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Co Integration of Stock Markets of the GCC Nations in the Wake of the Arab Spring of 2010: Analysis of the Relationship between Oil and Stock Market Prices

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Abstract:

This research study investigates the long run relationship between stock market indices of six GCC nations - Saudi Arabia, Oman, Qatar, Kuwait, UAE and Bahrain. It also studies the long run relationship between oil prices and the combined index of the GCC. A unique addition to this research is the study of the effect of the Arab Spring on co-integration in the case of both these relationships. The time period of the study ranges from May, 2013 to December, 2013. Correlation technique and Johansen co-integration test were used for the purpose of analysis. The study has concluded that a strong long run equilibrium relationship exists amongst stock market prices of GCC nations. No long term relationship is detected between oil prices and stock market prices in GCC countries as a group. The Arab Spring has been found to have a minor effect on the co-integrating relation in both contexts.

Keywords: GCC, co-integration, stock markets, oil prices

1. Introduction

1.1. Background

Stock market integration can be described as a "regional or global investing environment wherein the pricing of financial assets with similar risk and return profiles are comparable in trading on stock exchanges on a transnational basis" (AlSuhailani, 2004). In simpler terms, co-integration indicates the presence of a long term relationship between different time series (Khan, 2011). Co-integration of stock markets usually involves "equality of asset prices" or "market prices' interdependence" (AlSuhailani, 2004), i.e., stock markets are said to be integrated if assets of similar risk and nature have similar yields across countries. Co-integration assists in calculating the relationship "between non-stationary series within a stationary model" (AlSuhailani, 2004). Thus it may overcome the dilemma of spurious regression.

Co-integration of stock markets has been a topic of interest for researchers since the late 1900s. Worldwide integration of financial markets has increased over the past few decades due to globalization of investments and liberalization and deregulation of markets. Liberalization policies implemented by developing nations have contributed towards greater financial integration through a rise in capital flows and Foreign Direct Investment (AlSuhailani, 2004). Co-integration is affected by many factors such as listing of similar shares in more than one stock market, informational and regulatory barriers and transfer of funds by institutions (AlSuhailani, 2004). Another factor that could influence co-integration is a major crisis such as recession. The Arab spring is a major crisis that hit the Arab world in December, 2010. This uprising started in Tunisia and spread to many other countries such as Egypt, Libya, Yemen, Syria and Bahrain. This research paper examines the effect of this uprising on co-integrating relationships in GCC.

1.2. Problem Statement

There are six countries in the GCC region. The stock markets of these countries have been established in the mid-1990s and early-2000s. The policies implemented by each country differ with regards to liberalization and efficiency. This research tackles the following research questions:

- Does long run equilibrium relationship exist between stock markets of the six GCC countries - Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the UAE as a group?
- Does long run equilibrium relationship exist between stock market prices in the GCC countries and Global oil prices?
- Did the Arab spring of 2010 affect the relationship amongst stock markets of GCC countries?
- Did the Arab spring of 2010 affect the relationship between oil prices and stock market prices of the GCC?

1.3. Aims and Objectives

This research paper aims to identify the presence or lack thereof of co-integration amongst the following time series:

- Stock markets of the GCC countries.
- Stock market prices in the GCC countries and oil prices.

The following are the objectives of this paper:

- To conduct research on existing literature on the topic and write its review.
- To identify significant variables affecting the economies of the region.
- To collect data relevant to the research.
- To measure correlation amongst GCC nations and between GCC index and oil prices.
- To conduct the Johansen test to test for co-integration between the stock market indices of the six GCC nations.
- To conduct the Johansen test to test for co-integration between GCC stock market prices and oil prices.
- To conduct the Johansen test to test for co-integration amongst GCC stock markets for the time period before and after the Arab Spring.
- To conduct the Johansen test to test for co-integration between oil prices and GCC stock market prices for the time period before and after the Arab Spring.
- To provide a summary and analysis of findings.

1.4. Importance of the Research

This study is of significance to policy makers in the GCC as it offers a current analysis of the extent of financial integration in the GCC region. Co-integration of stock markets is of great interest to economists as well because of the financial and economic benefits it offers to the integrated economies. Some of these benefits are mentioned below.

- Financial integration has been shown to be a contributing factor to economic growth. Financial integration results in diversification of investments and liberalization of the economy. Investors start investing in high risk and high return investments to diversify the risk quotient. Studies conducted in early 1990s have proven the link between economic growth, diversification and financial integration (AlSuhailani, 2004).
- One of the agendas of the GCC is to build a monetary union. If the stock markets in these countries are co-integrated, it will ultimately support the single currency movement (AlSuhailani, 2004).
- Financial integration will also reduce cost of capital for companies whose stocks are listed in integrated stock markets due to greater access to international funds (AlSuhailani, 2004).
- Besides the above mentioned benefits, stock market co-integration also reduces the risk for investors and encourages them to invest in other stock markets as returns will be similar for similar assets (AlSuhailani, 2004).

This research paper adds to existing literature on co-integration of GCC stock markets by taking into account the events of Arab spring. It also offers further scope for research by expanding the area of study to MENA region as a whole and including international stock market indices.

1.5. Scope

This research paper includes stock markets of six countries-Bahrain, Qatar, Kuwait, Oman, UAE and Saudi Arabia.

The time period of the research will be from 2005 - 2013 to incorporate the period before and after the Arab Spring.

2. Literature review

This literature review aims to provide a background to some of the research relevant to the area of study. It can be noted that researchers have used various methods to calculate and interpret their data.

2.1. Literature on theory

Ssekuma (2011) analyses three different co-integration tests - Engle-Granger method, Phillips-Ouliaris methods and Johansen's procedure. He describes the tests involved in each method along with its procedure and limitations. Ssekuma (2011) also applies to test to different time series to analyze their results. His paper has found that the results of these three co-integration methods are inconsistent with each other. He recommends the Johansen method as it can detect "more than one co-integration relationship".

Hendry and Juselius (1999) in their paper titled " Explaining co-integration analysis: Part I", provide a description of the concept of co-integration and also its nature, statistical adequacy, determinants and implications in building models and estimating forecasts. The paper focuses on Vector Autoregressive processes.

2.2. Literature on co-integration in the global scenario

Purna and Sujit (2013) have studied the effect of the recession on the relationship between five world stock markets by running co-integration tests separately for the period before and after the recession. They have used the Johansen co-integration test, Engle-Granger co-integration test and Granger causality to investigate the changes in linkages and influences in these stock markets. The paper has reached the conclusions that correlation amongst the stock markets was significantly negatively affected by the crisis. Co-integration tests have shown only weak form of co-integration being present both before and after the recession. Granger causality test results depict change in only a few instances.

Aghayev (2012) scrutinizes the co-integration between the Turkish stock exchange and the stock exchanges of 13 international countries using the Engle Granger, Johansen and Gregory Hansen tests. Granger causality is also employed. The Engle Granger

and Johansen tests showed similar results with co-integration being visible only with few countries such as Germany, Israel and Korea. The Gregory and Hansen test, on the other hand, showed the presence of co-integration with all stock markets. Granger causality shows the presence of causal relationships running from the international stock markets to the Turkish stock market.

Al-Zalabani and Menon (2012) investigate the co-integration between Saudi Arabia's TASI and eight other international stock markets of emerging and developed nations. They use the Engle Granger test to test for co-integration. Their results depict that there is no relationship between the TASI and the indices of emerging economies. Developed countries also display a similar trend, with the US's S&P 500 being the only index to show a presence of co-integration with the TASI.

Perera and Wickramanayake (2012) have examined the financial integration in four South Asian countries – Bangladesh, India, Pakistan and Sri Lanka. This study is unique as it uses both stock and bond data. They have developed the following hypotheses for their data:

“Stock markets:

- H1a. Pair-wise stock returns in different markets are positively correlated.
- H2a. Stock returns in different markets indicate at least one co-integrated equation.
- H3a. Stock return series in one market Granger causes the return series in other Market/s.

Bond markets:

- H1b. Pair-wise bond returns of different markets are positively correlated.
- H2b. Bond returns of different markets indicate at least one co-integrated equation.
- H3b. Bond return series in one market Granger causes the return series in other market/s” (Perera and Wickramanayake, 2012).

Perera and Wickramanayake (2012) have used the Johansen multivariate test and Granger causality tests to analyze their data. Correlation tests revealed no relationship between stock returns. However co-integration tests have indicated a strong presence of long run association between stock markets. Bond markets also reveal similar conclusions. Hence the hypotheses regarding co-integration of both stock and bond markets (H1a and H1b) were supported but those regarding correlation and causality were disproved. Assidenou (2011) has explored the co-integration of eleven major international stock markets during the financial crisis of 2008. He divided his data into three major groups- the OECD group, the Pacific group and the East-Asia group. He has used the Johansen test based on Vector Auto Correction to test for co-integration. The study has concluded that for the OECD group both trace and Max-eigenvalue statistics show a presence of co-integration. The tests conducted on the Pacific group and the East-Asia group has also revealed similar results. However, the co-integration in case of the East-Asia group is weaker than others. Assidenou (2011) has concluded based on his research that during times of crisis, market efficiency is more definite.

Khan (2011) investigates the co-integration between the stock markets of 23 "geographically diverse" countries. He has employed the Johansen and the Gregory and Hansen test to test for co-integration. He also applies the CAPM model to analyze the short term diversification opportunities in these countries. The Johansen test did not find any significant co-integration amongst the stock markets. However, the Gregory-Hansen test finds evidence of an international movement towards co-integration. Khan (2011) has used the CAPM model to identify those countries which are relatively not much influenced by changes in the global index and hence provide an opportunity for diversification.

2.3. Literature on co-integration in the GCC, MENA or Middle East region

Arouri et al. (2013) study the dynamics of regional integration in four countries of the Middle East. They also analyze the determinants of such co-integration. They have used a CAPM model with three risks - regional risk, exchange rate risk and non-diversifiable domestic risk to calculate co-integration. Their findings show that there is a high level of co-integration between these countries and that inflation rates and exchange rate changes are the most significant determinants of integration.

Hadi et al. (2013) have used the VAR model (Engle Granger co-integration test) and Granger causality test to examine the relationship between the stock exchanges of Amman and Palestine. The study has found presence of co-integration in both stock indices and the Granger causality test has proved that movements in the Amman stock exchange affect the Palestine stock exchange. Hadi et al. believe that The Palestine economy is influenced by neighboring economies and there is mutual benefit in conducting trade in these countries. They conclude that any growth in the stock markets of neighboring economies has a favorable effect on the Palestinian economy. Nguyen, Paskela and Jones (2013) explore the existence of co-integration of nine countries of the MENA region with the US's S&P 500. The Johansen test and Granger causality are used for analysis. Co-integration analysis has concluded that markets in the MENA region are co-integrated with each other but not with the US. Granger causality has also resulted in similar observations. There are strong bi-directional and unidirectional influences within the MENA countries. However, influence of the US stock market appears to be non-existent. Rengasamy (2012) inspected the patterns in returns and the long term links in stock market indices in five GCC countries. He has used weekly data of three years from 2009 to 2012 for the purpose of analysis. Rengasamy (2012) has also researched if the sweeping market reforms implemented by the GCC governments have improved the profit making opportunities for local and international investors. The researcher has used EViews to calculate descriptive statistics for the data and employed Spearman's "rho" non-parametric test to test for correlation. He has used the Johansen-Julieus multivariate test to test for co-integration. Rengasamy (2012) has concluded through his descriptive statistics that Qatar's stock market yields the highest returns to investors and Saudi Arabia's stock market has the highest volume of trade. Dubai's stock market seems to suffer from the most volatility. Correlation analysis has proved that there is a relationship between the stock markets of Dubai, Abu Dhabi and Oman. However, the co-integration test has revealed no long term link between the five stock markets. Al-Khazali, Darrat and Saad (2006) have also investigated the co-integration between GCC stock markets. They have also studied the impact of market liberalization measures on co-integration in the GCC by analyzing the

extent of market linkages prior to and after the implementation of liberalization measures. They have taken into account stock market indices of Saudi Arabia, Bahrain, Kuwait and Oman. Al-Khazali et al. (2006) have utilized the Johansen–Juselius test for co-integration. Their study has concluded that a long run relationship does exist between these stock markets. It has also concluded that market liberalization techniques are an essential factor to promote greater financial and economic co-integration in the region. Alsuhaibani (2004) conducted an in-depth analysis of the history of GCC stock markets and financial integration amongst them. His scope for research includes five stock markets – Bahrain Stock Exchange (BSE), Doha Securities market (DSM), Kuwait Stock Exchange (KSE), Muscat Securities Market (MSM) and Saudi Stock Market (SSM). He has used several tests to evaluate the correlation and co-integration amongst the stock markets as a group as well as with international stock market indices. He has described the economic context of the region and various efforts made towards economic and financial integration over the years. Alsuhaibani (2004) used the Augmented Dickey Fuller test to test for stationarity in the time series. He employed the Johansen co-integration test to test for co-integration amongst the GCC stock markets and between each market and chosen international stock markets. He also applied the Granger causality test to detect presence of causal relationships. The research has concluded that positive correlation exists between the BSE and MSM. Correlation also exists among the stock markets of Dubai, Saudi Arabia and Kuwait. Co-integration analysis concluded that co-integration exists between the BSE and KSE, the BSE and MSM and the DSM and the KSE. The Granger causality test has concluded that Saudi Arabia has the strongest influence in the region. This test has also detected the influence of major international stock markets on BSE and SSM. The KSE and DSM were influenced by all international stock markets excluding that of the U.S. The MSM was influenced only by the UK stock market.

2.4. Literature on co-integration between oil prices and stock market prices

Asteriou, Dimitras and Lendewig (2013) have studied the effect of oil prices on stock markets and interest rates on oil importing and oil exporting countries. Their data included 31 countries-18 oil importing and 13 oil exporting. They used monthly data which spanned 20 years from 1988 to 2008. They have used the Johansen co-integration test and Granger causality to analyze the data. Their research has concluded that there is no substantial link in the short run between oil prices and interest rates, with very few countries revealing any such link. However in case of oil prices and stock markets, these two variables affect each other in 15 countries, in 6 countries only oil prices have an effect on stock markets. In the long run, however, none of the three variables seem to be linked. Arouri and Rault (2012) have investigated the long run relationship between oil prices and stock markets of the GCC. For the purpose of data collection, stock markets of four countries were included – Kuwait, Saudi Arabia, Bahrain and Oman. Arouri and Rault (2012) use bootstrap panel co-integration techniques and SUR methods to conduct research. Their paper has concluded that co-integration does exist between the stock markets of the selected countries and oil prices.

Kapusuzoglu (2011) studies the relationship between oil prices and the Turkish stock market indices. Johansen co-integration test and Granger causality are used for the purpose of data analysis. Kapusuzoglu (2011) has found that co-integration does exist between oil prices and the returns of the stock market indices in Turkey. There also exists a uni-directional causal relationship running from the Turkish stock market to oil prices.

2.5. Critique of literature

The literature available on co-integration is very vast. Most of the studies conducted at the global level appear to indicate the presence of co-integration. Only one study, Al-Zalabani and Menon (2012), does not seem to detect any co-integration in most cases in the study. These results go in hand with the global trend towards integration and globalization. In case of the Middle East too only Rengasamy (2012) does not seem to find a long term relationship between the countries in the GCC region. However, it is interesting note that although almost all of the studies conducted in the Middle East appear to show presence of regional co-integration, co-integration of the region with the international market seems to be weak or unsubstantial in most cases. The influence of only the U.S is prominent.

Most of the researchers use the Johansen test to test for co-integration. However, as Khan (2011) and Aghayev (2012) note in their research, this test usually does not take into account influence of any structural breaks or crises. Hence its results may not depict a true picture of reality. Another apparent flaw in the research is the fact that most studies rely on monthly or weekly data while daily data will probably be more relevant. Paskelian, Nguyen and Jones (2013) admit that weekly data is not very applicable, especially to the Middle East region as the weekends differ in various countries. Although, Rengasamy (2012) does feel that weekly data gives a better depiction of the situation owing to "thin trading bias". The variable used by most researchers is stock prices. However, a few researchers, such as Rengasamy (2012) use returns as the variable. Thus it can be concluded from the literature review that despite limitations in studies, most of the research shows a trend towards co-integration on a global scale as well as in the Middle East region. The next section of this research introduces the stock markets of the GCC briefly.

3. A brief background of Stock Markets in the GCC

3.1. Saudi Arabia

The first Joint stock company "Arab Automobile Company" was formed in the 1930s. There was a rapid rise in the number of companies in the 1970s due to economic expansion and saudization of banks. However the stock market remained informal until the 1980s. In 1984, SAMA was appointed as the supervising body for the market. In 2003, the CMA (Capital Market Authority) was formed and replaced SAMA as the regulating body. The Saudi stock exchange, also known as Tadawul, was formed in 2007 (tadawul.com.sa).

3.2. Kuwait

Kuwait stock exchange or KSE was established in 1977. It is the oldest stock market in the region. The stock market took a hit during the Iraqi invasion and resumed its activities after the war. The Kuwaiti stock exchange is very dynamic and its turnover has sometimes exceeded that of the London stock exchange (Hassan, 2003).

3.3. Bahrain

The Bahrain Stock Exchange (BSE) was formed in 1987. Until the formation of the BSE, trading took place in an informal market which collapsed during the Iraqi invasion of Kuwait. The BSE was replaced by the Bahrain Bourse (BHB) in 2010. Since 2002, the Central Bank of Bahrain has been appointed the regulatory body for the BHB (bahrainbourse.com.bh).

3.4. Oman

The Muscat Securities Market (MSM) was formed in 1988 through a royal decree. The Capital market Authority (CMA) is the regulatory body of MSM. Foreign investors are allowed to invest in the market through mutual funds. However foreigners can hold a maximum of 49% of the fund (msm.gov.om).

3.5. Qatar

The Doha Securities market (DSM) was formed in 1995 and started functioning two years later. In 2009, the DSM was replaced by the Qatar exchange as a result of a deal between Qatar Holding (an arm of the Qatar Investment Authority) and NYSE Euronext. The Qatar Exchange is regulated by the Qatar Financial Markets Authority (qe.com.qa).

3.6. United Arab Emirates

The UAE has two stock markets, the Dubai Financial Market (DFM) and the Abu Dhabi Securities Exchange (ADX). The DFM's operations started in 2000. It was setup as a public company in 2005 (dfm.ae). The ADX was also established in 2000 and is headed by a group of seven Board of Directors (adx.ae).

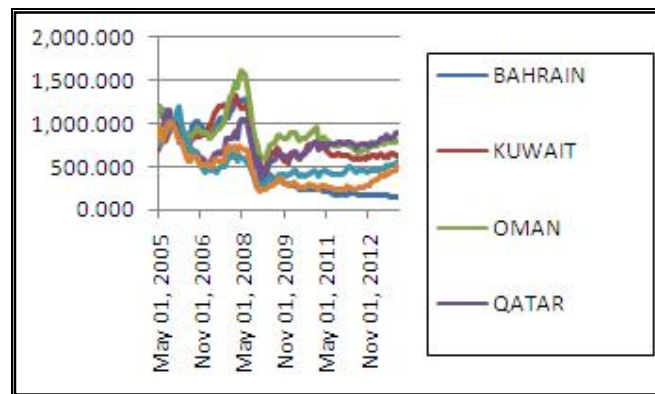


Figure 1: Stock market prices of GCC countries in USD

Source: (msci.com)

The next section of the paper discusses the data and methodology used in analysis.

4. Data and Methodology

4.1. Data

The domestic stock market indices of six countries - Saudi Arabia, Qatar, Bahrain, Oman, UAE and Kuwait are used in the study. Data required for the study is obtained from MSCI. The MSCI index used is the Global Standard index which incorporates Large and mid-sized capital segments. To compare with oil prices, the MSCI GCC countries Index have been used. It includes six GCC countries - Kuwait, Saudi Arabia, Oman, UAE and Qatar. The index covers about 85% of free float-adjusted market capitalization for each country (msci.com). For the purpose of research, monthly stock price data has been used due to unavailability of daily data for some countries included in the study. All the prices included in analysis are in terms of US dollars. The time frame for the study ranges from May 31, 2005 to December 31, 2013 to provide sufficient data to be considered long-term and also to include the effects, if any, of the Arab Spring. Another reason for selection of given time period is availability of data for all indices during that period. The number of observations for each series is 105.

4.2. Methodology

4.2.1. Correlation

Linear relationships among variables are commonly measured by the Pearson correlation coefficient. Its values range from -1 to +1. "0" indicates no linear relationship exists among the variables. A perfect positive relationship is denoted by "+1" and a perfect negative relationship is denoted by "-1". The coefficient is calculated using the following formula:

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

Studies conducted on the subject have concluded that a higher degree of correlation indicates stronger co-integration amongst stock markets.

(AlSuhailani, 2004)

4.2.2. Unit root test

To ensure that data is relevant for conducting a co-integration test, a unit root test needs to be conducted. There are many tests such as the Augmented Dickey Fuller test, the Philips-Perron test. This study will employ the Augmented Dickey Fuller test to test for stationarity amongst the data series. The ADF test utilizes the following formula:

$$\Delta Y_t = \mu + \beta t + \alpha Y_{t-1} + \sum_{k=1}^p C_k \Delta Y_{t-k} + \varepsilon_t$$

A null hypothesis indicates the presence of a unit root whereas the alternative hypothesis indicates that the series is stationary (Perera, 2012). The next step is to run a co-integration analysis.

4.2.3. Co-integration test

As mentioned earlier, there are many tests for co-integration. The second step is to run the co-integration test.

For the purpose of this research, the Johansen multivariate co-integration test is used. It is the most widely used test as observed in the literature review. Padhan and Sujit (2013), Perera and Wickramanayake (2012), Assidenou (2011), Nguyen, Paskela and Jones (2013), Rengasamy (2012), Al-Khazali, Darrat and Saad (2006), Asteriou, Dimitras and Lendewig (2013), Kapusuzoglu (2011) have all used the Johansen test for co-integration in their research.

It utilizes the VAR model which is based on the following equation:

$$y_t = \Gamma_1 y_{t-1} + \Gamma_2 y_{t-2} + \dots + \Gamma_p y_{t-p} + \varepsilon_t$$

"Where y_t is $n \times 1$ vector of stock market indices of sample countries in logarithmic level, ε_t is a $n \times 1$ vector of residual" (Aghayev, 2012).

Johansen uses two tests, the trace test and the maximum Eigenvalue test. The trace test investigates the null hypotheses of r co-integrating vectors as opposed to the alternative hypotheses of n co-integration vectors. The Eigenvalue test "tests the null hypothesis of r co integration vectors against the alternative hypothesis of $r+1$ vector" (Aghayev, 2012). These tests are represented by the following equations:

$$\lambda_{trace}(r) = -T \sum_{k=r+1}^n \ln(1 + \lambda_k)$$

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

"Where λ_r and λ_{r+1} are the estimated values of the roots taken from the matrix" (Aghayev, 2012).

r = number of co-integrating vectors

k = number of variables

T = number of observations

The null hypotheses are that there are no co-integrating vectors. This hypotheses is rejected when the t-statistics value is greater than the critical value.

(Aghayev, 2012)

5. Results

5.1. Correlation

The following table gives the result of correlation between stock market indices of the six GCC nations as calculated in MS Excel:

	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	United Arab Emirates
Bahrain	1					
Kuwait	0.85	1				
Oman	0.79	0.82	1			
Qatar	0.30	0.36	0.58	1		
Saudi Arabia	0.60	0.40	0.47	0.64	1	
United Arab Emirates	0.86	0.69	0.72	0.62	0.86	1

Table 1: Correlation amongst GCC nations

- Moderate positive correlation is observed between Qatar and Bahrain, Qatar and Kuwait, Qatar and Oman, Saudi Arabia and Bahrain, Saudi Arabia and Kuwait and Saudi Arabia and Oman.
- Strong positive correlation is observed between Kuwait and Bahrain, Oman and Kuwait, Oman and Bahrain, Saudi Arabia and Qatar. UAE and Kuwait, UAE and Oman, UAE and Bahrain, UAE and Qatar and UAE and Saudi Arabia.

The following table shows the correlation between oil prices and the GCC combined index:

	GGCC	OIL PRICES (PER BARREL)
GCC	11	
OIL PRICES (PER BARREL)	-0.16	1

Table 2: Correlation between oil prices and combined GCC index

- Low negative correlation can be observed between the two variables.

5.2. Unit root test

The following table displays the results of the ADF test conducted by the software, EViews:

	ADF t-statistic	Critical value of t at 1%	Critical value of t at 5%
Bahrain	-1.303	-3.496	-2.89
Kuwait	-1.65	-3.495	-2.89
Oman	-3.26	-3.496	-2.89
Qatar	-2.02	-3.495	-2.89
Saudi Arabia	-1.69	-3.495	-2.89
UAE	-1.96	-3.496	-2.89

Table 3: ADF test result for GCC stock markets

- The ADF test result for the stock prices of individual GCC countries, the group GCC index and oil prices conducted at level indicated the presence of a unit root.
- The ADF test was conducted again at first difference. In this case the results indicated the data to be stationary.
- Thus, it can be concluded that the indices are integrated of order one, i.e., I (1).
- Since all the time series are integrated of the same order, co-integration test can be run on them.

5.3. Co-integration

The following tables display the results of the Johansen co-integration test conducted by EViews on GCC stock markets as a group and combined GCC index and oil prices for the time period ranging from May 31, 2005 to December 31, 2013.

Hypothesized No. of co-integrating equations	Trace-statistic	0.05 critical value	Max-Eigen statistic	0.05 critical value
None*	156.67	103.84	53.31	40.95
At most 1*	103.36	76.97	37.91	34.81
At most 2*	65.45	54.07	31.88	28.59
At most 3	33.57	35.19	21.89	22.3

Table 4: Co-integration amongst stock market prices of the GCC
* indicates rejection of hypothesis at 0.05 level

Hypothesized No. of co-integrating equations	Trace-statistic	0.05 critical value	Max-Eigen statistic	0.05 critical value
None	20.13	20.26	12.87	15.89
At most 1	7.26	9.16	7.26	9.16

Table 5: Co-integration between combined GCC stock market index and global oil prices

- Both the trace and maximum Eigen value tests indicate 3 co-integrating equations amongst the GCC countries.
- Both tests indicate no co-integrating equations between oil prices and the GCC combined index.

The following tables display the results of the Johansen co-integration test conducted by EViews on GCC stock markets as a group and combined GCC index and oil prices for the time period ranging from May 31,2005 to December 31, 2010 (before Arab Spring) and January 1, 2011 to December 31, 2013 (after Arab Spring).

Hypothesized No. of co-integrating equations	Trace-statistic	0.05 critical value	Max-Eigen statistic	0.05 critical value
None	134.51*	103.85	46.14*	40.95
At most 1	88.38*	76.97	34.22	34.81
At most 2	54.16*	54.08	21.42	28.59
At most 3	32.74	35.19	17.57	22.29

Table 6: Co-integration amongst GCC stock market prices before Arab Spring
* indicates rejection of hypothesis at 0.05 level

Hypothesized No. of co-integrating equations	Trace-statistic	0.05 critical value	Max-Eigen statistic	0.05 critical value
None	109.55*	106.85	30.91	40.95
At most 1	78.64*	76.97	25.53	34.81
At most 2	53.10	54.08	21.69	28.59

Table 7: Co-integration amongst GCC stock market prices after Arab Spring
* indicates rejection of hypothesis at 0.05 level

Hypothesized No. of co-integrating equations	Trace-statistic	0.05 critical value	Max-Eigen statistic	0.05 critical value
None	18.88	20.26	15.74	15.89
At most 1	3.15	9.16	3.15	9.16

Table 8: Co-integration between GCC combined stock market index and oil prices before Arab Spring

Hypothesized No. of co-integrating equations	Trace-statistic	0.05 critical value	Max-Eigen statistic	0.05 critical value
None*	32.97	20.26	25.51	15.89
At most 1	7.46	9.16	7.46	9.16

Table 9: Co-integration between GCC combined stock market index and oil prices after Arab Spring
*indicates rejection of hypothesis at 0.05 level.

- For the time period before the Arab Spring, trace test detected the presence of 3 co-integrating equations amongst the stock markets of GCC countries. On the other hand, Maximum Eigenvalue test indicated the presence of 1 co-integrating equation.
- For the time period after the Arab Spring, trace test indicated the presence of 2 co-integrating equations and Maximum Eigenvalue test indicated the presence of no co-integrating equations amongst the stock markets of GCC countries.
- With regards to co-integration between combined GCC stock market index and oil prices, trace test detected the presence of zero and 1 co-integrating equation before and after the Arab Spring respectively. Maximum Eigenvalue test also returned the same results.

6. Conclusion

The conclusions of this research are in line with the findings of Arouri et al. (2013), Nguyen, Paskela and Jones (2013), Al-Khazali, Darrat and Saad (2006), Alsuhaibani (2004), Arouri and Rault (2012), Kapusuzoglu (2011). The research has concluded that most of the GCC nations are strongly correlated. Correlation between oil prices and GCC index is very low. There is a presence of strong co-integration amongst them as inferred from the detection of 3 co-integrating equations. However, no co-integration is observed between oil prices and stock prices of combined GCC index. The Arab Spring seems to have a negligible effect on co-integration in both cases. In the case of co-integration amongst GCC stock market prices, co-integration is slightly negatively affected. However, in case of oil prices and GCC combined index, Co-integration is slightly positively affected. Thus it can be concluded that a strong long run equilibrium relationship exists amongst GCC countries and no long run equilibrium relationship exists between oil prices and the combined GCC index. It can also be concluded that the Arab Spring had a very minor effect in both co-integrating relationships.

7. Limitations of the study

Despite best efforts, this research was hindered by the following limitations:

- The time available to conduct research and write the paper was not sufficient to conduct an in-depth analysis of the topic.
- The data available on the GCC region limited the period of study from 2005 - 2013. A longer research period would have allowed for better analysis and results.
- Complexity of the EViews package hindered ability to conduct research. Besides this, only the Johansen test could be conducted using this software.

8. Recommendations for further research

This research paper can be further improved in the following ways:

- The scope of research can be expanded by including the MENA region instead of just the GCC. Research can also be conducted to include comparison with international stock markets.
- The time period of the research can be extended to establish a more long term relationship.
- Co-integration can be tested using other co-integration tests to test the accuracy of results.
- Granger causality can be run to establish causal relationships amongst the variables.

9. References

1. Abdul Hadi, A., Hamad, S., Yahya, M., & Iqbal, T. (2013). Examining Relationship between Palestine Stock Exchange and Amman Stock Exchange–Cointegration Approach. *International Journal of Business And Management*, 8(7).
2. About Us. (N.D.). Retrieved From http://Www.Tadawul.Com.Sa/Wps/Portal/!Ut/P/C1/04_SB8K8xLLM9MSSzPy8xBz9CP0os3g_A-Ewie8tiwodyfmda08tn7aqzx93ywn3i_3gIDz9gmxHRQB7GACB/
3. Abu Dhabi Securities Exchange. (N.D.). Retrieved From Duabi Financial Market. (N.D.). Retrieved From <Http://Www.Dfm.Ae/Pages/Default.aspx?C=801>
4. Aghayev, B. (2012). Testing For Turkish Stock Market Integration Using Traditional and Regime Switching Cointegration Tests (Unpublished Doctoral Dissertation). Universiteit Van Amsterdam.
5. Al-Khazali, O., Darrat, A. F., & Saad, M. (2006). Intra-Regional Integration Of The GCC Stock Markets: The Role Of Market Liberalization. *Applied Financial Economics*, 16(17), 1265-1272. Doi:10.1080/09603100500426630
6. Alsuhaibani, S. I. (2004). Financial Integration of Stock Markets In The Gulf Cooperation Council Countries (Doctoral Dissertation, Colorado State University). Proquest Information and Learning Company.
7. Al-Zalabani, A., & Menon, S. (2012). Co-Integration of the Saudi Arabian Stock Market with Other Stock Markets From Emerging And Developed Economies. *Pakistan Business Review*.
8. Arouri, M., & Rault, C. (2012). OIL PRICES AND STOCK MARKETS IN GCC COUNTRIES: EMPIRICAL EVIDENCE FROM PANEL ANALYSIS. *International Journal Of Finance & Economics*, 17(3), 242-253. Doi:10.1002/Ijfe.443
9. Assidenou, K. E. (2011). Cointegration of Major Stock Market Indices During The 2008 Global Financial Distress. *International Journal Of Economics And Finance*, 3(2). Doi: 10.5539/Ijef.V3n2p212

10. Asteriou, D., Dimitras, A., & Lendewig, A. (2013). The Influence Of Oil Prices On Stock Market Returns: Empirical Evidence From Oil Exporting And Oil Importing Countries. *International Journal Of Business And Management*, 8(18), 101-120. Retrieved From [Http://Search.Proquest.Com/Docview/1468416464?Accountid=130572](http://Search.Proquest.Com/Docview/1468416464?Accountid=130572)
11. Bahrain Bourse. (N.D.). Retrieved From http://Bahrainbourse.Com/Bh/Bhb/About_Us.Asp?Page=About_Us&Sec=History
12. Duabi Financial Market. (N.D.). Retrieved From <Http://Www.Dfm.Ae/Pages/Default.AspxC=801>
13. Hendry, D. F., & Juselius, K. (1999). Explaining Co-Integration Analysis: Part I [Scholarly Project]. Retrieved November 10, From <Http://Www.Lippi.Ws/SC/Cointegration1.Pdf>
14. James, R. M. (2007). A REVIEW OF THE FINANCIAL MARKETS IN THE GULF COOPERATION COUNCIL (GCC) COUNTRIES. *Journal of International Business Research*, 6(1), 15-48. Retrieved From <http://Search.Proquest.Com/Docview/215465196?Accountid=130572>
15. Kapusuzoglu, A. (2011). Relationships between Oil Price and Stock Market: An Empirical Analysis from Istanbul Stock Exchange (ISE). *International Journal of Economics and Finance*, 3(6), 99-106. Retrieved From <http://Search.Proquest.Com/Docview/902687126?Accountid=130572>
16. Khan, Taimur A. (2011) "Cointegration of International Stock Markets: An Investigation Of Diversification Opportunities," *Undergraduate Economic Review: Vol. 8: Iss. 1, Article 7*. Available At: <http://Digitalcommons.Iwu.Edu/Uer/Vol8/Iss1/7>
17. MSCI Inc. (N.D.). Retrieved From <http://Www.Msci.Com/Products/Index/Performance.Html?Chart=Regional&Pricelevel=0&Scope=R&Style=C&Asof=%25253CDATE%25253E&Cy=15&Size=36&Indexid=13>
Muscat Securities Market. (N.D.). Retrieved From <Http://Msm.Gov.Om/>
18. Ohannes, G. P., Chu, V. N., & Jones, K. (2013). Did Financial Market Integration Really Happen In MENA Region? - An Analysis. *Journal Of Economic Cooperation & Development*, 34(1), 111-133. Retrieved From <http://Search.Proquest.Com/Docview/1427257928?Accountid=130572>
19. Purna, C. P., & K, S. S. (2013). Pre & Post-Recession Stock Markets Integration: Some Empirical Evidence. *International Journal Of Business And Management*, 8(8), 147-161. Retrieved From <http://Search.Proquest.Com/Docview/1372106916?Accountid=130572>
20. Qatar Exchange. (N.D.). Retrieved From <http://Www.Qe.Com.Qa/Pps/Qe/Qe%20english%20portal/Pages/About%20QE/About%20QE>
21. Rengasamy, E. (2012). On The Return Patterns and Cointegration Of GCC Stock Indices. *Annual International Conference On Micro & Macro Economics Research*, 54-62. Doi:10.5176/2251-2055_MME1245
22. Ssekuma, R. (2011). A Study Of Cointegrating Models With Applications (Unpublished Doctoral Dissertation). University Of South Africa. Retrieved From <Http://Uir.Unisa.Ac.Za/Handle/10500/4821>
23. Wickramanayake, J., & Perera, A. (2012). Financial Integration In Selected South Asian Countries. *South Asian Journal of Global Business Research*, 1(2)