FINANCIAL MARKET INTEGRATION OF MIDDLE EAST AND NORTH AFRICAN (MENA) COUNTRIES

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ABSTRACT

This study examines the financial market integration of four emerging economies in Middle East and North Africa (MENA) region, namely, Saudi Arabia, Tunisia, Egypt and Oman for a period of April 1999 to December 2008. The study utilizes the GARCH model by using daily stock prices from the market indices of these four emerging economies. The results suggest that financial markets in MENA region are integrated among them and segmented globally during the period of the study. Further, the financial markets in MENA region are inefficient because of the predictability of the future prices of a market based on the prices of other markets.

Keywords: Emerging Economies, market integration, predictability

INTRODUCTION

Apart from its widespread challenges, globalization coupled with technology advances and financial liberalization has significantly changed the international financial landscape (Hazem, 2006). Thus financial markets observed increased capital mobility and greater opportunity for portfolio diversification (Hazem, 2006). Studies on financial integration have been common for the last few decades and the international financial markets have been experiencing some degree of integration. The integration of stock markets has significant implications for cost of capital and portfolio diversification strategies (Zivanemoyo, 2008). The current financial integration is thought to be the result of the openness of markets to foreign investors and as financial markets become more open, it is expected the degree of integration to increases (Rim & Setaputra, 2008).

Although openness of the financial markets to foreign investors may be perceived as a threat to national interest by the opponents of this idea, its supporters argue that the advantages outweigh the flaws if properly regulated. In the developing economies in which the financial sector is yet to develop, financial openness can facilitate to bring experiences of developed economies. By achieving greater financial openness, domestic financial sector will be developed due to various experiences brought by the foreign investors from different places (Rim & Setaputra, 2008). Financial openness can also increase financial efficiency among domestic firms because firms can choose the most efficient sources of fund to minimize the cost of capital (Rim & Setaputra, 2008). On the other hand, firms can allocate funds to the most productive projects if the financial markets are open to foreign investors (Rim & Setaputra, 2008).

There are several arguments in modern financial theory that emphasized the desirability of market integration. Competitive auction-model is one of these arguments and it stresses that integration leads to more efficient allocation of resources if barriers to capital movement is

removed. Besides, capital will move from inefficient markets to efficient markets looking for superior investment returns. Another argument in modern financial theory reveals that when there is integration among stock markets, the exposure to the systematic risk will be minimized switching from the exposure to systematic risk to unsystematic risk which is manageable. The concept of stock market integration stems from the theory of "law of one price". This theory reveals that identical securities should carry the same price across all stock markets, when transaction costs and tax expenses are not taken into consideration. The analogy is that if financial markets are integrated, the prices of the same securities within the markets should be identical as all markets are exposed to the same risk factors.

Remarkable improvements have been achieved by the emerging markets of some developing countries. There are a couple of factors contributed to the improvements achieved by these markets. Stock markets reforms, privatization and financial liberalization, and conduct of sound macroeconomic policies are factors played a vital role in these improvements (Hazem, 2006).

Although there has been tremendous research on stock markets integration in general but those that focus on MENA are relatively few. The studies that have been carried out in MENA region have been conducted over short period of time and in a small number of markets (Hazem, 2005). Additionally, most of these studies focus on the same countries. There is also a significant difference among the findings of these studies. Some of the studies found that the MENA markets are segmented globally and integrated regionally (Darrat et al., 2000; Marashdeh, 2005), whereas other studies found weak linkage among MENA markets but strong integration between these markets and developed markets (Neaime, 2002; Maghyereh, 2003)

BACKGROUND AND LITERATURE REVIEW

The seminal work by Grubel (1968), which explained the gains from international portfolio diversification, inspired more studies in 1970s. These studies were based on different methodological framework such as Granger causality and correlation. In spite of the various methods used, the overwhelming finding was that correlations among return of national stock markets were low. As globalization, technology, and financial liberalization continued to get momentum, the image of findings started changing (Chinzara, 2008).

Existing literature on financial integration can be divided into two parts. The first part investigates the long run comovement of stock markets using cointegration. The existence of long-run relationships among stock markets reveals that stocks will be highly correlated in the long-run even though they may diverge in the short run. This means that long term diversification in the stock markets will be unlikely to yield significant benefits (Chinzara, 2008). The second part of the literature focuses on the linkages of financial markets in terms of returns linkage.

The studies in emerging markets indicate different results. In Asian economies, for example, Maosen Zhong (2005) examined the linkage among stock markets in the Pasific Basin and found that there is significantly higher level of equity market linkage between each other, whereas, Hong Rim and Rober Setaputra (2008) concluded that ASEAN-5 plus 4 Asian economies have not yet become more integrated. On the other hand, Shabri, et al. (2008) found that ASEAN stock markets are going towards a greater integration either among themselves or with US and Japan.

Regarding stock markets in MENA region, the studies found mixed results. Using the Johansen-Juselius (1990) Cointegration, Darrat et al. (2000) found that MENA stock markets are segmented globally and integrated regionally. Similarly, using autoregressive distributed lag (ARDL) approach to cointegration, Hazem Marashdeh (2005), found that there is integration among stock markets in the MENA region, but not between the MENA and International stock markets. In contrast, utilizing the Engle-Granger (1987) Cointegration approach, Neaime (2002) examined the MENA stock markets and his results indicate a weak integration among the MENA stock markets and strong integration with international stock markets. In the same way, Maghyereh (2003) examined the integration among emerging markets in MENA region his study concludes that there is weak linkage among the four markets. Similarly, Shabri et al. (2007), using Vector autoregression (VAR), found that there is no integration among the MENA stock markets.

AIMS OF THE STUDY

The purpose of this study is to examine the process of financial market integration in four economies in MENA region and whether these markets link to UK stock market. As such, this study will attempt to answer the following question:

Research Question I

What is the status of Saudi Arabia, Tunisia, Egypt and Oman for a period of April 1999 to December 2008 based on their stock market indices?

PROCEDURES OF THE STUDY

This study focuses on the stock markets integration of four MENA countries, named, Saudi Arabia, Oman, Egypt and Tunisia. UK stock market is used to examine the linkage between MENA economies and the world. For each stock market, data on daily market indices, measured in local currency, is obtained for a period of April 1999 to January 2009. The following indices are used: Tunisia (TUNIS STOCK EXCHANGE), Saudi Arabia (TADAWUL), Oman (MUSCUT SECUTIES MARKET), Egypt (HERMAS), and United Kingdom (FTSE 100). The regional index (MENA) is the weighted average of individual markets in the region excluding the market of the country concerned. Data used in the research is obtained from Bloomberg.

This study used the Generalized Autoregressive Conditional Heteroscedasticity (GARCH) model and the correlations coefficients to examine the process of financial market integration in MENA countries. The following are the steps:

1.   Examining Stationarity

The first step is to examine the stationarity by utilizing the Augmented-Dickey-Fuller (ADF) and the Phillips-Person (PP) tests.

2.   Testing Cointegration

The second step is to test Cointegration between stock markets by using the maximum likelihood Cointegration test (Johansen, 1988, 1991, 1995).

3.   Testing correlation

The third step is to test the correlation between MENA markets and the stock market in United Kingdom to examine the linkage between MENA economies and UK.

4.   **Utilizing GARCH Model**

The fourth step is to use GARGH model (Generalized Autoregressive Conditional Heteroscedasticity) to test which market has played a more important role in the process of integration, UK or the regional market. The following are the two equations of the model:

$$Y_t = \alpha + \beta_x + \varepsilon \qquad (1)$$

$$\sigma_t^2 = \omega + \alpha\varepsilon_{t-1}^2 + \beta\sigma_{t-1}^2 \qquad (2)$$

RESULTS AND DISCUSSION

This study employed daily stock market indices for four emerging stock markets in the MENA region, namely Tunisia, Saudi Arabia, Oman and Egypt. Daily data for UK was used to examine the relationship between MENA region and United Kingdom stock market. In spite of some disturbances, the results show that the four markets relatively have similar movements during the period of study. It's evident from the result that there has been an increase in stock prices from the late 1990s until 2000 due to several privatization programs that took place in the region. The prices started dropping from 2001 until the end of 2002 as a result of 9/11 attack. Likewise, the markets started declining in 2008 as a result of the recent global financial crisis. The findings indicate that the movement of UK stock market is flat.

Descriptive Analysis

As shown in Table 1, Egypt has the highest average returns of 0.051%, while Oman has the lowest average return of 0.030%. Only United Kingdom has a negative return of about 0.014%, which indicates a decline of UK stock market returns. As regards to the volatility of these markets, the stock markets of Egypt and Saudi Arabia show the highest volatility of 1.57% (as measured by the standard deviation), whereas Oman has the lowest volatility of 0.98%. It can be observed from the statistics that the existence of high volatility in a stock market correlates with the existence of high returns. Good examples are Egypt and Oman whereby Egypt has both the highest return and the highest volatility, while Oman has the lowest return and the lowest volatility. Regarding to higher moments, all Stock returns are skewed to the left, indicating a greater probability of lower returns.

Table 1: Descriptive Statistics for Daily Stock Returns in (Local Currency)

	Tunisia	Saudi Arabia	Oman	Egypt	UK
Mean	0.000448	0.000426	0.000297	0.000511	-0.000137
Median	0.000000	0.001157	0.000000	0.000000	0.000000
Maximum	0.375623	0.093907	0.080388	0.119249	0.093843
Minimum	-0.400025	-0.103285	-0.110372	-0.171876	-0.104842
Std. Dev.	0.013736	0.015719	0.009789	0.015621	0.012139
Skewness	-1.479576	-0.970378	-1.340352	-0.414055	-0.376998
Observations	2788	2788	2788	2788	2788

Correlation Test

It is evident from the correlation matrices of table 2 that Egypt and Oman have the highest correlation coefficient of 0.97, while Saudi Arabia and Tunisia have the lowest correlation coefficient of 0.54. All of the four markets have weak and positive relationship with the world market represented by UK. Overall, the data illustrates that there is strong relationship among the MENA countries but a weak relationship with international market.

Table 2: Correlation of the stock prices (Local Currency)

	EGYPT	OMAN	SAUDI ARABIA	TUNISIA	United Kingdom (UK)
EGYPT	1.00				
OMAN	0.97**	1.00			
SAUDI ARABIA	0.86**	0.81**	1.00		
TUNISIA	0.71**	0.71**	0.54**	1.00	
UK	0.35*	0.26*	0.02*	0.39*	1.00

Note: * indicates weak correlation, ** indicates strong correlation

Tests of the Unit Roots Hypothesis

To test the stationarity of the data, two tests, namely, ADF (Augmented Dickey Fuller) and PP (Phillip Perron) were conducted. The presences of non-stationary variables might produce spurious regression result. The value of ADF t-statistic and PP z-statistic was compared to the critical value given by Mackinnon (1996). The result shows that the null hypothesis of non-stationarity at level for all the time series fails to be rejected. However, all null hypotheses were rejected for every test at first difference. It indicates clearly that all variables are stationary at I(1) (first difference).

Table 3: Stationary tests at level and first difference

Variables	ADF		PP	
	Level	1st Difference	Level	1st Difference
SSP	-1.150153	-6.808652	-0.624305	-47.86707
OSP	-3.067496	-4.108390	-1.545190	-46.39057
TSP	-1.125682	-7.118066	-1.355949	-94.31532
ESP	-2.261955	-5.461318	-0.921426	-45.69776
USP	-1.637597	-13.32753	-1.700834	-55.85325

Notes: ADF and PP t-statistic with trend have -3.44 as their critical value at 5% significance level

Cointegration Test Analysis

After conducting the unit root test and having established the presence of a unit root in the first difference of each variable, the next task is to test whether the linear combination of the series is stationary. The purpose of this technique is to test whether the series in each country has different unit roots (non-cointegrated), or shares the same unit root (cointegrated).

A non-stationary variable tends to drift extensively over time, but a pair of non-stationary variables may have the property that a particular linear combination would keep them together. Under this scenario, the two variables are said to be cointegrated, or possess a long-run (equilibrium) relationship. The Johansen (1990) efficient maximum likelihood test is used to examine the existence of a long-term relationship among individual markets in MENA region

and between MENA and the world. The tests were based on the 5 and 1 percent levels of significance.

The findings are reported in Tables 4 & 5. Before carrying out the cointegration test, it has been ensured that there is no autocorrelation in the residuals. In Table 4, the cointegration test indicates that, at lag interval equal to 15, there is one cointegration exists at both 1 and 5 percent levels of significance. If there is cointegration, there would be long-run relationship binding the series together among the market stocks in MENA region, which implies that investment across the stock markets of MENA region could not totally enjoy long run diversification benefits.

Table 4: Johansen Cointegration Likelihood Ratio Test for the MENA Stock Markets

Hypothesis		Test Statistics (Trace)	Critical Values	
Null	**Alternative**		**(5%)**	**(1%)**
r=0	r=1	54.71**	47.86	54.68
r = or < 1	r=2	27.91	29.79	35.46
r= or <2	r=3	13.72	15.49	19.94
r= or <3	r=4	5.48	3.84	6.63

NOTES:

 1- The Johansen Cointegration Likelihood Ratio Test is based on the Trace of the Stochastic Matrix.
2- The test allows for a linear deterministic trend in the data.
3- r represents the number of cointegration vectors.
4- A ** indicates significance at both 1% and 5%level of significance, whereas * indicates significance only at 5% level of significance.

Table 5. Cointegration Likelihood Ratio Test for MENA Stock Markets and the World

Hypothesis		Test Statistics (Trace)	Critical Values	
Null	**Alternative**		**(5%)**	**(1%)**
r=0	r=1	69.22434	69.81889	77.81884
r = or < 1	r=2	41.28194	47.85613	54.68150
r= or <2	r=3	21.06253	29.79707	35.45817
r= or <3	r=4	8.662835	15.49471	19.93711
r= or <4	r=5	2.196506	3.841466	6.634897

NOTES:
1- The Johansen Cointegration Likelihood Ratio Test is based on the Trace of the Stochastic Matrix.
2- The test allows for a linear deterministic trend in the data.
3- r represents the number of cointegration vectors.
4- A ** indicates significance at both 1% and 5%level of significance, whereas * indicates significance only at 5% level of significance

In Table 5, the cointegration test indicates that, at lag interval equal to 15, there is no cointegration exists at both 1 and 5 percent level of significance. If there is no cointegration, there would be no long-run relationship binding the series together. This effect would arise since all linear combinations of the series would be non-stationary, and thus would not have a constant

mean that would be returned to frequently. This implies nonexistence of higher level of linkage between MENA and UK stock markets indicating a greater diversification opportunity.

Vector Error Correction Model (VECM)

After establishing that MENA countries are cointegrated among themselves, the next task was to employ a Vector Error Correlation Model (VECM) to tie the short-run behavior of each series to its long-run values. There is long-run relationship among the stock markets in MENA region, as the error correction term is negative and significant. To get the optimum lags, a general to specific technique were used. The statistical significance of the ECT provides evidence of an error correction mechanism driving the variables back to their long-run relationship.

Table 6: Vector Error Correction Model Results for Variables

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECT	-0.004247	0.001054	-4.030005	0.0001
	R^2 = 0.15			
	F-Statistic = 7.57			
Diagnostics	**ARCH** = 865.6 (0.0000)			

Granger's Causality Test

To examine the short-run dynamics of the series, a Granger Causality tests was performed. The results, which are summarized in Figure 2, suggest that the four countries in MENA region are significantly related in the short-run. Tunisian stock market is affected by UK stock market and other three regional markets. Saudi Arabian Stock market is affected by UK stock market and other regional stock markets. Oman stock market is affected by UK stock market and other regional stock markets except Tunisia. Egyptian stock market is affected by UK stock market and other regional stock markets except Tunisia.

Figure 2: Summary of Bivariate Granger Causality Test

Tunisia	←——→	Saudi Arabia
Tunisia	←——	Oman
Tunisia	←——	Egypt
Oman	←——→	Saudi Arabia
Oman	←——→	Egypt
Egypt	←——→	Saudi Arabia
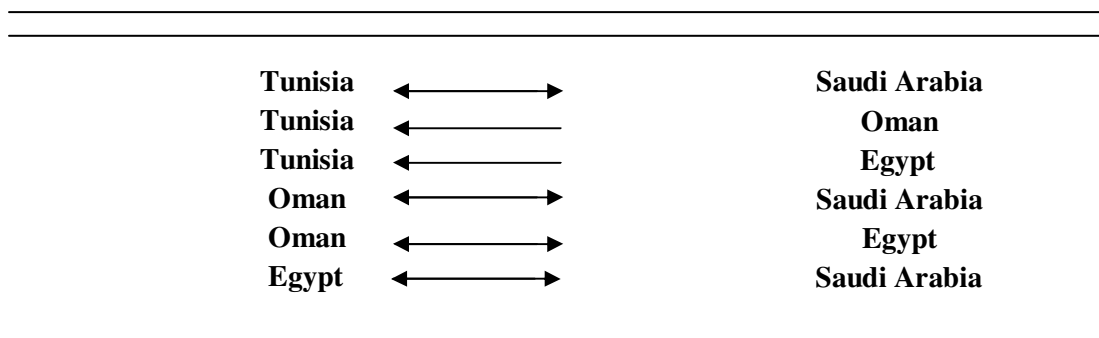
Note: ←——→ indicates a bidirectional Granger Causality between the stock markets;

←—— or ——→ indicates a unidirectional Granger Causality from one stock market to another.

Using GARCH Model

This model is developed to identify which one, UK or the regional impact, has played a more important role in the process of financial integration. GARCH model is used because the data suffers from ARCH effect, which constraints the use of OLS (Ordinary Least Square) model, therefore, it was necessary to develop non-linear model. ARCH and GARCH are one of the non-linear models but GARCH model overcomes some problems that cannot be solved by ARCH model.

For the purpose of this study, the model was employed using two indexes; a regional index and UK index. For the UK index, the study used FTSE 100, whereas the study produced a regional index. To have the regional index, the average (geometric mean) of individual markets in the region, excluding the market under study, was used.

Tunisia Stock Market

The volatility of Tunisia with regional index is highly persistent[1] (0.38 + 0.71 = 1.09), which means the subsequent volatility tends to be similar to previous volatility. Likewise, the volatility of Tunisia with UK is persistent. Tunisia stock market has no comovement with both regional and UK indices. Regional index affects Tunisia by 31%, while UK affects Tunisia by only 10%. This concludes that the regional impact has played an important role in the process of financial integration in Tunisia.

Saudi Arabia Stock Market

The volatility of Saudi Arabia with regional index is highly persistent[2] (0.216 + 0.810 = 1.026). Similarly, the volatility of Saudi Arabia with UK index is persistent. Saudi stock market has comovement with both regional and UK index. UK index affects Saudi Arabia by 5%, while the regional market affects Saudi Arabia by 3%. Comparing the two effects, Saudi Arabian stock market is affected more by the world index compared to regional index.

Oman Stock Market

The volatility of Oman with regional index is highly persistent (0.1148 + 0.8951 = 1.099). Also, the volatility of Oman with UK index is persistent. Oman stock market has comovement with the regional index but has no comovement with the UK index. The Regional index affected Oman by 9%, while the world index affected Oman by only 1%. It is evident from the statistics that the regional index has strong impact on Oman stock market compared to world stock markets.

Egypt Stock Market

The volatility of Egypt with regional index is not persistent (0.06 + 0.93 = 0.99), which means the subsequent volatility tends to be smaller than previous volatility. As well, the volatility of Egypt with world index is not persistent (0.06 + 0.92 = 0.98). Egypt stock market has comovement with both the regional and the UK indices. The Regional index affected Egypt by 25%, while the world index affects Egypt by only 2%. It is evident that the regional index has strong impact on Egypt stock market compared to the impact of the world stock markets.

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[1] RESID(-1)^2 + GARCH(-1) = 1.0

Table 7: The GARCH (1, 1) Model of both MENA and World Stock Markets

Variables	Mean Equation:	Variance Equation:
Tunisia with Regional	0.0013 + (-0.312)R	0.0001 + (0.379)RESID(-1)^2 + (0.71) GARCH(-1)
Tunisia with World	0.0009 + (-0.10)W	0.00087 +(0.04)RESID(-1)^2 + (0.97) GARCH(-1)
Saudi Arabia with Regional	0.00092 + 0.032R	0.00016 + (0.22)RESID(-1)^2 + (0.81) GARCH(-1)
Saudi Arabia with World	0.00092 + 0.051W	0.00016 +(0.21)RESID(-1)^2 + (0.82) GARCH(-1)
Oman with Regional	0.00032 + 0.088R	0.00069 + (0.11)RESID(-1)^2 + (0.89) GARCH(-1)
Oman with World	0.00038 +(- 0.013)W	0.0007 +(0.12)RESID(-1)^2 + (0.89) GARCH(-1)
Egypt with Regional	0.00068 + 0.25R	0.00031 + (0.062)RESID(-1)^2 + (0.93) GARCH(-1)
Egypt with World	0.00081 + 0.015)W	0.00031 +(0.06)RESID(-1)^2 + (0.93) GARCH(-1)

Policy Implications

In order for a portfolio to be beneficial, Glezakos et al., (2007) identified two main conditions. Firstly, the assets included in a portfolio should be weakly correlated. Secondly, securities in the portfolio should be negatively correlated. By applying this theory, losses from one asset will be covered by the gains from the other asset.

For international stock markets to be weakly correlated, the assets should be driven by different macroeconomic fundamentals (Darrat & Benkato, 2003; Marana & Beltratti, 2006). Weakly correlated assets will provide an opportunity for international diversification. It's broadly forecasted that globalization and financial market integration would diminish much of the gains from diversification.

It seems that Tunisian stock market is isolated and has no comovement with both UK and the regional indices. The lack of comovement of Tunisia with both regional and UK markets suggest that there is potential portfolio diversification that can be exploited. Similarly, the weak comovement that Saudi has with UK market suggests diversification benefits. Oman has no comovement with UK markets, thus, this may facilitate a beneficial portfolio diversification that can be gained between Oman the UK stock markets. Equally, Egypt has weak comovement with the world markets which suggests a portfolio diversification.

As the financial markets in MENA are strongly cointegrated, the market is not efficient as the stock prices can predicted. Because of the linkage among these markets, creating a portfolio from the region will be risky because of the comovement among the stock markets in the region.

The results of this study is consistent with the findings of Darrat et al. (2000), who found that MENA stock markets are segmented globally and integrated regionally. Likewise, it is consistent with the findings of Hazem Marashdeh (2005), who found that there is integration among stock markets in the MENA region, but not between the MENA and International stock markets. On the other hand, the result of this study is different from the findings of Neaime (2002), who concluded existence of a weak integration among the MENA stock markets and strong integration with international stock markets. Also, it is different from the finding of Maghyereh (2003), whose results indicate the existence of weak linkage among the four markets. The difference can be referred to different samples, data, time period and different methodology.

CONCLUSION

This paper examines the process of financial market integration in four MENA economies and whether these markets link to the world markets. The empirical findings suggest that financial

markets in MENA region are integrated among them and segmented globally. The results indicate stock markets in MENA region are inefficient because of the predictability of these markets.

REFERENCES

Baudouhat A. (2006). Nordic Financial Market Integration: An Analysis with GARCH Model.

Chai H. (2005). Financial Integration and Financial Efficiency In Asia

Chinzara Z. (2008). An Empirical Analysis of South African Stock Market Linkage with World Stock Market

Darrat, A.F, Elkhal, K. & Hakim, S. (2000). On the integration of emerging stock markets in the Middle East. *Journal of Economic Development*

Engle, R. (2001). The Use Of GARCH/ARCH Model In Applied Econometrics

Marashdeh, H. (2005). Stock Market Integration in MENA Region: An Application of ARDL Bounds Testing Approach

Mishra, M. (2008). Stock Market Integration And Volatility Spillover: India And Its Major Counterparts

Mohd. Shabri Abd. Majid., Ahamed Kameel Mydin Meera, & Mohd. Azmi Omar (2008). Interdependence ASEAN-5 Stock Markets from The US And Japan

Mohd. Sharbi Abd. Majid, Rosylin Mohd. Yusof & Ahmad Nazri Razal (2007). Dynamic Financial Linkages among Selected OIC Countries. *Journal of Economic Coordination*

Rim H. & Setaputra R. (2008). Studies on Financial Integration and Market Efficiency: Empirical evidence from Asia.

Zhong M. (2005). An Analysis of Equity Linkage Market in *The Pacific Basin.*