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The Relationship Between Interest Rate and Stock Market Index: Empirical Evidence from Arabian Countries

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Abstract
This paper examines both short and long-run relationship between interest rate and Arab Monetary Fund indices for five Arabian stock market index, namely: Jordan, Egypt, Oman, Qatar and Kuwait, using monthly data selected from Arabian Monetary Fund database, for the period started from 1st January 2014 to 30th June 2016, and employing various econometrics tests, such as: Augmented Dicky Fuller test, Vector Auto Regression, Johansen test of Coinetgration, Granger causality test, and Variance Decomposition. The results indicate that there is a significant negative relationship between interest rate and stock market index in Egypt, while it was insignificant in Qatar and Kuwait. However, a significant positive relationship was found in Jordan and Oman.The result of Co-integration test concluded that the interest rate and the stock market index shows a long-run association only in Qatar, but not in Jordan, Egypt, Oman and Kuwait.Our Granger causality test could not establish causality of any direction between interest rate and stock market index in Oman, Qatar, and Kuwait. However there was a bidirectional relationship in Jordan, and a unidirectional relationship in Egypt running from stock market index to interest rate.Finally, the results of variance decomposition have shown that lending rate plays important role in explaining (26.54%, 26.01%) variation in Jordanian and Kuwaiti stock market prices index respectively. While only a little variation in stock index can be explained by interest rate especially in Egypt, Oman and Qatar, where it shows that shocks of interest rate explains (13.18%, 13.13%, and 0.07%) respectively.The findings of this study can be helpful for the investors for selecting optimum portfolio.Based on our findings, the study recommends further research to in depth investigating the reason behind the lack of causal relation in some countries, and employ other macroeconomic variables that could explain stock price.
Keywords: Arab Monetary Fund Indices; interest rate, Coinetgration, Granger causality test, Variance Decomposition (VDCs).

1. Introduction

A Stock market has been a major preoccupation of the financial sector, due to its key role in the mobilization of capital, and resources into productive sectors.

Price fluctuation in stock market can be explained by change in many factors, interest rate is one of these factors, generally, it is considered as the cost of capital; from the lender point of view, it is the fee charged for lending money (lending rate), while from borrower's point of view, it is the cost of borrowing money (borrowing rate).

The relationship between interest rates and stock markets, has over the years, gained reasonable academic attention from students, researchers, regulators, stock brokers, to mention but a few, because it provides an important implications for government monitory policy, and investment decisions, through financial securities valuation.

The existing literature and previous studies about presence and nature of the relationship between interest rates and stock markets, was inconclusive, with a documented evidence of the existence and non-existence, the positive and negative in various countries. According to author's knowledge, there is no single study trying to analysis the causality relationship between the Arabian stock indexes until now.

In this context, the study problem is represented in determining the existence and nature of this relationship in Arabian countries, by answering the following question:

Is there a relationship between interest rate (IR) and stock market index (SMI), in both short and long-run, in Arabian countries? If so, what is the causality direction between them?

Therefore, the main objective of this study, is to provide some empirical evidence regarding both short and long-run relationship between interest rate and stock market index, in five Arabian countries namely: Jordan, Egypt, Oman, Qatar and Kuwait individually, by using monthly data obtained from Arabian Monetary Fund (AMF) database, for the period starting from 1st January 2014 to 30th June, and employing various econometric tests. It also aims to provide a body of knowledge that would be beneficial for the regulators, investors, shareholders and stakeholders.

The novelty of this study is to examine this relationship in a unified base, by introducing the (AMF) indices. The (AMF)[1] is a regional Arab organization, established in 1976, and has started operations in 1977. The

[1] (for more details, please visit fund home page: http://www.amf.org.ae)

member Countries are: Jordan, United Arab Emirates, Bahrain, Tunisia, Algeria, Djibouti, Saudi Arabia, Sudan, Syria, Somalia, Iraq, Oman, Palestine, Qatar, Kuwait, Lebanon, Libya, Egypt, Morocco, Mauritania, Yemen, and Comoros.

AMF has many objectives, including promoting the development of Arab financial markets by multiple means, such as calculating a composite index measuring the performance of Arab Capital Markets combined, it also calculates an index for each Capital Market alone. These indices are Market capitalization weighted, using a chained Paasche method[1]. Prices are calculated in U.S dollar terms, and uses end period data.

This study also differs from previous studies in several aspects:

First of all, only a few attempts are made to study the relationship between interest rate and stock prices for a several Arab countries in a comparative way.

Furthermore, in earlier researches most of the related studies examined the developed economies, only a few studies concentrated on emerging markets.

Besides all of these, most of the previous studies on this topic, were dealing with several macroeconomic factors, this study is concerned only with the interest rate relationship with stock index.

The rest of the paper will be arranged as the following, beginning in the next section with a review the literature and previous studies. Section 3 will discuss the methodology, section 4 will describe the data analysis and results, and the final section will present discussion and conclusion.

2. Literature Review and previous studies:

2.1 Theoretical Literature Review

Different theoretical frameworks have been employed by many researchers to link macroeconomic variables in general, and particularly the interest rate with stock market index. These include the semi strong efficient market hypothesis, which developed by Fama (1970), and the Arbitrage Pricing Theory (APT) developed by Ross (1976).

Fama, (1970) defined an efficient market as “a market where prices always reflect all available information”. However, there are different kinds of information that affect security values. The semi strong hypothesis is used to investigate the negative or positive relationship between stock return and macroeconomic variables, since it postulates that macroeconomic factors are fully reflected in the stock price.

The (APT) is a different approach to determine asset prices, Ross (1976) proposes a multifactor approach to explain asset pricing through the (APT). He argue that the primary influences on stock returns are some economic forces, such as (1) unanticipated movements in the shape of the term structure of interest rate; (2) unanticipated shifts in risk premiums; (3) unanticipated inflation and (4) changes in the expected level of industrial production. These factors are denoted with factor specific coefficients that measure the sensitivity of the assets to each factor.

2.1.2 Interest Rate and Stock Prices relationship:

Fama (1981, 1990) argues that interest rates have inverse relationship with stock prices in the long-run, which stems directly from the present value model through the influence of the long-term interest rate on the discount rate (Uddin and Alam, 2010).

The negative relationship is also based on the view that a rise in interest rate will lead to a higher borrowing costs, lower future profits, increase in discount rate for equity investors; and then stock prices decrease. Thus, increases in interest rates have indirect impact on stock prices (Ibrahim1& Musah, 2014).

2.2 .Previous studies:

Empirically, various recent studies reviewed here showed mixed results and conclusions as follows:

In Wongbampo and Sharma, (2002) explored the association between stock market behavior and macroeconomic fundamentals in five Asian nations (Philippines, Malaysia, Thailand, Indonesia and Singapore). They found a negative relationship between interest rates and stock prices for Singapore, Thailand, and Philippines, but positively related to Malaysia and Indonesia.

Mayasmi, et. Al., (2004) examined the relationship between macroeconomic factors and the Sector Stock Indices, using Johansen’s cointegration VECM, they found that the Singapore stock market and the SES All-S Equities Property Index formed significant relationships with all macroeconomic variables.

Rashid, (2008) examines the dynamic interactions between stock prices and four macroeconomic variables in Pakistan, using Granger causality and cointegration tests. It was discovered that there is a long-run bi-directional causation between the stock prices and interest rates. The results also revealed that the stock prices Granger caused by changes in interest rates in the short run.

Rahman, et al., (2009) studied the association between stock prices and selected macroeconomic

[1] A Paasche index: index developed by German economist Hermann Paasche for measuring current price or quantity levels relative to those of a selected base period.

variables in Malaysia. They employed VECM/VAR framework. They showed that interest rate was positively related to Malaysian stock market return in the long-run. Their causality test signifies a bi-directional relationship between interest rates and stock market return.

Xiufang, (2010) examine the relationship between macroeconomic variable volatility, and stock market volatility for China. He found that there is a unidirectional relationship exists between the interest rate and stock prices, through the direction from stock prices to the interest rate.

Ochieng & oriwo, (2012) examined the relationship between macroeconomic variables and market index in Kenya. Their findings showed a negative relationship between treasury bill rate and index.

Issahaku, et, al (2013) study the existence of causality between stock returns and macroeconomic factors in Ghana. They employ (VECM). Their findings showed a significant relationship exists between the stock market returns and interest rate in the short-run.

Naik (2013), investigated the shock of macroeconomic variables on the stock market behavior in India. He revealed that the interest rate and exchange rate were found to be insignificant relationship with stock market index.

Hunjra, et, al (2014) examine the impact of macroeconomic factors on stock price in Pakistan, by employing cointegration and Granger causality. Their findings revealed that, there is no relationship between the stock price and the macroeconomic variables in the short-run. While, in the long-run, findings showed a strong relationship between the stock prices and the macroeconomic variables.

Ibrahim and Musah, (2014), examined the impact of macroeconomic variables on the stock market returns in Ghana, by employing the VECM, and the Johansen multivariate cointegration approach. The findings showed significant negative relations between the stock prices and interest rate.

Khan, et. al., (2014), study the relationships between KSE-100 and the macroeconomic factors. They used multiple regression and Pearson's correlation, and found negative impact of interest rate on the stock prices index.

Subburayan and Srinivasan (2014), investigate the effects of macroeconomic indicators on CNX bankex return in the Indian stock market. They employed Cointegration test, Granger causality test and regression. They found that, interest rate has significant positive influence on the bank stock returns. They also found that there is no causal relationship between interest rate and CNX Bankex.

Mutuku and Ng'eny (2015) investigated the dynamic relationship between macroeconomic variables and the stock prices in Kenya. They used Vector Autoregressive Model and Vector error correction Model. They found positive relationships between the stock price and the Treasury bill rate.

3. Data and Methodology

3.1 Data

This study used monthly data series on interest rate (IR) and stock market index (SMI), for five Arabian countries (Jordan, Egypt, Oman, Qatar and Kuwait) that were obtained from the (AMF) database, spanning January 2014 to June 2016.

Since the research is aimed to investigate significant relationships between research variables, it can be classified as a correlation research. In addition, because the results of the study can benefit students, researchers, regulators, stock brokers, it can be considered as an applied research.

Articles and other resources were reviewed for literature and previous studies. In addition, to collect data of research variables, AMF database is used. After collecting the data in Excel work sheets, it is examined by EViews software.

3.2 Variables definition

3.2.1 Stock market index (SMI)[1]:

Stock market index is proxied by Arab Monetary Fund (AMF) indices for Jordan, Egypt, Oman, Qatar and Kuwait.

AMF indices calculate the adjusted market capitalization (Mad) in local currencies, and then, converted to U.S dollar to calculate the index for each market. (Appendix (1) show AMF Mathematical Equation of calculate indices.

3.2.2 Interest Rate (IR):

The pure rate of interest is defined by Reilly and Brown (2003) as the rate of exchange between future and current consumption.

Following several previous studies, such as: Ochieng & oriwo, (2012), the lending rate is considered as a proxy for interest rate.

[1](for more details please visit (AMF) home page;
http://www.amf.org.ae/en/page/description-and-methodology)

3.3 Research Hypotheses

Considering the available literature and in line with the objectives of the study, the following hypotheses are formulated to study the relationship between interest rate and stock market Index in each country separately (at $\alpha < 0.05$ significant level):-

H01: There is no statistically significant long-run relationship between interest rate and Stock market index.

H02: There is no statistically significant causality relationship between interest rate and Stock market index. We derived two sub hypotheses from this hypothesis:

H02-1: Interest rate does not Granger cause stock market index.

H02-2: Stock market index does not Granger cause interest rate.

3.4 Research Model

The aim of doing the analysis is investigating if the IR influences the SMI and vice versa for each country. The researchers used EViews 7 to get the results, by using the following regression equation:

$\mathrm{SMI} = a_0 + \sum_{i=0}^{n} \mathrm{IRi, t} + \varepsilon_{i,t}$…………………………..(1)

$\mathrm{IR} = \beta_0 + \sum_{i=0}^{n} \mathrm{SMI\ i, t} + u_{i,t}$…………………………..(2)

Where:

SMI: stock market index, IR: lending rate, t: time, α,β: parameters. ε, u: error.

3.5 Research Methodology:

Following several previous study, this study employed various econometrics tests such as: Augmented Dicky Fuller (ADF) test, Vector Auto Regression (VAR), Johansen test of Coinetgration, Granger causality test, and variance decomposition (VDCs).

3.5.1 Unit Root Test

The first step, the study employed (ADF) test to check the stationarity of a time series variable, because most macroeconomic time series are often assumed to be non-stationary. Granger & Newbold (1974) identified that the use of a non-stationary data time series in regression analysis may lead to spurious regression.

The (ADF) test is one of the cited unit root tests in the existing literature, which is principally most commonly used.

The (ADF) test is applied to determine whether the data series is stationary (has no unit root) or not, by calculating the respective statistics and p-values in level, if all the variables are non-stationary at level, we take the first difference, this means that they are integrated in order 1.

3.5.2 Vector Auto Regression (VAR)

As the result is quite sensitive to the number of lagged terms, the appropriate lag length should be chosen carefully, therefore, we conduct (VAR) to select the optimal lag length to be included in the test, by using 5 lag selection criteria; sequential modified LR test, Akaike Information Criterion (AIC), Final Prediction Error (FPE), Schwarz Criterion (SC), and Hannan Quinn Criterion (HQ). The lower of the value of the respective criteria, the better will be the model.

3.5.3 Johansen Test of Cointegration

After insuring that the data series is stationary, we invoke the Johansen (1991), to test the possibility of a long-run equilibrium relationship between variables.

Johansen (1991) suggests the trace and the maximum eigenvalue tests in testing the statistical significance. Johansen and Julieus (1990) argue that, in the trace statistic tests the H0 of r cointegrating relation as opposed to the H1 of n cointegrating vectors, where n denotes the number of variables in the system. Conversely, in the maximum eigenvalue tests, the H0 of r cointegrating vectors against the H1 of $r + 1$ cointegrating vectors. The critical values which are given by Johansen and Julieus (1990) reported by most econometric software packages, like the EViews 7, which is used in estimating all equations in this study (Ibrahim & Musah, 2014).

3.5.4 Granger Causality Test

Granger causality means that one variable past value can help predict another variable. For example, if it was established that variable X is Granger cause variable Y, this means that the historical data of X can be used to predict Y. This relation can be bidirectional which means Y can also Granger cause X. In other words, it determines whether the interest rate can be useful in forecasting the stock market index fluctuations, and whether the interest rate is affected by the stock market index.

According to Granger's definition of causal relationships:

H01: IR does not cause SMI.

H02: SMI does not cause IR.

We reject each H0 if the computed (F) statistic is greater than the critical value at a reasonable significance level, otherwise we do not reject H0.

3.5.5 Variance Decomposition composition (VDC) **Test:**

The variance decomposition is accounts for the share of variations in the endogenous variables resulting from the endogenous variables, and the transmission to all other variables in the system, because of the dynamic nature of the (VAR). Hence, (VDC) gives the proportion of the movements in the dependent variables that are due to their "own" shocks, versus shocks to the other variables (Brooks, 2008). It is pointed out by (Pesaran and Shin, 2001) that the variable decomposition method shows the contribution in one variable due to innovation shocks stemming in the forcing variables. The variance decomposition indicates the amount of information each variable contributes to the other variables in the auto regression (Joshi and Giri, 2015).

4. Data Analysis and Results

4.1 Descriptive statistics

Table (1) presents the summary of descriptive statistics for the full sample data period. The mean describes the average value in the series, and Std. deviation measures the dispersion or spread of the series. The maximum and minimum statistics measures upper and lower bounds of the variables, under study during our chosen time span. Finally, the Jarque-Bera test (J-B) is used to check the normality of the data (Gujrati, 2004).

Table 1. Descriptive statistics

Country	Jordan		Egypt		Oman		Qatar		Kuwait	
	SMI	**IR**	**SMI**	**IR**	**SMI**	**IR**	**SMI**	**IR**	**SMI**	**IR**
Mean	372.01	8.63	143.2	11.85	331.66	5.00	1069.6	4.56	363.4	**4.27**
Median	384.4	8.61	143.4	11.70	326.21	4.98	1106.3	4.66	353.5	**4.27**
Max	409.06	9.1	171.0	13.40	376.13	5.40	1214.9	5.13	425.8	**4.35**
Min	311.40	8.14	121.0	11.30	300.97	4.75	694.4	3.69	316.6	**4.21**
Std.Dev	31.11	0.337	15.28	0.47	17.90	0.21	136.3	0.43	35.10	**0.03**
Skewness	-1.167	-0.04	0.136	1.99	0.66	0.30	-1.87	-0.39	0.391	**0.54**
Kurtosis	2.865	1.435	1.833	6.37	2.82	1.69	5.68	1.80	1.992	**4.00**
J- B	2.827	3.07	1.79	34.15	2.21	2.59	**26.4**	**2.55**	**1.626**	**2.19**
Prob	0.03	0.216	0.40	0.00	0.33	0.27	**0.00**	**0.28**	**0.44**	**0.33**

Source: Results of the statistical analysis. from E-views

The summary statistics for IR and SMI are given in table (1). The IR mean is (8.63, 11.85, 5, 4.56 and 4.27), and the SMI mean is (372.01, 143.2, 331.66, 1069.6 and 363.4) for Jordan, Egypt, Oman, Qatar and Kuwait respectively.

The results of J-B statistics, skewness and kurtosis, indicated that most of data series of variables follow the normal distribution, as there are many probability of J-B greater than 0.05 significant level. In addition, skewness value for SMI and IR in Jordan, Egypt, Oman, Qatar and Kuwait are (-1.167, 0.136, 0.66, -1.87 and 0.390) respectively for SMI, and (-0.039, 1.99, 0.30, -0.39 and 0.544) respectively for IR. Whereas kurtosis values are (2.865, 1.833, 2.82, 5.68 and 1.99) respectively for SMI, and (1.435, 6.37, 1.69, 1.8 and 4) respectively for IR.

4.2 Correlation between variables

Correlation between variables show that how much of one variable is explained by the other variable, and its value is between (+1 and -1). The correlation matrix between research variables is shown in Table (2).

Table 2.Correlation matrix

Correlation between IR &SMI	St. (Prob.)
Jordan	0.655 *
Egypt	-0.440 **
Oman	0.749 *
Qatar	-0.319
Kuwait	-0.05

*, ** (***) denote significance at 1%, 5% (10%) level.

Source: Output data from E-views 7

The results of table (2) show that there is a significant negative relationship between IR &SMI at 0.05 significant level in Egypt, and insignificant in Qatar and Kuwait. While a positive significant relationship (at 0.01 significant level) was encountered in Jordan and Oman.

The results of table (2) show that the most correlation between IR &SMI is in Oman which is positive, which indicates that the high stock price results in a high IR and vice versa. In addition, the results show that the least correlation is in Kuwait.

4.3 Empirical Results:

4.3.1 Unit root tests results:

The results of the unit root tests for the series of (IR &SMI) variables in five countries are shown in Table (3). The (ADF) test provides the formal test for unit roots in this study.

The null hypothesis is that the (IR &SMI) have a unit root, or the data series is non-stationary.

Table 3. Results of (ADF) Test.

Country	variable	level			1st Difference			Decision
		intercept	Trend& intercept	None	intercept	Trend& intercept	None	
Jordan	JSMI	-0.832	-2.06	-1.053	-6.84*	-7.05*	-6.79*	I~(1).
	JIR	-0.819	-1.409	-1.613	-3.74*	-3.56*	-3.53*	I~(1)
Egypt	ESMI	-0.497	-2.09	-0.568	-6.16*	-6.566*	-6.22*	I~(1)
	EIR	1.638	0.469	1.49	-3.58*	-4.458*	-3.38*	I~(1)
Oman	OSMI	-1.613	-2.589	-0.493	-4.74*	-4.675*	-4.79*	I~(1)
	ORI	-2.64	0.952	-3.42	-1.86	-4.89*	-1.8***	I~(1)
Qatar	QSMI	-3.12	-2.719	0.700	-5.14*	-5.44*	-5.033*	I~(1)
	QRI	-1.515	-4.19**	-0.847	-6.60*	-6.423*	-6.288*	I~(1)
Kuwait	KSMI	-1.258	-4.387*	-2.15*	-4.62*	-4.616*	-4.146*	I~(1)
	KRI	-2.514	-2.349	0.304	-4.91*	-5.167*	-5.056*	I~(1)
C.V		-2.97	-3.58	-1.95	-2.97	-3.58	-1.95	

*, ** denote significance at 1%, 5% level.
C.V: critical values at 5% levels.
Source: Output data from E-views 7.

Table (3) presents the (ADF) unit root test at their levels clearly shows that (ADF) test statistics for all variables are less than the critical values at 5% levels (C.V), and P-values are greater than the level of significance (α=0.05), so the null hypothesis of the existence of a unit root cannot be rejected at 5% significance levels. Hence, all the series are contain unit root at level.

We can conclude that, all variables are non-stationary at level, and following a pure random walk, thus, any causal inferences from the two series in levels are invalid. The remedy is to take the first difference of the variables before using them in the regression model.

The analysis of the first difference variables show that the P-values are less than the level of significance (α=0.05), and (ADF) test statistics for all variables are greater than the critical values at 5% levels, meaning that the null hypothesis of the existence of a unit root is rejected at 5% significance levels and accept that the series are stationary.

In summary, for both variables IR &SMI, it was found that data series is non-stationary in the level, but stationary at the first difference, which is the precondition of using the Johansen test of Coinetgration. Thus, we can conclude that those variables are stationary at first difference and the variables are integrated of order I~(1).

4.3.2 VAR Lag Order Selection Criteria:

As we found that SMI and IR data series is non-stationary in the level but stationary at the first difference, the next step is selecting the optimum lags used in the Johansen test of Coinetgration. The aim is to choose the number of parameters, which minimizes the value of the information criteria.

Table 4. VAR Lag Order Selection Criteria

Criteria	Lag	Jordan	Egypt	Oman	Qatar	Kuwait
LR	0	NA	NA	NA	NA	NA
	1	104.11*	84.18*	110.32*	53.55*	41.04*
	2	2.20	1.93	2.62	0.54	0.56
FPE	0	70.44	50.28	5.79	1718.33	0.87
	1	1.46*	2.31*	0.09*	268.96*	0.14*
	2	1.77	2.84	0.11	351.74	0.207
AIC	0	9.93	9.59	7.43	13.12	5.54
	1	6.05*	6.51*	3.30*	11.26*	3.74*
	2	6.24	6.71	3.48	11.53	4.08
SC	0	10.03	9.69	7.53	13.22	5.64
	1	6.34*	6.79*	3.59*	11.55*	4.04*
	2	6.72	7.19	3.95	12.00	4.57
HQ	0	9.96	9.62	7.46	13.15	5.56
	1	6.14*	6.59*	3.39*	11.35*	3.814*
	2	6.39	6.86	3.62	11.67	4.19

Source: Output data from E-views 7
* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table (4). Shows the results of test Statistics and Choice Criteria for Selecting the Order of the VAR model, the lag selection criteria consisting of: sequential modified LR test, Akaike Information Criterion (AIC), Final Prediction Error (FPE), Schwarz Criterion (SC), and Hannan Quinn Criterion (HQ). The lower of the value of the respective criteria, the better will be the model. The results indicate that the optimum lags for all country is one lag.

4.3.3 Contigration results

In the next step, we used Johansen Test of Cointegration with the purpose to determine the long-term relationship between (IR &SMI).

The results of the Johansen cointegration test for the series IR &SMI in Jordan, Egypt, Oman, Qatar and Kuwait are reported in Table (5).

Table 5. Contigration test results.

country	Hypothesized No. of CE(s	Eigen-value	Trace Test		Maximum Eigenvalue test	
			Trace St.	Prob.**	Max E. St.	Prob.**
Jordan	None	0.2403	10.225	0.263	7.696	0.410
	At most 1	0.0864	2.529	0.112	2.529	0.112
Egypt	None	0.150	5.259	0.78	4.56	0.79
	At most 1	0.02	0.70	0.40	0.70	0.40
Oman	None	0.279	13.477	0.10	9.170	0.27
	At most 1	0.142	4.31	0.04	4.31	0.04
QTR	None	0.405	17.414	0.03	14.56	0.05
	At most 1	0.097	2.85	0.09	2.863	0.09
Kuwait	None	0.400	10.89	0.22	10.742	0.16
	At most 1	0.007	0.15	0.70	0.15	0.70
0.05 Critical Value for H0: None			15.495		14.264	
0.05 Critical Value for H0:At most 1			3.841		3.841	

* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values
Source: Output data from E-views 7.

The results of trace and Max-Eign tests in table (5) show that the null hypothesis of absence of cointegrating relation (None) cannot be rejected at 5% level of significance, were all calculated value except for Qatar is less than 0.05 Critical Value. Moreover, the individual P-values are also greater than the level of significance (α=0.05). Therefore, the null hypothesis cannot be rejected, to infer that there is no cointegration between (IR &SMI).

In Qatar case the calculated value (17.414 and 14.56) are greater than 0.05 critical value (15.495 and 14.264) in trace and Max-Eign tests respectively. Moreover, the individual P-values are also less than the level of significance (α=0.05), therefore, we reject the null hypothesis, to infer that there is a long run relationship between (IR &SMI) in Qatar.

Thus, we can conclude that there is no long-run relationship between IR &SMI for Jordan, Egypt, Oman and Kuwait.

4.3.4 Granger causality results:

A test for existence and direction of Granger causality between variables were carried out. Our causality test results are presented in Table (6) below.

Table 6. Pairwise Granger Causality Tests

Country	Null Hypothesis	F Statistic	Prob.	decision
Jordan	H01: JIR does not Granger Cause JSI	5.123	0.03	Reject H0
	H02: JSMI does not Granger Cause JIR	6.317	0.02	Reject H0
Egypt	H01: EIRdoes not Granger Cause ESMI	0.25	0.62	Accept H0
	H02: ESMI does not Granger Cause EIR	4.53	0.04	Reject H0
Oman	H01: OIR does not Granger Cause OSMI	2.679	0.11	Accept H0
	H02: OSMI does not Granger Cause OIR	1.333	0.26	Accept H0
Qatar	H01: QIR does not Granger Cause QSMI	0.129	0.88	Accept H0
	H02: QSMI does not Granger Cause QIR	0.375	0.69	Accept H0
Kuwait	H01: KIR does not Granger Cause KSMI	1.025	0.32	Accept H0
	H02: KSMI does not Granger Cause KIR	0.42	0.52	Accept H0

Source: Output data from E-views 7.

From Table (6) above, results from the Granger causality for H01 reveal that all P-values are greater than the level of significance (α=0.05) except for Jordan. That is why null hypothesis cannot be rejected, and we infer that IR does not Granger cause SMI in Egypt, Oman, Qatar, and Kuwait market, and reject it in Jordanian market whereas p-value (0.03). Thus IR indicators cannot be used to predict the past values of SMI in these markets.

Coming to H02, all P-values are greater than the level of significance (α=0.05) except for Jordan and Egypt. So, here again null hypothesis cannot be rejected, to infer that SMI do not cause Granger Cause IR in Oman, Qatar, and Kuwait market, and reject null hypothesis in Jordan and Egypt market, whereas P-value (0.02 and 0.04) respectively.

Thus, we can conclude that there is no causality relationship between IR & SMI in Oman, Qatar, and Kuwait markets, On the other hand, we can conclude that, there is unidirectional causality relationship in Egyptian market run from SMI to IR.

Finally, results indicate the existence of a two-way causal relationship between interest rates and stock market index in Jordan. Thus IR indicators can be used to predict the past values of SMI and vice versa just in Jordan markets.

4.3.5 Variance Decomposition Analysis (VDC)

Table (7) presents Variance Decomposition of stock market indices results.

Table 7. Variance Decomposition of stock market indices results

Period	Jordan S.I	Egyptian S.I	Omani S.I	Qatari S.I	Kuwaiti S.I
1	100.00	100.00	98.34	100.00	100.00
2	99.20	98.22	96.52	99.90	95.84
3	97.21	98.50	94.34	99.83	88.44
4	94.03	98.76	92.38	99.76	83.26
5	89.99	98.61	90.89	99.68	79.97
6	85.63	97.83	89.76	99.61	77.83
7	81.53	96.28	88.85	99.53	76.37
8	78.07	93.90	88.09	99.45	75.34
9	75.39	90.71	87.43	99.38	74.57
10	73.46	86.82	86.87	99.30	73.99

Note: All the values of VDC are calculated using E-views 7.0

The Table (7) shows that changes in all SMI variables are typically driven by its own variations, especially in the initial period, where it accounts for all of its variations, and by end of the 7^{th} and 10^{th} period, about (81.5% and 73.5%) of the variation in Jordan stock market index is respectively caused by the stock index itself. By the end of the 10^{th} period, about (87%, 87%, 99% and 74%) of variation in Egypt, Oman, Qatar and Kuwait stock market index is respectively explained by there's own variation.

Therefore, it can be said that over the horizon of 10 years, lending rate plays important role in explaining (26.54%, 26.01%) variation in Jordanian and Kuwaiti stock market prices index respectively. While only a little variation in stock index can be explained by interest rate especially in Egypt, Oman and Qatar, where it shows that shocks of interest rate explains (13.18%, 13.13%, and 0.07%) respectively.

5. Discussion and Conclusion

This paper investigated empirically both of the short and long-run relationship between interest rate and stock market index in five Arabian countries (Jordan, Egypt, Oman, Qatar and Kuwait), using monthly data selected from (AMF) database, for the period starting from 1st January 2014 to 30th June 2016, and employing various econometrics tests, namely: unit root test, (ADF) test, (VAR) test, Johnson cointegration, Granger causality test, and (VDCs).

The results showed a significant negative relationship between IR &SMI (at 0.05 significant level) in Egypt, and insignificant in Qatar and Kuwait.

These results are consistent with the theoretical argument that a high interest rate will decrease the flow of capital, and increase borrowing costs for firms which in turn will lower the future profits, and cause a decrease in the additional funds flowing in the stock market and thus a lowering stock prices. This argument also stated that a higher interest rates prompt investors to move money from the equity market to the bond market.

These results are consistent with several previous studies such as: (In Wongbampo and Sharma, 2002, for Singapore, Thailand, and Philippines; Uddin and Alam, 2010, in Bangladesh; Ochieng & oriwo, 2012, in Kenya; Ibrahim and Musah, 2014, in Ghana, and Khan, et.al., 2014, in Pakistan.

On the other hand, the results showed a significant positive relationship between IR & SMI, in Jordan and Oman. This result is consistent with InWongbampo and Sharma, 2002, for Malaysia and Indonesia; in Nigeria; Rahman, et al., (2009) in Malaysia; Subburayan and Srinivasan, (2014) in Indian stock market and (Mutuku and Ng'eny, 2015) in Kenyan Equity Market.

The cointegration test results concluded that, there was no long-run relationship between IR & SMI for Jordan, Egypt, Oman and Kuwait.

This result implies that the past data of either of the variables cannot be used to predict one another, which is consistent with (Naik, 2013) who revealed that the interest rate was found to have insignificant relationship in Indian stock market index. While it was inconsistent with other previous studies such as: (Mayasmi et al,. 2004) for Singapore stock market; (Rashid ,2008) and (Hunjra, et, al,. 2014) in Pakistan.

The results of granger causality concluded that there was no causality relationship between IR & SMI in Oman, Qatar, and Kuwait market, thus IR indicators cannot be used to predict the past values of SMI, and vice versa in these markets. This result is consistent with (Subburayan and Srinivasan, 2014) in Indian stock market and with (Hunjra, et, al., 2014) in Pakistan.

On the other hand, results also concluded that there was a unidirectional causality relationship in Egyptian market that runs from SMI to IR. This result is consistent with (Xiufang Wang, 2010) in China; (Issahaku et. al., 2013) in Ghana, and inconsistent with Rashid (2008) in Pakistan.

The results also revealed a two-way causal relationship between IR & SMI in Jordan. This result is consistent with (Rahman, et al., 2009) who found a bi-directional relationship between interest rates and Malaysian stock market return.

Finally, the results of the variance decomposition (VDCs) showed that it can be said that over the horizon of 10 years, lending rate plays important role in explaining (26.54%, 26.01%) variation in Jordanian and Kuwaiti stock market prices index respectively. While only a little variation in stock index can be explained by interest rate especially in Egypt, Oman and Qatar, where it shows that shocks of interest rate explains (13.18%, 13.13%, and 0.07%) respectively. These findings can be helpful for the investors for selecting optimum portfolio.

Based on our findings, the study recommends investigating in depth the reason behind the lack of causal relation in some countries, and conducting a further research's that using of the other macroeconomic variables that could explain stock price changes which in turn will help in drawing a complete picture of the factors that affect the stock market.

Appendix (1):
AMF indices calculating methodology

The (AMF) calculates an index for each Capital Market. These indices are Market capitalization weighted, using a chained Paasche Method, prices are calculated in U.S dollar terms, using end of period data.

Changes of the value of the components are adjusted to accommodate changes in market capitalization resulted from the addition or deletion of shares in the samples of the indices.

Mathematical Equation

The mathematical equation for the indices (x) is:

When time period $i < 1$,

$X_i = (M_i/B_i) * 100$

$B_i = B_i\text{-}1 * (M_i / M_{ad})$

and when i=1,

$X_i = 100 * B_i = M_i$

Where:

i = time period.
X_i = index at time i
B_i = base value of index. when i=1 (the first period), market capitalization=base value of index.
M_i = market capitalization of constituents at time i
M_{ad} = adjusted market capitalization (adjusted for , rights issues , new issues of stock , stock cancellations for constituents, and the addition or deletion of constituents).

Market capitalization

Market capitalization (M_i) is the sum of the market value of all stocks included in the index. The market value of each stock is equal to:

$M_i = P_i * n_i$

where

P_i = the last transaction price for the stock in period i
n_i = the number of shares issued and outstanding at the end of the period i.

Adjusted Market Capitalization

Adjustments to the basic method of measuring change in capitalization are needed when a company issues new shares or declares a rights issue. The purpose of the adjustment is to neutralize the change so the change has no effect on the index. For example, when a company sells additional shares of stock, it adds market capitalization that would distort the index by implying that the market capitalization of the index increased from the period before the new shares were issued to the period after the new issue.

$M_{ad} = M_i - I_i - N_i - R_i + Q_{i-1}$

where,

Mi : market capitalization of constituents at time I (the sum of the market capitalization of all stocks included in the index)
M_{ad} : adjusted market capitalization at time i.
I_i : market capitalization of new shares issued by a company included in the index and listed at time i
N_i : market capitalization of the company added to the index at time i.
R_i : market capitalization of rights issues
Q_{i-1} : market capitalization of the company at time (i-1) which deleted of the index at time i

No adjustment is made, however, in case of stock split, bonus shares (stock dividend) and a decrease in paid-in capital, since such corporate actions do not affect the current market capitalization. Thus, adjustments are done for any changes in index sample or any corporate action affecting the market capitalization on index stocks. This can be achieved by using the adjustments factor M_{ad}.

AMF indices

The formula above is used to calculate the adjusted market capitalization (Mad) in local currencies, and then converted to U.S dollar to calculate the index for each market.

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