 6 tests the relationship between the daily return for the ADSM and the daily return for the BSE in period t. In this test, the daily return for the ADSM is the independent variable, while the daily return for the BSE is the dependent variable. This analysis will test whether or not the Emirati market's daily return leads the daily return in the

Bahraini market. Additionally, the correlation coefficient between the two variables is calculated.

Table 6. Analysis of $BSE_t^{o-c} = \alpha_{UAE} + \beta_{UAE}ADSM_t^{o-c} + \varepsilon_{UAE}$

Local Currency		Common Currency	
Multiple R	0.08489	Multiple R	0.02721
R Square	0.00721	R Square	0.00074
Adjusted R Square	0.00584	Adjusted R Square	-0.0006
Standard Error	0.0064	Standard Error	0.01668
Observations	728	Observations	728
Intercept	0.00054	Intercept	0.00067
$ADSM_t^{o-c}$	0.03954	$ADSM_t^{o-c}$	0.03292
P-value	0.02199	P-value	0.46355
Correlation	0.08489	Correlation	0.02721

Kuwait

The KSE's overall annual return for the entire study period was an average of 14.62%, compared to 8.31% for the S&P 500. The standard deviation for the same period for the KSE was 21.16%, compared to 21.08% for the S&P 500. On yearly basis, the annual returns for the KSE were 24.09% in 2005, -9.96% in 2006, and 28.75% in 2007. On the other hand, the S&P 500's annual returns were 3.50% in 2005, 14.64% in 2006, and 5.27% in 2007. Figure 20 below, shows

returns for the KSE and the S&P 500 for the three year study period.

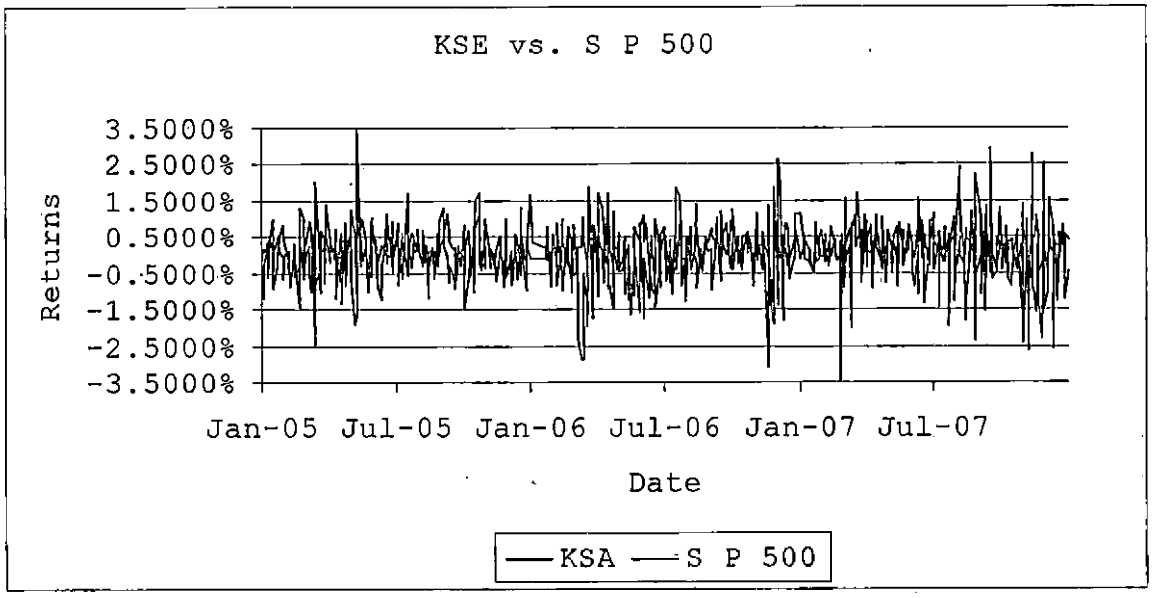

Figure 20. Returns for KSE and S&P 500 over the same time period

Analysis Outcome for KSE_t^{o-c} and $S\&P_t^{o-c}$

The regression analysis outcome in table 7 tests the relationship between the daily return for the KSE and the daily return for the S&P 500 in period t. In this test, the daily return for the KSE is the independent variable, while the daily return for the S&P 500 is the dependent variable. This analysis will test whether or not the Kuwaiti market's

daily return leads the daily return in the American market. Additionally, the correlation coefficient between the two variables is calculated.

Table 7. Analysis of $S\&P_t^{o-c} = \alpha_K + \beta_K KSE_t^{o-c} + \varepsilon_K$

Local Currency		Common Currency	
Multiple R	0.02125	Multiple R	0.00874
R Square	0.00045	R Square	7.6E-05
Adjusted R Square	-0.0017	Adjusted R Square	-0.0021
Standard Error	0.00785	Standard Error	0.00785
Observations	458	Observations	458
Intercept	0.00043	Intercept	0.00044
KSE_t^{o-c}	0.02248	KSE_t^{o-c}	0.00898
P-value	0.65018	P-value	0.85208
Correlation	0.02125	Correlation	0.00874

Analysis Outcome for $S\&P_{t-1}^{o-c}$ and KSE_t^{o-c}

The regression analysis outcome in table 8 tests the relationship between the daily return for the KSE in period t and the daily return for the S&P 500 in period t-1. In this test, the daily return for the S&P 500 is the independent variable, while the daily return for the KSE is the dependent variable. This analysis will test whether or not the American market's daily return leads the daily return in the Kuwaiti market. Additionally, the correlation coefficient between the two variables is calculated.

Table 8. Analysis of $KSE_t^{o-c} = \alpha_{US} + \beta_{US} S\&P_{t-1}^{o-c} + \varepsilon_{US}$

Local Currency		Common Currency	
Multiple R	0.03014	Multiple R	0.02355
R Square	0.00091	R Square	0.00055
Adjusted R Square	-0.0014	Adjusted R Square	-0.0017
Standard Error	0.00765	Standard Error	0.00795
Observations	437	Observations	437
Intercept	0.00092	Intercept	0.0008
$S\&P_{t-1}^{o-c}$	-0.0303	$S\&P_{t-1}^{o-c}$	-0.0246
P-value	0.52977	P-value	0.62346
Correlation	-0.0301	Correlation	-0.0235

Analysis Outcome for KSE_t^{o-c} and $S\&P_t^{c-o}$

The regression analysis outcome in table 9 tests the relationship between the daily return for the KSE and the overnight return for the S&P 500 in period t. In this test, the daily return for the KSE is the independent variable, while the overnight return for the S&P 500 is the dependent variable. This analysis will test whether or not the Kuwaiti market's daily return leads the overnight return in the American market. Additionally, the correlation coefficient between the two variables is calculated.

Table 9. Analysis of $S\&P_t^{c-o} = \alpha_K + \beta_K KSE_t^{o-c} + \varepsilon_K$

Local Currency		Common Currency	
Multiple R	0.03044	Multiple R	0.00602
R Square	0.00093	R Square	3.6E-05
Adjusted R Square	-0.0013	Adjusted R Square	-0.0022
Standard Error	0.0007	Standard Error	0.0007
Observations	458	Observations	458
Intercept	-2E-05	Intercept	-2E-05
KSE_t^{o-c}	-0.0029	KSE_t^{o-c}	-0.0006
P-value	0.51581	P-value	0.89773
Correlation	-0.0304	Correlation	-0.006

Analysis Outcome for $S\&P_{t-1}^{o-c}$ and KSE_t^{c-o}

The regression analysis outcome in table 10 tests the relationship between the overnight return for the KSE in period t and the daily return for the S&P 500 in period t-1. In this test, the daily return for the S&P 500 is the independent variable, while the overnight return for the KSE is the dependent variable. This analysis will test whether or not the American market's daily return leads the overnight return in the Kuwaiti market. Additionally, the correlation coefficient between the two variables is calculated.

Table 10. Analysis of $KSE_t^{c-o} = \alpha_{US} + \beta_{US} S\&P_{t-1}^{o-c} + \varepsilon_{US}$

Local Currency		Common Currency	
Multiple R	0.03297	Multiple R	0.03297
R Square	0.00109	R Square	0.00109
Adjusted R Square	-0.0012	Adjusted R Square	-0.0012
Standard Error	0.0025	Standard Error	0.0025
Observations	437	Observations	437
Intercept	0.00047	Intercept	0.00047
$S\&P_{t-1}^{o-c}$	0.01081	$S\&P_{t-1}^{o-c}$	0.01081
P-value	0.49176	P-value	0.49176
Correlation	0.03297	Correlation	0.03297

Analysis Outcome for $TASI_t^{o-c}$ and KSE_t^{o-c}

The regression analysis outcome in table 11 tests the relationship between the daily return for the TASI and the daily return for the KSE in period t. In this test, the daily return for the TASI is the independent variable, while the daily return for the KSE is the dependent variable. This analysis will test whether or not the Saudi market's daily return leads the daily return in the Kuwaiti market. Additionally, the correlation coefficient between the two variables is calculated.

Table 11. Analysis of $KSE_t^{o-c} = \alpha_{SA} + \beta_{SA}TASI_t^{o-c} + \varepsilon_{SA}$

Local Currency		Common Currency	
Multiple R	0.13019	Multiple R	0.12997
R Square	0.01695	R Square	0.01689
Adjusted R Square	0.01558	Adjusted R Square	0.01552
Standard Error	0.0077	Standard Error	0.00794
Observations	720	Observations	720
Intercept	0.00031	Intercept	0.00041
$TASI_t^{o-c}$	0.04744	$TASI_t^{o-c}$	0.04884
P-value	0.00046	P-value	0.00047
Correlation	0.13019	Correlation	0.12997

Analysis Outcome for $ADSM_t^{o-c}$ and KSE_t^{o-c}

The regression analysis outcome in table 12 tests the relationship between the daily return for the ADSM and the daily return for the KSE in period t. In this test, the daily return for the ADSM is the independent variable, while the daily return for the KSE is the dependent variable. This analysis will test whether or not the Emirati market's daily return leads the daily return in the Kuwaiti market. Additionally, the correlation coefficient between the two variables is calculated.

Table 12. Analysis of $KSE_t^{o-c} = \alpha_{UAE} + \beta_{UAE}ADSM_t^{o-c} + \varepsilon_{UAE}$

Local Currency		Common Currency	
Multiple R	0.18928	Multiple R	0.18699
R Square	0.03583	R Square	0.03497
Adjusted R Square	0.03442	Adjusted R Square	0.03356
Standard Error	0.00757	Standard Error	0.00782
Observations	689	Observations	689
Intercept	0.00029	Intercept	0.00037
$ADSM_t^{o-c}$	0.10094	$ADSM_t^{o-c}$	0.10289
P-value	5.6E-07	P-value	7.7E-07
Correlation	0.18928	Correlation	0.18699

Oman

The MSM's overall annual return for the entire study period was an average of 59.39%, compared to 8.31% for the S&P 500. The standard deviation for the same period for the MSM was 22.58%, compared to 21.08% for the S&P 500. On yearly basis, the annual returns for the MSM were 47.99% in 2005, 15.33% in 2006, and 62.95% in 2007. On the other hand, the S&P 500's annual returns were 3.50% in 2005, 14.64% in 2006, and 5.27% in 2007. Figure 21 below, shows returns for the MSM and the S&P 500 for the three year study period.

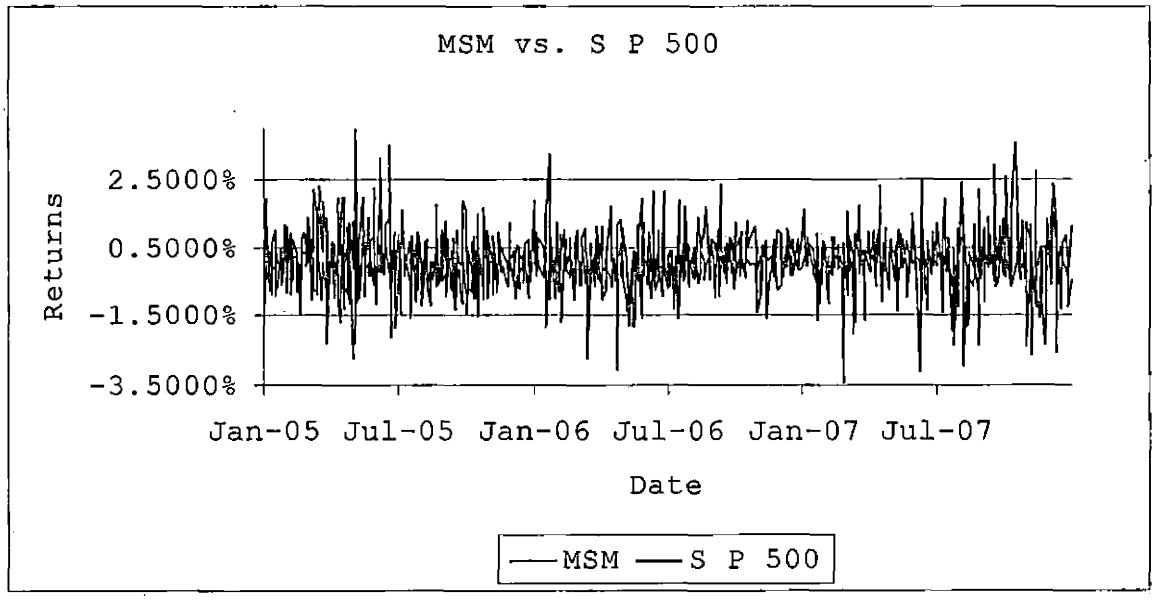

Figure 21. Returns for MSM and S&P 500 over the same time period

Analysis Outcome for MSM_t^{o-c} and $S\&P_t^{o-c}$

The regression analysis outcome in table 13 tests the relationship between the daily return for the MSM and the daily return for the S&P 500 in period t. In this test, the daily return for the MSM is the independent variable, while the daily return for the S&P 500 is the dependent variable. This analysis will test whether or not the Omani market's daily return leads the daily return in the American market. Additionally, the correlation coefficient between the two variables is calculated.

Table 13. Analysis of $S\&P_t^{o-c} = \alpha_o + \beta_o MSM_t^{o-c} + \varepsilon_o$

Local Currency		Common Currency	
Multiple R	0.00698	Multiple R	0.00287
R Square	4.9E-05	R Square	8.2E-06
Adjusted R Square	-0.0017	Adjusted R Square	-0.0017
Standard Error	0.00777	Standard Error	0.00777
Observations	584	Observations	584
Intercept	0.00035	Intercept	0.00035
MSM_t^{o-c}	-0.0063	MSM_t^{o-c}	-0.0025
P-value	0.86642	P-value	0.9448
Correlation	-0.007	Correlation	-0.0029

Analysis Outcome for $S\&P_{t-1}^{o-c}$ and MSM_t^{o-c}

The regression analysis outcome in table 14 tests the relationship between the daily return for the MSM in period t and the daily return for the S&P 500 in period t-1. In this test, the daily return for the S&P 500 is the independent variable, while the daily return for the MSM is the dependent variable. This analysis will test whether or not the American market's daily return leads the daily return in the Omani market. Additionally, the correlation coefficient between the two variables is calculated.

Table 14. Analysis of $MSM_t^{o-c} = \alpha_{US} + \beta_{US} S\&P_{t-1}^{o-c} + \varepsilon_{US}$

Local Currency		Common Currency	
Multiple R	0.06136	Multiple R	0.05468
R Square	0.00376	R Square	0.00299
Adjusted R Square	0.00214	Adjusted R Square	0.00137
Standard Error	0.00857	Standard Error	0.00865
Observations	616	Observations	616
Intercept	0.00147	Intercept	0.00137
$S\&P_{t-1}^{o-c}$	0.07106	$S\&P_{t-1}^{o-c}$	0.06387
P-value	0.1282	P-value	0.17529
Correlation	0.06136	Correlation	0.05468

Analysis Outcome for MSM_t^{o-c} and $S\&P_t^{c-o}$

The regression analysis outcome in table 15 tests the relationship between the daily return for the MSM and the overnight return for the S&P 500 in period t. In this test, the daily return for the MSM is the independent variable, while the overnight return for the S&P 500 is the dependent variable. This analysis will test whether or not the Omani market's daily return leads the overnight return in the American market. Additionally, the correlation coefficient between the two variables is calculated.

Table 15. Analysis of $S\&P_t^{c-o} = \alpha_o + \beta_o MSM_t^{o-c} + \varepsilon_o$

Local Currency		Common Currency	
Multiple R	0.01313	Multiple R	0.00841
R Square	0.00017	R Square	7.1E-05
Adjusted R Square	-0.0015	Adjusted R Square	-0.0016
Standard Error	0.00054	Standard Error	0.00054
Observations	584	Observations	584
Intercept	-5E-05	Intercept	-5E-05
MSM_t^{o-c}	0.00083	MSM_t^{o-c}	0.00052
P-value	0.75155	P-value	0.83924
Correlation	0.01313	Correlation	0.00841

Analysis Outcome for $TASI_t^{o-c}$ and MSM_t^{o-c}

The regression analysis outcome in table 16 tests the relationship between the daily return for the TASI and the daily return for the MSM in period t. In this test, the daily return for the TASI is the independent variable, while the daily return for the MSM is the dependent variable. This analysis will test whether or not the Saudi market's daily return leads the daily return in the Omani market. Additionally, the correlation coefficient between the two variables is calculated.

Table 16. Analysis of $MSM_t^{o-c} = \alpha_{SA} + \beta_{SA}TASI_t^{o-c} + \varepsilon_{SA}$

Local Currency		Common Currency	
Multiple R	0.06093	Multiple R	0.06988
R Square	0.00371	R Square	0.00488
Adjusted R Square	0.00192	Adjusted R Square	0.00309
Standard Error	0.00796	Standard Error	0.00847
Observations	558	Observations	558
Intercept	0.00087	Intercept	0.00086
$TASI_t^{o-c}$	0.02343	$TASI_t^{o-c}$	0.02859
P-value	0.15061	P-value	0.09914
Correlation	0.06093	Correlation	0.06988

Analysis Outcome for $ADSM_t^{o-c}$ and MSM_t^{o-c}

The regression analysis outcome in table 17 tests the relationship between the daily return for the ADSM and the daily return for the MSM in period t. In this test, the daily return for the ADSM is the independent variable, while the daily return for the MSM is the dependent variable. This analysis will test whether or not the Emirati market's daily return leads the daily return in the Omani market. Additionally, the correlation coefficient between the two variables is calculated.

Table 17. Analysis of $MSM_t^{o-c} = \alpha_{UAE} + \beta_{UAE}ADSM_t^{o-c} + \varepsilon_{UAE}$

Local Currency		Common Currency	
Multiple R	0.11432	Multiple R	0.11691
R Square	0.01307	R Square	0.01367
Adjusted R Square	0.01148	Adjusted R Square	0.01207
Standard Error	0.00803	Standard Error	0.00847
Observations	621	Observations	621
Intercept	0.00116	Intercept	0.00115
$ADSM_t^{o-c}$	0.06662	$ADSM_t^{o-c}$	0.07195
P-value	0.00434	P-value	0.00353
Correlation	0.11432	Correlation	0.11691

Qatar

The DSM's overall annual return for the entire study period was an average of 21.01%, compared to 8.31% for the S&P 500. The standard deviation for the same period for the DSM was 44.77%, compared to 21.08% for the S&P 500. On yearly basis, the annual returns for the DSM were 78.45% in 2005, -33.07% in 2006, and 36.37% in 2007. On the other hand, the S&P 500's annual returns were 3.50% in 2005, 14.64% in 2006, and 5.27% in 2007. Figure 22 below, shows returns for the DSM and the S&P 500 for the three year study period.

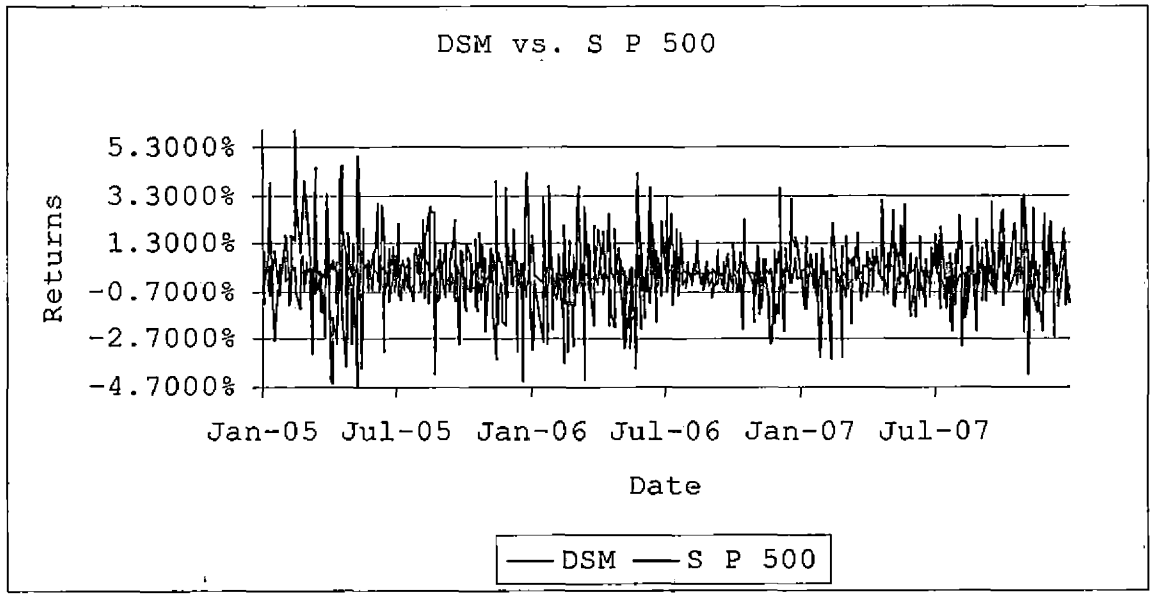

Figure 22. Returns for DSM and S&P 500 over the same time period

Analysis Outcome for DSM_t^{o-c} and $S\&P_t^{o-c}$

The regression analysis outcome in table 18 tests the relationship between the daily return for the DSM and the daily return for the S&P 500 in period t. In this test, the daily return for the DSM is the independent variable, while the daily return for the S&P 500 is the dependent variable. This analysis will test whether or not the Qatari market's daily return leads the daily return in the American market. Additionally, the correlation coefficient between the two variables is calculated.

Table 18. Analysis of $S\&P_t^{o-c} = \alpha_Q + \beta_Q DSM_t^{o-c} + \varepsilon_Q$

Local Currency		Common Currency	
Multiple R	0.04415	Multiple R	0.0181
R Square	0.00195	R Square	0.00033
Adjusted R Square	0.00023	Adjusted R Square	-0.0014
Standard Error	0.00778	Standard Error	0.00779
Observations	583	Observations	583
Intercept	0.00036	Intercept	0.00034
DSM_t^{o-c}	-0.0216	DSM_t^{o-c}	-0.0072
P-value	0.28718	P-value	0.66275
Correlation	-0.0442	Correlation	-0.0181

Analysis Outcome for $S\&P_{t-1}^{o-c}$ and DSM_t^{o-c}

The regression analysis outcome in table 19 tests the relationship between the daily return for the DSM in period t and the daily return for the S&P 500 in period t-1. In this test, the daily return for the S&P 500 is the independent variable, while the daily return for the DSM is the dependent variable. This analysis will test whether or not the American market's daily return leads the daily return in the Qatari market. Additionally, the correlation coefficient between the two variables is calculated.

Table 19. Analysis of $DSM_t^{o-c} = \alpha_{US} + \beta_{US} S\&P_{t-1}^{o-c} + \varepsilon_{US}$

Local Currency		Common Currency	
Multiple R	0.01527	Multiple R	0.02967
R Square	0.00023	R Square	0.00088
Adjusted R Square	-0.0021	Adjusted R Square	-0.0014
Standard Error	0.01518	Standard Error	0.01872
Observations	432	Observations	432
Intercept	0.00103	Intercept	-0.0017
$S\&P_{t-1}^{o-c}$	0.02975	$S\&P_{t-1}^{o-c}$	0.07131
P-value	0.75162	P-value	0.53853
Correlation	0.01527	Correlation	0.02967

Analysis Outcome for DSM_t^{o-c} and $S\&P_t^{c-o}$

The regression analysis outcome in table 20 tests the relationship between the daily return for the DSM and the overnight return for the S&P 500 in period t. In this test, the daily return for the DSM is the independent variable, while the overnight return for the S&P 500 is the dependent variable. This analysis will test whether or not the Qatari market's daily return leads the overnight return in the American market. Additionally, the correlation coefficient between the two variables is calculated.

Table 20. Analysis of $S\&P_t^{c-o} = \alpha_Q + \beta_Q DSM_t^{o-c} + \varepsilon_Q$

Local Currency		Common Currency	
Multiple R	0.01195	Multiple R	0.0061
R Square	0.00014	R Square	3.7E-05
Adjusted R Square	-0.0016	Adjusted R Square	-0.0017
Standard Error	0.00062	Standard Error	0.00062
Observations	583	Observations	583
Intercept	-3E-05	Intercept	-3E-05
DSM_t^{o-c}	0.00046	DSM_t^{o-c}	0.00019
P-value	0.77344	P-value	0.88318
Correlation	0.01195	Correlation	0.0061

Analysis Outcome for $TASI_t^{o-c}$ and DSM_t^{o-c}

The regression analysis outcome in table 21 tests the relationship between the daily return for the TASI and the daily return for the DSM in period t. In this test, the daily return for the TASI is the independent variable, while the daily return for the DSM is the dependent variable. This analysis will test whether or not the Saudi market's daily return leads the daily return in the Qatari market. Additionally, the correlation coefficient between the two variables is calculated.

Table 21. Analysis of $DSM_t^{o-c} = \alpha_{SA} + \beta_{SA}TASI_t^{o-c} + \varepsilon_{SA}$

Local Currency		Common Currency	
Multiple R	0.01816	Multiple R	0.03703
R Square	0.00033	R Square	0.00137
Adjusted R Square	-0.0012	Adjusted R Square	-0.0001
Standard Error	0.01702	Standard Error	0.02186
Observations	662	Observations	662
Intercept	0.00053	Intercept	0.00062
$TASI_t^{o-c}$	0.01591	$TASI_t^{o-c}$	0.04167
P-value	0.64087	P-value	0.34151
Correlation	0.01816	Correlation	0.03703

Analysis Outcome for $ADSM_t^{o-c}$ and DSM_t^{o-c}

The regression analysis outcome in table 22 tests the relationship between the daily return for the ADSM and the daily return for the DSM in period t. In this test, the daily return for the ADSM is the independent variable, while the daily return for the DSM is the dependent variable. This analysis will test whether or not the Emirati market's daily return leads the daily return in the Qatari market. Additionally, the correlation coefficient between the two variables is calculated.

Table 22. Analysis of $DSM_t^{o-c} = \alpha_{UAE} + \beta_{UAE}ADSM_t^{o-c} + \varepsilon_{UAE}$

Local Currency		Common Currency	
Multiple R	0.16842	Multiple R	0.13231
R Square	0.02836	R Square	0.01751
Adjusted R Square	0.02705	Adjusted R Square	0.01618
Standard Error	0.01609	Standard Error	0.02067
Observations	740	Observations	740
Intercept	0.00063	Intercept	0.00063
$ADSM_t^{o-c}$	0.20104	$ADSM_t^{o-c}$	0.20173
P-value	4.1E-06	P-value	0.00031
Correlation	0.16842	Correlation	0.13231

Saudi Arabia

The TASI's overall annual return for the entire study period was an average of 20.77%, compared to 8.31% for the S&P 500. The standard deviation for the same period for the TASI was 59.00%, compared to 21.08% for the S&P 500. On yearly basis, the annual returns for the TASI were 109.03% in 2005, -46.36% in 2006, and 44.50% in 2007. On the other hand, the S&P 500's annual returns were 3.50% in 2005, 14.64% in 2006, and 5.27% in 2007. Figure 23 below, shows returns for the TASI and the S&P 500 for the three year study period.

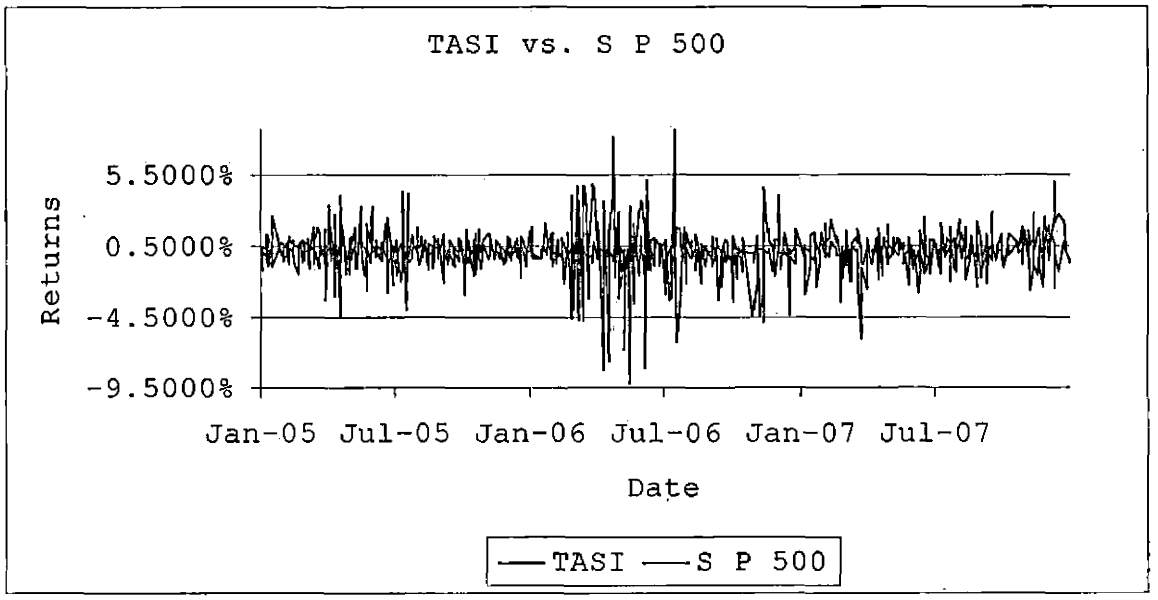

Figure 23. Returns for TASI and S&P 500 over the same time period

Analysis Outcome for $TASI_t^{o-c}$ and $S\&P_t^{o-c}$

The regression analysis outcome in table 23 tests the relationship between the daily return for the TASI and the daily return for the S&P 500 in period t. In this test, the daily return for the TASI is the independent variable, while the daily return for the S&P 500 is the dependent variable. This analysis will test whether or not the Saudi market's daily return leads the daily return in the American market. Additionally, the correlation coefficient between the two variables is calculated.

Table 23. Analysis of $S\&P_t^{o-c} = \alpha_{SA} + \beta_{SA}TASI_t^{o-c} + \varepsilon_{SA}$

Local Currency		Common Currency	
Multiple R	0.07035	Multiple R	0.07481
R Square	0.00495	R Square	0.0056
Adjusted R Square	0.00294	Adjusted R Square	0.00358
Standard Error	0.00771	Standard Error	0.00771
Observations	496	Observations	496
Intercept	0.00049	Intercept	0.00049
$TASI_t^{o-c}$	-0.0273	$TASI_t^{o-c}$	-0.029
P-value	0.11763	P-value	0.09608
Correlation	-0.0704	Correlation	-0.0748

Analysis Outcome for $S\&P_{t-1}^{o-c}$ and $TASI_t^{o-c}$

The regression analysis outcome in table 24 tests the relationship between the daily return for the TASI in period t and the daily return for the S&P 500 in period t-1. In this test, the daily return for the S&P 500 is the independent variable, while the daily return for the TASI is the dependent variable. This analysis will test whether or not the American market's daily return leads the daily return in the Saudi market. Additionally, the correlation coefficient between the two variables is calculated.

Table 24. Analysis of $TASI_t^{o-c} = \alpha_{US} + \beta_{US} S\&P_{t-1}^{o-c} + \varepsilon_{US}$

Local Currency		Common Currency	
Multiple R	0.06663	Multiple R	0.06673
R Square	0.00444	R Square	0.00445
Adjusted R Square	0.00241	Adjusted R Square	0.00242
Standard Error	0.02144	Standard Error	0.02145
Observations	492	Observations	492
Intercept	0.00101	Intercept	0.00096
$S\&P_{t-1}^{o-c}$	-0.1885	$S\&P_{t-1}^{o-c}$	-0.1888
P-value	0.13997	P-value	0.13943
Correlation	-0.0666	Correlation	-0.0667

Analysis Outcome for $TASI_t^{o-c}$ and $S\&P_t^{c-o}$

The regression analysis outcome in table 25 tests the relationship between the daily return for the TASI and the overnight return for the S&P 500 in period t. In this test, the daily return for the TASI is the independent variable, while the overnight return for the S&P 500 is the dependent variable. This analysis will test whether or not the Saudi market's daily return leads the overnight return in the American market. Additionally, the correlation coefficient between the two variables is calculated.

Table 25. Analysis of $S\&P_t^{c-o} = \alpha_{SA} + \beta_{SA}TASI_t^{o-c} + \varepsilon_{SA}$

Local Currency		Common Currency	
Multiple R	0.04266	Multiple R	0.03672
R Square	0.00182	R Square	0.00135
Adjusted R Square	-0.0002	Adjusted R Square	-0.0007
Standard Error	0.00061	Standard Error	0.00061
Observations	496	Observations	496
Intercept	-2E-05	Intercept	-2E-05
$TASI_t^{o-c}$	0.0013	$TASI_t^{o-c}$	0.00112
P-value	0.34308	P-value	0.41455
Correlation	0.04266	Correlation	0.03672

Analysis Outcome for $ADSM_t^{o-c}$ and $TASI_t^{o-c}$

The regression analysis outcome in table 26 tests the relationship between the daily return for the ADSM and the daily return for the TASI in period t. In this test, the daily return for the ADSM is the independent variable, while the daily return for the TASI is the dependent variable. This analysis will test whether or not the Emirati market's daily return leads the daily return in the Saudi market. Additionally, the correlation coefficient between the two variables is calculated.

Table 26. Analysis of $TASI_t^{o-c} = \alpha_{UAE} + \beta_{UAE}ADSM_t^{o-c} + \varepsilon_{UAE}$

Local Currency		Common Currency	
Multiple R	0.1552	Multiple R	0.15492
R Square	0.02409	R Square	0.024
Adjusted R Square	0.02275	Adjusted R Square	0.02267
Standard Error	0.02017	Standard Error	0.02018
Observations	734	Observations	734
Intercept	0.00071	Intercept	0.0007
$ADSM_t^{o-c}$	0.21175	$ADSM_t^{o-c}$	0.21142
P-value	2.4E-05	P-value	2.5E-05
Correlation	0.1552	Correlation	0.15492

The United Arab Emirates

The ADSM's overall annual return for the entire study period was an average of 20.53%, compared to 8.31% for the S&P 500. The standard deviation for the same period for the ADSM was 41.67%, compared to 21.08% for the S&P 500. On yearly basis, the annual returns for the ADSM were 76.52% in 2005, -40.55% in 2006, and 53.81% in 2007. On the other hand, the S&P 500's annual returns were 3.50% in 2005, 14.64% in 2006, and 5.27% in 2007. Figure 24 below, shows returns for the ADSM and the S&P 500 for the three year study period.

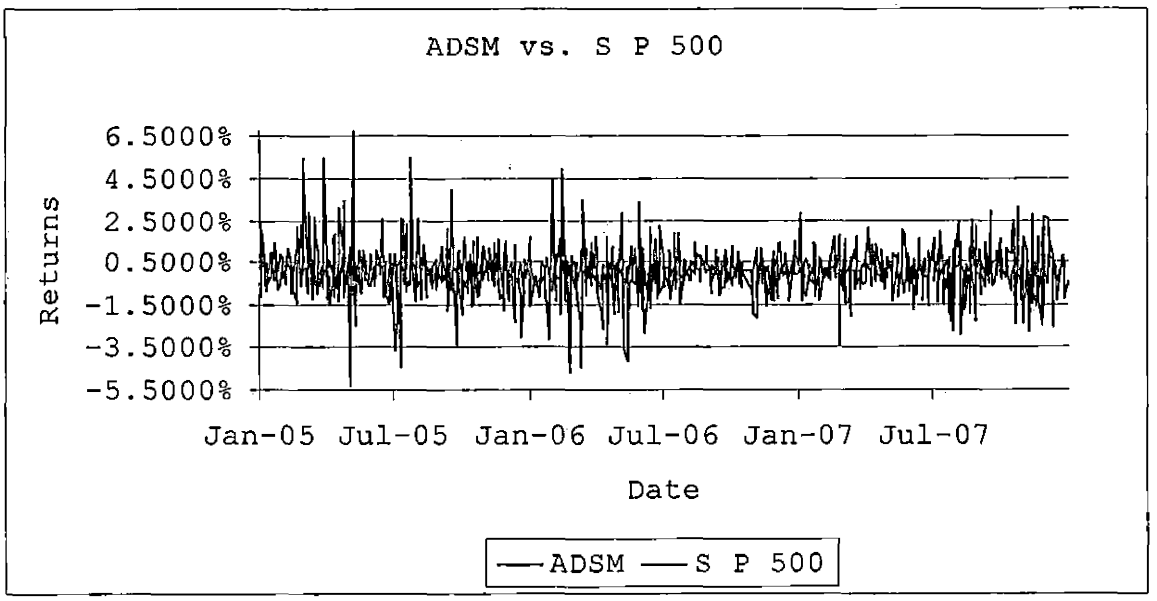

Figure 24. Returns for ADSM and S&P 500 over the same time period

Analysis Outcome for $ADSM_t^{o-c}$ and $S\&P_t^{o-c}$

The regression analysis outcome in table 27 tests the relationship between the daily return for the ADSM and the daily return for the S&P 500 in period t. In this test, the daily return for the ADSM is the independent variable, while the daily return for the S&P 500 is the dependent variable. This analysis will test whether or not the Emirati market's daily return leads the daily return in the American market. Additionally, the correlation coefficient between the two variables is calculated.

Table 27. Analysis of $S\&P_t^{o-c} = \alpha_{UAE} + \beta_{UAE}ADSM_t^{o-c} + \varepsilon_{UAE}$

Local Currency		Common Currency	
Multiple R	0.04948	Multiple R	0.04985
R Square	0.00245	R Square	0.00249
Adjusted R Square	0.00071	Adjusted R Square	0.00075
Standard Error	0.00776	Standard Error	0.00776
Observations	577	Observations	577
Intercept	0.00031	Intercept	0.00031
$ADSM_t^{o-c}$	-0.0287	$ADSM_t^{o-c}$	-0.0289
P-value	0.23535	P-value	0.23184
Correlation	-0.0495	Correlation	-0.0499

Analysis Outcome for $S\&P_{t-1}^{o-c}$ and $ADSM_t^{o-c}$

The regression analysis outcome in table 28 tests the relationship between the daily return for the ADSM in period t and the daily return for the S&P 500 in period t-1. In this test, the daily return for the S&P 500 is the independent variable, while the daily return for the ADSM is the dependent variable. This analysis will test whether or not the American market's daily return leads the daily return in the Emirati market. Additionally, the correlation coefficient between the two variables is calculated.

Table 28. Analysis of $ADSM_t^{o-c} = \alpha_{US} + \beta_{US} S\&P_{t-1}^{o-c} + \varepsilon_{US}$

Local Currency		Common Currency	
Multiple R	0.0277	Multiple R	0.02623
R Square	0.00077	R Square	0.00069
Adjusted R Square	-0.0012	Adjusted R Square	-0.0013
Standard Error	0.01459	Standard Error	0.01459
Observations	511	Observations	511
Intercept	0.00135	Intercept	0.00131
$S\&P_{t-1}^{o-c}$	-0.0532	$S\&P_{t-1}^{o-c}$	-0.0504
P-value	0.53206	P-value	0.55407
Correlation	-0.0277	Correlation	-0.0262

Analysis Outcome for $ADSM_t^{o-c}$ and $S\&P_t^{c-o}$

The regression analysis outcome in table 29 tests the relationship between the daily return for the ADSM and the overnight return for the S&P 500 in period t. In this test, the daily return for the ADSM is the independent variable, while the overnight return for the S&P 500 is the dependent variable. This analysis will test whether or not the Emirati market's daily return leads the overnight return in the American market. Additionally, the correlation coefficient between the two variables is calculated.

Table 29. Analysis of $S\&P_t^{c-o} = \alpha_{UAE} + \beta_{UAE}ADSM_t^{o-c} + \varepsilon_{UAE}$

Local Currency		Common Currency	
Multiple R	0.04234	Multiple R	0.0408
R Square	0.00179	R Square	0.00166
Adjusted R Square	5.7E-05	Adjusted R Square	-7E-05
Standard Error	0.00062	Standard Error	0.00062
Observations	577	Observations	577
Intercept	-4E-05	Intercept	-4E-05
$ADSM_t^{o-c}$	0.00196	$ADSM_t^{o-c}$	0.00188
P-value	0.30995	P-value	0.32795
Correlation	0.04234	Correlation	0.0408

Analysis Outcome for $TASI_t^{o-c}$ and $ADSM_t^{o-c}$

The regression analysis outcome in table 30 tests the relationship between the daily return for the TASI and the daily return for the ADSM in period t. In this test, the daily return for the TASI is the independent variable, while the daily return for the ADSM is the dependent variable. This analysis will test whether or not the Saudi market's daily return leads the daily return in the Emirati market. Additionally, the correlation coefficient between the two variables is calculated.

Table 30. Analysis of $ADSM_t^{o-c} = \alpha_{SA} + \beta_{SA}TASI_t^{o-c} + \varepsilon_{SA}$

Local Currency		Common Currency	
Multiple R	0.1552	Multiple R	0.15492
R Square	0.02409	R Square	0.024
Adjusted R Square	0.02275	Adjusted R Square	0.02267
Standard Error	0.01479	Standard Error	0.01479
Observations	734	Observations	734
Intercept	0.0004	Intercept	0.0004
$TASI_t^{o-c}$	0.11376	$TASI_t^{o-c}$	0.11353
P-value	2.4E-05	P-value	2.5E-05
Correlation	0.1552	Correlation	0.15492

CHAPTER SIX

DISCUSSION OF RESULTS

Bahrain

During the study period, the BSE had an average annual return that is more than twice the S&P 500's. Also the BSE had a lower standard deviation than the S&P 500's, indicating a smaller volatility and therefore a less risky investment. Besides the MSM, the BSE is the only other GCC market, which had managed to stay in the positive territories after the Gulf market crash in 2006. The BSE had its lowest index value at the beginning of the study period and its highest index value at the end of the study period, indicating a growing stable market.

The correlation matrix revealed that the BSE had a small positive correlation with the S&P 500 during the entire study period. The correlation before the Gulf market crash was a little higher at 0.08 and then was lowered to zero in 2006, indicating no relationship had existed at the time. In 2007, the correlation had increased minimally. However, the correlations throughout the study period were considered too low to draw any relations. Among the GCC markets, the BSE had small positive correlations with all

markets. Consecutively, the KSE, the DSM, and the MSM had the highest correlations with the BSE. Also, the BSE was found to be the third influential market in the GCC after the KSE.

The regression analysis between the BSE and the S&P 500 disclosed the following:

- The analysis of $S\&P_t^{o-c} = \alpha_B + \beta_B BSE_t^{o-c} + \varepsilon_B$ resulted in P Values that are larger than the determined level of significance for both local and common tests. As a result, we will not reject the null hypothesis. Accepting the null hypothesis in this case indicates that there was no linear relationship between the two returns. Therefore, the BSE's daily returns had no impact on the S&P 500's daily returns.
- The analysis of $BSE_t^{o-c} = \alpha_{US} + \beta_{US} S\&P_{t-1}^{o-c} + \varepsilon_{US}$ resulted in P Values that are larger than the determined level of significance for both local and common tests. As a result, we will not reject the null hypothesis. Accepting the null hypothesis in this case indicates that there was no linear relationship between the two returns. Therefore, the

lagged S&P 500's daily returns had no impact on the BSE's daily returns.

- The analysis of $S\&P_t^{c-o} = \alpha_B + \beta_B BSE_t^{o-c} + \varepsilon_B$ resulted in P Values that are larger than the determined level of significance for both local and common tests. As a result, we will not reject the null hypothesis. Accepting the null hypothesis in this case indicates that there was no linear relationship between the two returns. Therefore, the BSE's daily returns had no impact on the S&P 500's overnight returns.

The regression analysis between the TASI and the BSE resulted in P Values that are larger than the determined level of significance for both local and common tests. As a result, we will not reject the null hypothesis. Accepting the null hypothesis in this case indicates that there was no linear relationship between the two returns. Therefore, the TASI's daily returns had no impact on the BSE's daily returns.

The regression analysis between the ADSM and the BSE resulted in a P Value that is smaller than the determined level of significance for the local tests. As a result, we

will reject the null hypothesis. Rejecting the null hypothesis in this case indicates that there was a linear relationship between the two returns. The slope coefficient (β_1) for $ADSM_t^{o-c}$ of 0.0395 indicates that BSE_t^{o-c} moved for each unit change by as much as 0.04%. Additionally, to determine the goodness of fit of the regression analysis model, the coefficient of determination (R^2) was examined to determine the reliability of the relationship. R^2 of 0.0037 is insignificant, indicating that over 99% of the change in BSE_t^{o-c} is caused by other unknown variables excluding movements in $ADSM_t^{o-c}$ and exchange rates' fluctuation. Therefore, according to the local test, the ADSM's daily returns had a small impact on the BSE's daily returns. On the other hand, the common test results failed to reject the null hypothesis, indicating that there was no linear relationship.

Kuwait

During the study period, the KSE had an average annual return that is almost twice the S&P 500's. The KSE's standard deviation was about the same as the S&P 500's, indicating an equal volatility and therefore an equivalent risky investment. The KSE's returns suffered in 2006, as a

result of the aftermath of the Gulf market crash. However, due to impressive returns in 2005 and 2007, the KSE was still a good investment when considering long term investing. Despite the losses in 2006, the KSE had its lowest index value at the beginning of the study period and its highest index value at the end of the study period, indicating a growing market.

The correlation matrix revealed that the KSE had a small positive correlation with the S&P 500 during the entire study period. The correlation before the Gulf market crash was a little higher at 0.11 and then was lowered to 0.02 in 2006, indicating no relationship had existed at the time. In 2007, the correlation was converted to a negative correlation. However, the correlations throughout the study period were considered too low to draw any relations. Among the GCC markets, the KSE had small positive correlations with all markets. Consecutively, the ADSM, the BSE, and the TASI had the highest correlations with the KSE. Also, the KSE was found to be the second influential market in the GCC after the ADSM.

The regression analysis between the KSE and the S&P 500 disclosed the following:

- The analysis of $S\&P_t^{o-c} = \alpha_K + \beta_K KSE_t^{o-c} + \varepsilon_k$ resulted in P Values that are larger than the determined level of significance for both local and common tests. As a result, we will not reject the null hypothesis. Accepting the null hypothesis in this case indicates that there was no linear relationship between the two returns. Therefore, the KSE's daily returns had no impact on the S&P 500's daily returns.
- The analysis of $KSE_t^{o-c} = \alpha_{US} + \beta_{US} S\&P_{t-1}^{o-c} + \varepsilon_{US}$ resulted in P Values that are larger than the determined level of significance for both local and common tests. As a result, we will not reject the null hypothesis. Accepting the null hypothesis in this case indicates that there was no linear relationship between the two returns. Therefore, the lagged S&P 500's daily returns had no impact on the KSE's daily returns.
- The Analysis of $S\&P_t^{c-o} = \alpha_K + \beta_K KSE_t^{o-c} + \varepsilon_k$ resulted in P Values that are larger than the determined level of significance for both local and common tests. As a result, we will not reject the null

hypothesis. Accepting the null hypothesis in this case indicates that there was no linear relationship between the two returns. Therefore, the KSE's daily returns had no impact on the S&P 500's overnight returns.

- The analysis of $KSE_t^{c-o} = \alpha_{US} + \beta_{US} S\&P_{t-1}^{o-c} + \varepsilon_{US}$ resulted in P Values that are larger than the determined level of significance for both local and common tests. As a result, we will not reject the null hypothesis. Accepting the null hypothesis in this case indicates that there was no linear relationship between the two returns. Therefore, the lagged S&P 500's daily returns had no impact on the KSE's overnight returns.

The regression analysis between the TASI and the KSE resulted in P Values that are smaller than the determined level of significance for both local and common tests. As a result, we will reject the null hypothesis. Rejecting the null hypothesis in this case indicates that there was a linear relationship between the two returns. β_1 for $TASI_t^{o-c}$ for both tests averaged 0.0481 indicating that KSE_t^{o-c} moved for each unit change by as much as 0.05%. Additionally, for

both tests, an average R^2 of 0.0169 is insignificant, indicating that about 98% of the change in KSE_t^{o-c} is caused by other unknown variables excluding movements in $TASI_t^{o-c}$ and exchange rates' fluctuation. Therefore, the TASI's daily returns had a small impact on the KSE's daily returns.

The regression analysis between the ADSM and the KSE resulted in P Values that are smaller than the determined level of significance for both local and common tests. As a result, we will reject the null hypothesis. Rejecting the null hypothesis in this case indicates that there was a linear relationship between the two returns. β_1 for $ADSM_t^{o-c}$ for both tests averaged 0.1019 indicating that KSE_t^{o-c} moved for each unit change by as much as 0.10%. Additionally, for both tests, an average R^2 of 0.0354 is insignificant, indicating that about 96% of the change in KSE_t^{o-c} is caused by other unknown variables excluding movements in $ADSM_t^{o-c}$ and exchange rates' fluctuation. Therefore, the ADSM's daily returns had a small impact on the KSE's daily returns and a larger impact than the one caused by changes in $TASI_t^{o-c}$.

Oman

During the study period, the MSM had an astounding average annual return that is more than six times the S&P 500's. The MSM's standard deviation was about the same as the S&P 500's, indicating an equal volatility and therefore an equivalent risky investment. Besides the BSE, the MSM is the only other GCC market, which had managed to stay in the positive territories after the Gulf market crash in 2006. Moreover, the MSM also managed to outperform the S&P 500 in 2006 as the only GCC market to do so. The MSM had its lowest index value at the beginning of the study period and its highest index value at the end of the study period, indicating an excellent growing, stable market.

The correlation matrix revealed that the MSM had a small negative correlation with the S&P 500 during the entire study period. The correlation before the Gulf market crash was a little negatively higher at -0.06 and remained the same in 2006, indicating no relationship had existed at the time. In 2007, the correlation had increased minimally into the positive territories at 0.08. However, the correlations throughout the study period were considered too low to draw any relations. Among the GCC markets, the MSM had small positive correlations except with the DSM

where the correlation was negative. Consecutively, the ADSM, the BSE, and the TASI had the highest correlations with the MSM. Also, the MSM was found to be the least influential market in the GCC.

The regression analysis between the MSM and the S&P 500 disclosed the following:

- The analysis of $S\&P_t^{o-c} = \alpha_o + \beta_o MSM_t^{o-c} + \varepsilon_o$ resulted in P Values that are larger than the determined level of significance for both local and common tests. As a result, we will not reject the null hypothesis. Accepting the null hypothesis in this case indicates that there was no linear relationship between the two returns. Therefore, the MSM's daily returns had no impact on the S&P 500's daily returns.
- The analysis of $MSM_t^{o-c} = \alpha_{US} + \beta_{US} S\&P_{t-1}^{o-c} + \varepsilon_{US}$ resulted in P Values that are larger than the determined level of significance for both local and common tests. As a result, we will not reject the null hypothesis. Accepting the null hypothesis in this case indicates that there was no linear relationship between the two returns. Therefore, the

lagged S&P 500's daily returns had no impact on the MSM's daily returns.

- The analysis of $S\&P_t^{c-o} = \alpha_o + \beta_o MSM_t^{o-c} + \varepsilon_o$ resulted in P Values that are larger than the determined level of significance for both local and common tests. As a result, we will not reject the null hypothesis. Accepting the null hypothesis in this case indicates that there was no linear relationship between the two returns. Therefore, the MSM's daily returns had no impact on the S&P 500's overnight returns.

The regression analysis between the TASI and the MSM resulted in P Values that are larger than the determined level of significance for both local and common tests. As a result, we will not reject the null hypothesis. Accepting the null hypothesis in this case indicates that there was no linear relationship between the two returns. Therefore, the TASI's daily returns had no impact on the MSM's daily returns.

The regression analysis between the ADSM and the MSM resulted in P Values that are smaller than the determined level of significance for both local and common tests. As a

result, we will reject the null hypothesis. Rejecting the null hypothesis in this case indicates that there was a linear relationship between the two returns. β_1 for $ADSM_t^{o-c}$ for both tests averaged 0.0693 indicating that MSM_t^{o-c} moved for each unit change by as much as 0.07%. Additionally, for both tests, an average R^2 of 0.0134 is insignificant, indicating that over 98% of the change in MSM_t^{o-c} is caused by other unknown variables excluding movements in $ADSM_t^{o-c}$ and exchange rates' fluctuation. Therefore, the ADSM's daily returns had a small impact on the MSM's daily returns.

Qatar

During the study period, the DSM had an average annual return that is more than one and a half times the S&P 500's. The DSM's standard deviation was twice as much as the S&P 500's, indicating a large volatility and therefore a very risky investment. The DSM's returns suffered greatly in 2006, as a result of the aftermath of the Gulf market crash. The DSM was the first market to break the overvaluation cycle in September of 2005 and set the domino effect that led to the Gulf market crash. The market had

touched the bottom level of the study period in December 2006 where the market started to pick up thereafter.

The correlation matrix revealed that the DSM had a small negative correlation with the S&P 500 during the entire study period. The correlation before the Gulf market crash was negatively higher at -0.10 and then was lowered to zero in 2006, indicating no relationship had existed at the time. In 2007, the correlation had decreased minimally to -0.03. However, the correlations throughout the study period were considered too low to draw any relations. Among the GCC markets, the DSM had small positive correlations except with the MSM where the correlation was negative. Consecutively, the ADSM, the BSE, and the KSE had the highest correlations with the DSM. Also, the DSM was found to be the least influential market in the GCC after the MSM.

The regression analysis between the DSM and the S&P 500 disclosed the following:

- The analysis of $S\&P_t^{o-c} = \alpha_Q + \beta_Q DSM_t^{o-c} + \varepsilon_Q$ resulted in P Values that are larger than the determined level of significance for both local and common tests. As a result, we will not reject the null

hypothesis. Accepting the null hypothesis in this case indicates that there was no linear relationship between the two returns. Therefore, the DSM's daily returns had no impact on the S&P 500's daily returns.

- The analysis of $DSM_t^{o-c} = \alpha_{US} + \beta_{US} S\&P_{t-1}^{o-c} + \varepsilon_{US}$ resulted in P Values that are larger than the determined level of significance for both local and common tests. As a result, we will not reject the null hypothesis. Accepting the null hypothesis in this case indicates that there was no linear relationship between the two returns. Therefore, the lagged S&P 500's daily returns had no impact on the DSM's daily returns.
- The analysis of $S\&P_t^{c-o} = \alpha_Q + \beta_Q DSM_t^{o-c} + \varepsilon_Q$ resulted in P Values that are larger than the determined level of significance for both local and common tests. As a result, we will not reject the null hypothesis. Accepting the null hypothesis in this case indicates that there was no linear relationship between the two returns. Therefore, the DSM's daily

returns had no impact on the S&P 500's overnight returns.

The regression analysis between the TASI and the DSM resulted in P Values that are larger than the determined level of significance for both local and common tests. As a result, we will not reject the null hypothesis. Accepting the null hypothesis in this case indicates that there was no linear relationship between the two returns. Therefore, the TASI's daily returns had no impact on the DSM's daily returns.

The regression analysis between the ADSM and the DSM resulted in P Values that are smaller than the determined level of significance for both local and common tests. As a result, we will reject the null hypothesis. Rejecting the null hypothesis in this case indicates that there was a linear relationship between the two returns. β_1 for $ADSM_t^{o-c}$ for both tests averaged 0.2014 indicating that DSM_t^{o-c} moved for each unit change by as much as 0.20%. Additionally, for both tests, an average R^2 of 0.0229 is insignificant, indicating that over 97% of the change in DSM_t^{o-c} is caused by other unknown variables excluding movements in $ADSM_t^{o-c}$ and exchange rates' fluctuation. Therefore, the ADSM's

daily returns had a small impact on the DSM's daily returns.

Saudi Arabia

During the study period, the TASI had an average annual return that is more than one and a half times the S&P 500's. The TASI's standard deviation was more than twice as much as the S&P 500's, indicating a very large volatility and therefore a very risky investment. The TASI's return hit a record low and was the most affected market in the GCC due to the 2006 Gulf market crash. The TASI followed the freefall of the DSM and the ADSM in February 2006 to make the largest drop, which was felt everywhere in the GCC markets. The market had touched the bottom level of the study period in June 2007 where the market started to pick up thereafter.

The correlation matrix revealed that the TASI had a small negative correlation with the S&P 500 during the entire study period. The correlation before the Gulf market crash was positively a little higher at 0.05 and then was increased into the negative territories at -0.14 in 2006, indicating no relationship had existed at the time. In 2007, the correlation decreased to -0.07. However, the

correlations throughout the study period were considered too low to draw any relations. Among the GCC markets, the TASI had small positive correlations with all markets. Consecutively, the ADSM, the KSE, and the MSM had the highest correlations with the TASI. Also, the TASI was not found to be the influential market in the GCC as a previous study suggested.

The regression analysis between the TASI and the S&P 500 disclosed the following:

- The analysis of $S\&P_t^{o-c} = \alpha_{SA} + \beta_{SA}TASI_t^{o-c} + \varepsilon_{SA}$ resulted in P Values that are larger than the determined level of significance for both local and common tests. As a result, we will not reject the null hypothesis. Accepting the null hypothesis in this case indicates that there was no linear relationship between the two returns. Therefore, the TASI's daily returns had no impact on the S&P 500's daily returns.
- The analysis of $TASI_t^{o-c} = \alpha_{US} + \beta_{US}S\&P_{t-1}^{o-c} + \varepsilon_{US}$ resulted in P Values that are larger than the determined level of significance for both local and common tests. As a result, we will not reject the

null hypothesis. Accepting the null hypothesis in this case indicates that there was no linear relationship between the two returns. Therefore, the lagged S&P 500's daily returns had no impact on the TASI's daily returns.

- The analysis of $S\&P_t^{c-o} = \alpha_{SA} + \beta_{SA}TASI_t^{o-c} + \varepsilon_{SA}$ resulted in P Values that are larger than the determined level of significance for both local and common tests. As a result, we will not reject the null hypothesis. Accepting the null hypothesis in this case indicates that there was no linear relationship between the two returns. Therefore, the TASI's daily returns had no impact on the S&P 500's overnight returns.

The regression analysis between the ADSM and the TASI resulted in P Values that are smaller than the determined level of significance for both local and common tests. As a result, we will reject the null hypothesis. Rejecting the null hypothesis in this case indicates that there was a linear relationship between the two returns. β_1 for $ADSM_t^{o-c}$ for both tests averaged 0.2116 indicating that $TASI_t^{o-c}$ moved for each unit change by as much as 0.21%. Additionally, for

both tests, an average R^2 of 0.0241 is insignificant, indicating that over 97% of the change in $TASI_t^{o-c}$ is caused by other unknown variables excluding movements in $ADSM_t^{o-c}$ and exchange rates' fluctuation. Therefore, the ADSM's daily returns had a small impact on the TASI's daily returns.

The United Arab Emirates

During the study period, the ADSM had an average annual return that is more than twice the S&P 500's. The ADSM's standard deviation was about twice as much as the S&P 500's, indicating a large volatility and therefore a very risky investment. The ADSM's returns suffered significantly in 2006, as a result of the aftermath of the Gulf market crash. The ADSM was the second market to break the overvaluation cycle in November of 2005 and set the domino effect that led to the Gulf market crash. The market had touched the bottom level of the study period in April 2007 where the market started to pick up thereafter.

The correlation matrix revealed that the ADSM had a small negative correlation with the S&P 500 during the entire study period. The correlation before the Gulf market crash was negatively higher at -0.10 and then was lowered

almost to zero in 2006, indicating no relationship had existed at all. In 2007, the correlation had decreased minimally to -0.05. However, the correlations throughout the study period were considered too low to draw any relations. Among the GCC markets, the ADSM had small positive correlations with all the GCC markets. Consecutively, the KSE, the DSM, and the TASI had the highest correlations with the ADSM. Also, the ADSM was found to be the most influential market in the GCC.

The regression analysis between the ADSM and the S&P 500 disclosed the following:

- The analysis of $S\&P_t^{o-c} = \alpha_{UAE} + \beta_{UAE} ADSM_t^{o-c} + \varepsilon_{UAE}$ resulted in P Values that are larger than the determined level of significance for both local and common tests. As a result, we will not reject the null hypothesis. Accepting the null hypothesis in this case indicates that there was no linear relationship between the two returns. Therefore, the ADSM's daily returns had no impact on the S&P 500's daily returns.
- The analysis of $ADSM_t^{o-c} = \alpha_{US} + \beta_{US} S\&P_{t-1}^{o-c} + \varepsilon_{US}$ resulted in P Values that are larger than the

determined level of significance for both local and common tests. As a result, we will not reject the null hypothesis. Accepting the null hypothesis in this case indicates that there was no linear relationship between the two returns. Therefore, the lagged S&P 500's daily returns had no impact on the ADSM's daily returns.

- The analysis of $S\&P_t^{c-o} = \alpha_{UAE} + \beta_{UAE}ADSM_t^{o-c} + \varepsilon_{UAE}$ resulted in P Values that are larger than the determined level of significance for both local and common tests. As a result, we will not reject the null hypothesis. Accepting the null hypothesis in this case indicates that there was no linear relationship between the two returns. Therefore, the ADSM's daily returns had no impact on the S&P 500's overnight returns.

The regression analysis between the TASI and the ADSM resulted in P Values that are smaller than the determined level of significance for both local and common tests. As a result, we will reject the null hypothesis. Rejecting the null hypothesis in this case indicates that there was a linear relationship between the two returns. β_1 for $TASI_t^{o-c}$

for both tests averaged 0.1137 indicating that $ADSM_t^{o-c}$ moved for each unit change by as much as 0.11%. Additionally, for both tests, an average R^2 of 0.0241 is insignificant, indicating that over 97% of the change in $ADSM_t^{o-c}$ is caused by other unknown variables excluding movements in $TASI_t^{o-c}$ and exchange rates' fluctuation. Therefore, the TASI's daily returns had a small impact on the ADSM's daily returns.

CHAPTER SEVEN

CONCLUSION

The results found in this project are surprising giving the strong economic relationships between the GCC countries and the US. The results of the correlation analysis between the GCC and the S&P 500 markets found that during the study period, there were insignificant small correlations between each of the GCC and the S&P 500 markets. Also, the correlation results for each year of the study showed that in 2005 and 2006 there were small correlations, while in 2007 after the Gulf market crash there were no significant correlations at all. These results clearly support the efficient market hypothesis and indicate the benefit of diversification.

Among the GCC countries, the correlations were small, indicating there was no large impact of one market on the other. However, after the Gulf market crash, the correlations between the GCC markets increased greatly compared to 2005. Such phenomena had been observed during regional market crashes in the past. In 2007 after the Gulf market crash, correlation begun to decrease from the higher levels experienced in 2006. These results again support the

efficient market hypothesis and indicate the benefit of diversifying portfolios among the GCC markets. Also, it was found that the ADSM was the most influential market and the MSM was the least influential market in the GCC.

The regression analysis was a method utilized to help identify causality relationship between each of the GCC and the S&P 500 markets. The regression analysis results for all of the markets have failed to reject the null hypothesis. This indicates that there were no linear relationships between any of the GCC and the S&P 500 markets. These results confirm with the results of the correlation analysis, indicating the benefit of diversification between the GCC and the S&P 500 markets. Moreover, such results support the efficient market hypothesis, indicating that public information of these markets is incorporated instantaneously.

On the other hand, the results of the regression analysis of Saudi Arabia and the UAE among the GCC markets have mostly supported the null hypothesis, indicating significant relationships between most of the GCC markets and the two largest markets. In a previous study, Saudi Arabia was found to be the leading market among the GCC markets. However, due to the increasing pace of market

liberalization in the UAE, the country's market is becoming a powerhouse in the region. According to the regression analysis results, the UAE had significant relationships with all the GCC markets except for the common test of the Bahraini market. In contrast, the Saudi market had significant relationships only with the Kuwaiti and the Emirati markets. Additionally, the regression analysis between the Saudi and the Emirati markets found that the Emirati market had the larger impact. Such a finding shows that a market leader is not required to be the largest market in terms of capitalization and resources as shown in this study.

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