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ARE DEVELOPING STOCK MARKETS EFFICIENT? EVIDENCE FROM RECENT KUWAITI DATA*

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Abstract

This study investigates the validity of the weak form of the Efficient Market Hypothesis as applied to the Kuwait Stock Exchange (KSE) using data for the 2000-2015 period and three sub-periods. Applying statistical analysis and moving average rules, this study provides new evidence of the KSE's inefficiency. In particular, the empirical results indicate that moving average strategies successfully predict the KSE index's returns. Furthermore, the sub-period results suggest that the KSE will not achieve greater efficiency despite the introduction of new regulations, an upward trend in accounting disclosures, and the development of market microstructures.

Introduction

This study examines the weak form of the Efficient Market Hypothesis (EMH) and a random walk model to determine whether historical data can be used to predict the price index of the Kuwait Stock Exchange (KSE). Fama (1970) suggests that share prices are unpredictable when both hypotheses are correct; thus, investors cannot consistently outperform the market by making trading decisions based exclusively on past information(1).

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(1) The random walk model follows the same approach as the fair game model (Fama, 1965). In other words, if price changes are random because information arrives in the market in an unpredictable fashion, then investment becomes a fair game. You might gain on some investments one day and lose on others another day such that you cannot outperform the market consistently by trading exclusively on the basis of historic information.

Most studies testing the weak form of the EMH use statistical analyses to measure the correlation between current and historical returns and conduct runs tests to search for patterns in stock price changes (Butler and Malaikah, 1992; Fama, 1970). Other studies focus on the outcomes of trading strategies (Hudson *et al*., 1996; Brock *et al*., 1992; Sweeney, 1988) and typically investigate whether an investor who trades using historical prices can outperform a passive approach (Fifield *et al*., 2008, 2005). One of the most common strategies employed in the literature is the moving average rule (Brock *et al*., 1992) in which buy and sell signals are generated by comparing the short-term moving average of a share price with its long-term moving average counterpart.

Research in this area typically focuses on developed markets such as the US and the UK (Hudson *et al*., 1996; Sweeney, 1988; Fama and Blume, 1966; Fama, 1965), and the findings suggest that these markets are efficient in terms of past data. Further, the research emphasizes that correlations between current and historical returns are close to zero (Fama, 1965). Meanwhile, runs tests which examine predictability among the signs of share price changes suggest that no patterns are present (Fama, 1965). Indeed, evidence from developed countries indicates that trading rules cannot outperform an investor with a portfolio of diversified shares who holds that portfolio for a specific time (Sweeney, 1988; Fama and Blume, 1966). Increasingly, the literature argues that stock markets in developing countries may not be weak form efficient because these markets are often characterized by a dearth of information, low levels of corporate transparency and unsophisticated investors.

Development of Kuwait Stock Exchange

KSE is a developing stock market that was officially established in 1977, although stock trading in the country began in the 1950s (Al-Yaqout, 2006). Over the last three decades, this market has experienced significant changes in its trading system and regulations (Almujamed *et al*., 2013). In 1998, KSE mandated that listed companies disclose accounting information about their companies' operations on a quarterly basis (Al-Yaqout, 2006). An electronic trading system was implemented in 2000; KSE has subsequently launched a new trading system, X-stream, which was developed by NASDAQ OMX in 2012 (KSE, 2015). Further, the Capital Market Authority (CMA) was introduced as an independent regulator of capital markets in Kuwait; this body has promulgated new regulations for quoted firms and foreign companies who wish to be listed on the KSE (KSE, 2015). Listed companies must

disclose and publish any information affecting share prices, including any unusual activity in their share transactions in terms of either share prices or transaction volumes. Further, listed firms must indicate whether any material information, such as speculative forecasts, news, or rumors, has previously been disclosed and comment on these events (KSE, 2015). In addition, restrictions on share ownership in Kuwaiti firms by non-nationals have been relaxed. Since 2001, foreign investors have been permitted to own large equity stakes in Kuwaiti companies listed on KSE (Almujamed, *et al*., 2013). New business regulations have also been introduced. For example, since 1991, Kuwait has introduced laws mandating the adoption of International Financial Reporting Standards (IFRS) and International Accounting Standards (IAS) to increase the level and consistency of corporate disclosures for listed companies in Kuwait (Al Mutawaa and Hewaidy, 2010).

Several recent studies have examined the disclosure levels of Kuwaiti listed firms (Alfraih and Alanezi, 2015, 2012; Al Mutawaa and Hewaidy, 2010; Al-Shammari *et al*., 2008). For example, Al Mutawaa and Hewaidy (2010) investigated data for 48 non-financial Kuwaiti listed companies in 2006 and found that 69% of items that must be supplied under IFRS were in fact disclosed. Alfraih and Alanezi (2012) examined all firms listed on KSE in the same year and found that the average level of mandatory disclosures was 72.6%. Alfraih and Alanezi (2015) examined 2010 data and found an average disclosure level of 71.2%, with a minimum level of 41% and a maximum level of 94%. These findings suggest some improvements among the sample companies and that Kuwaiti listed firms are moving toward more disclosure and greater transparency. These developments, particularly the full adoption of IFRS and the various corporate disclosures required by the CMA, suggest that the overall efficiency of the Kuwaiti stock market may have improved.

Table 1 illustrates the growth of KSE from 2003 to 2014. For example, the number of listed firms increased from 108 to 216 over the 2003-2011 period. Market capitalization grew by a factor of 1.7 between 2003 and 2014. Trading value rose by 15.8 percent between 2003 and 2005 before declining in 2008, presumably due to the global financial crisis, which clearly affected Kuwaiti equities. In addition, the returns from KSE investments over a three-years pan varied dramatically, ranging from a low of -74.7% in 2011 to a high of 481.8% in 2005. Thus, KSE displays the characteristics of an emerging market (Aguiar and Gopinath, 2007; Lesmond, 2005), including rapid growth and volatile equity prices. Such price volatility may be due to the lack of sophisticated traders in Kuwait. Unlike their counterparts in developed stock markets, research suggests that most KSE analysts and

stockbrokers are neither sufficiently knowledgeable nor sufficiently experienced to provide valuable advice to their clients (Almujamed *et al*., 2012). Further, most trading on KSE is executed by stockbrokers on the floor of the exchange; only a small number of investors use online trading (Almujamed *et al*., 2012).

Table 1
Key Statistics for Kuwait Stock Exchange from 2003-2014

Market Profile Item	1/2003	12/2005	12/2008	12/2011	12/2014
Number of Listed Companies	108	180	204	216	206
Market Capitalization	61.31	110.63	109.73	100.93	107.83
Trading Value	53.30	61.72	10.01	21.64	22.05
Turnover Ratio (%)	86.9	55.8	9.1	21.4	20.4
Change in Index (%)	201.6	481.8	-68.0	-74.7	112.4

Sources: Official Kuwait Stock Exchange website.

Note: Market capitalization and trading values are expressed in billions of US$, while turnover ratios are expressed as percentages.

The findings of this study based on data from a typical emerging market should offer valuable policy insights for Kuwait's regulatory authorities focused on improving KSE's overall efficiency. Such insights may lead to developments which attract more international investors to KSE. Further, the current research should yield insights for local and foreign investors, as well as for analysts who wish to understand exactly how the market has behaved during different historical sub-periods and how moving average rules actually work in an emerging stock market such as KSE. Academics can build on the current findings by examining the performance of other trading rules using price data for firms listed on KSE.

Literature Review

Early examinations of the EMH suggested that developed stock markets (DSMs) are often efficient and that their returns are not predictable using historical data. For example, Kendall (1953) used serial correlation tests to examine weekly changes in the British industrial share price index and commodity prices over a10-year period ending in 1938 and found no significant relationship between previous price changes and current returns. Moreover, the serial correlation coefficients of these price changes were very small. Indeed, the mean serial correlation coefficients for one- and two-week periods were 0.131 and 0.134, respectively.

In a subsequent study, Fama (1965) analyzed daily prices for each of the 30 firms included in the Dow Jones Industrial Average (DJIA) index over a 5-year

period ending in September 1962. He documented that the average serial correlation coefficient was only 0.03, although 73.3% of these correlations were positive, while only 26.7% had negative values. Fama analyzed 4-, 9-, and 16-day price changes using a runs test and reported that investors could not achieve excess returns by trading on the signs of past price changes. Several academics have built on Fama's pioneering work from the 1960s and arrived at similar conclusions: the serial correlation coefficients or runs test results for changes in share prices are not statistically significant from zero (Cooper, 1982; Cootner, 1964).

In brief, studies of early DSMs demonstrated that share prices tend to change in an unpredictable manner. However, a recent study of the DJIA index in the US for the 1897-1986 period argued that a specific trading strategy might indeed generate profits (Brock *et al.*, 1992). An investor who followed a moving average strategy would have outperformed a passive buy-and-hold approach by more than 0.05% per day. Other examinations of trading rules in developed markets by Hudson *et al.* (1996) and Fifield *et al.* (2005) reached the same conclusions, although they highlighted that transaction costs might reduce or eliminate some of the gains available.

Much of the previous literature in this area focused on statistical tests or the profitability of trading rules for DSMs; a relatively small group of papers studied the validity of the weak form of the EMH in Emerging Stock Markets (ESMs). However, this body of literature is growing as ESM data availability improves and more journals turn their attention to the issues of emerging market performance. The number of academics in emerging market countries who are studying national data is also increasing, and their findings continue to grow as developing country governments try to understand precisely how their domestic stock markets can assist with the furthering of their nations' economic growth.

Little is known about KSE's efficiency, particularly when statistical analyses and trading rules are used for long periods and include sub-periods with variable economic growth and global financial crises. Findings on KSE remained quite mixed. Although some studies such as Bulter and Malaikah (1992) and Al-Khazali *et al.* (2007) claim that KSE is weak form efficient, most empirical research continues to suggest that Kuwaiti share prices are predictable (Elango and Hussein, 2008; Smith, 2007; Hassan *et al.*, 2003; Abraham*et al.*, 2002; Al-Loughani and Moosa, 1999; Al-Loughani, 1995; Al-Shamali, 1989; Gandhi *et al.*, 1980). However, most of these studies focused on statistical analyses of share price data and rarely investigated the predictive ability of trading strategies. El-Erian and Kumar (1995) provided one of the earliest investigations of the efficiency

of KSE using statistical analyses of daily and weekly index values from December 1988 to April 1993. Their serial correlation tests indicated significant trends in the data, and findings from their runs tests showed that the null hypothesis of no patterns present in the signs of price changes could be rejected.

Only two studies investigated the efficiency of KSE using trading rules (Al-Shamali 1989; Al- Loughani and Moosa 1999), and both of these were erelatively old and analyze short periods of price data. Al-Shamali (1989) found that the weak form of the EMH is violated using filter rules for data spanning the five years ending in December 1987. Al-Loughani and Moosa (1999) investigated weekly data for the KSE from August 27, 1986 to March 12, 1997; they compared the performance of eight long-run moving average periods (5, 10, 15, 20, 25, 30, 35 and 40 weeks) to that of a buy-and-hold strategy. These authors found that moving average rules using historical prices have predictive power.

The current study aims to resolve these conflicting views by testing prices over a more recent and longer historical time span covering periods of both growth and economic recession (including analyses of the full study period as well as sub-periods). In contrast to previous studies, this investigation is broader in scope and conducts several tests: serial correlation tests and runs tests. In addition to these statistical analyses, a relatively large number of moving average strategies are examined.

The current study therefore should provide more reliable results than the contradictory conclusions of previous investigations because it considers both the whole time span as well as various sub-periods. In addition, it includes a more recent time frame when financial market developments came into force, such as the relaxation of restrictions on foreign investors, the introduction of the CMA, the imposition of mandatory accounting disclosures, the KSE trading system upgrade and the increasein corporate disclosures.

Data and Research Methods

The current study uses daily closing prices from the official KSE price index for the period spanning from January 1, 2000, to June 30, 2015, which results in a total of 3816 observations. Sub-periods are also examined. The whole fifteen and a half years are divided into three sub-periods to test market efficiency during different economic conditions. We believe that recessions or global financial crisis might cause equity prices for KSE firms to become increasingly volatile and/or fall. Further, a global downturn might lead developed country investors to liquidate their investments in Kuwait and repatriate their funds to their home country.Any

inefficiency might therefore become more pronounced in a crisis period. Testing different sub-periods therefore provides a good basis for comparing the efficiency of KSE over time and determining whether it is affected by the state of the local as well as the world economy.

According to Gore (2010), the global financial crisis began on December 1, 2007, and ended on June 30, 2009. During this period, the vast majority of the world's stock markets experienced sharp declines in their equity prices (Blundell-Wignall *et al.*, 2008). Our data is therefore split into three sub-periods: Sub-1 (the pre-global financial crisis) spans the years from January 1, 2000, to November 30, 2007; Sub-2 (the global financial crisis) spans the period from December 1, 2007, to June 30, 2009; and Sub-3 (the post- global financial crisis) spans the period from July 1, 2009, to June 30, 2015.

In this study, the daily returns are calculated as follows:

$$r_t = log\left[\frac{P_1}{P_{t-1}}\right] \qquad (1)$$

where r_t represents returns at time t, P_t is the closing price of the index on day t, P_{t-1} is the closing price for the previous day, and *Log* represents the natural logarithm of KSE index.

Descriptive Statistics

The summary statistics for KSE index are presented in Table 2. A visual inspection of this table shows that the daily average price change for the full study period is very small, with a positive mean return of 0.0004. This average makes a good deal of volatility over the period; returns ranged from a low of -0.0478 to a high of 0.0505, and an overall standard deviation value of 0.0079. All sub-periods report similar descriptive statistics with the exception Sub-2, which exhibits a negative mean return of -0.0011 and a relatively high standard deviation of 0.0110, presumably because of the effects of the global financial crisis. The returns for both the full period and the three sub-periods show signs of negative skewness indicating that the data may not be normally distributed. The kurtosis statistic (4.60) confirms this view that the return series for KSE index do not follow a normal distribution. The kurtosis values for the full study period and the three sub-periods are greater than twice their standard errors suggesting that the null hypothesis of a normal distribution can be rejected. Caution should therefore be

exercised when implementing parametric tests and more weight should be placed on non-parametric tests, such as runs tests and trading rules.

Table 2
Summary Statistics for Daily Returns

Statistics	Full Study Period	Non-overlapping Sub-periods		
	1/2000-6/2015	Sub-1	Sub-2	Sub-3
		1/2000-11/2007	12/2007-6/2009	7/2009-6/2015
Sample Size	3816	1950	385	1479
Mean	0.0004	0.0011	-0.0011	0.0004
StDev	0.0079	0.0082	0.011	0.0079
Min	-0.0478	-0.0478	-0.0387	-0.0478
Max	0.0505	0.0505	0.038	0.0505
Skewness	-0.63*	-0.56*	-0.48*	-0.88*
(Standard Error)	-0.04	-0.055	-0.124	-0.064
Kurtosis	4.60*	4.75*	1.70*	4.79*
(Standard Error)	-0.079	-0.111	-0.248	-0.127

Results of Autocorrelation

	Coefficient	*t- value*	*Coefficient*	*t- value*	*Coefficient*	*t- value*	*Coefficient*	*t- value*
$\rho(1)$	0.218*	13.49	0.183*	8.10	0.356*	6.99	0.165*	6.34
$\rho(2)$	0.052*	3.09	-0.002	-0.09	0.141*	2.48	0.067*	2.53
$\rho(3)$	0.058*	3.42	0.027	1.17	0.098*	1.69	0.061*	2.27
$\rho(4)$	0.086*	5.06	0.096*	4.08	0.042	0.71	0.069*	2.56
$\rho(5)$	0.075*	4.40	0.065*	2.74	0.111*	1.90	0.029	1.06

Returns are presented for the full study period and for three non-overlapping sub-periods (Sub-1, Sub-2 and Sub-3). Returns are measured as the log differences in the level of the KSE index. p (i) is the estimated autocorrelation at lag *i* for each series. The *t*-value for the test of the hypothesis, which is the specific autocorrelation at that lag, is equal to zero. Numbers marked with * are significant at the 5 percent level. The full study period runs from January 1, 2000 to June 30, 2015, Sub-1 (pre-financial crisis) covers January 1, 2000 to November 30, 2007, Sub-2 (financial crisis) runs from December 1, 2007, to June 30, 2009, and Sub-3 (post-financial crisis) spans from July 1, 2009, to June 30, 2015.

Autocorrelation Testing

The autocorrelation coefficient calculates the correlation between the value of a variable at time (t) and its value k periods earlier (t-k). This test can indicate whether there is a significant relationship between the current and lagged values of a series by comparing the coefficients to their standard errors. The null hypothesis of no significant association can be rejected if the coefficient is significantly different from zero at the 5% level. Rejection of the null hypothesis would suggest that the current index price changes can be predicted from their past values,which

would contradict the weak form of the EMH[(2)]. Several studies using both US and UK data investigate the size of the autocorrelation coefficient for share price changes and find that these coefficients are not significantly different from zero (Fama, 1965; Cootner, 1964; Kendall, 1953).

In Middle Eastern countries, autocorrelation tests also indicate that the estimated coefficients may not be statistically significant (El-Erian andKumar, 1995; Butler and Malaikah, 1992). For instance, Butler and Malaikah (1992) used daily and weekly data for the 36 and 35 most liquid shares listed on the Kuwaiti and Saudi stock markets, respectively. The authors found that the correlation coefficients for 23 of the 36 (64.0 percent) Kuwaiti shares were not statistically significant at the 5% level for the first lag. In the current investigation, autocorrelation statistics are calculated for Lag 1 to Lag 5. Obviously, different lag lengths could have been selected, but the lags tested here appear to be commonly used in the literature and thus allow for easy comparison of the current results with previous findings (Butler and Malaikah, 1992; Brock *et al* 1992; Fama, 1965).

Non-parametric Runs Tests

A runs test is a non-parametric test that does not require the data series to be normally distributed.It examines changes in the sign of the price index and investigates whether any patterns are present (Butler and Malaikah, 1992). A run is a sequence of consecutive price changes of the same sign. Index price changes can be positive (+), negative (-) or no change (0).The randomness of a series is then analyzed by comparing the actual to the expected number of runs. When the actual number of runs differs from the expected number by a significant amount, the null hypothesis of a random series can be rejected. If the number of actual runs is significantly higher than the expected number of runs, this suggests that prices are

(2) Autocorrelation was thus calculated as follows:

$$\rho_k = \frac{\sum_{t=1}^{n-k} (r_t - \bar{r})(r_{t+k} - \bar{r})}{\sum_{t=1}^{n} (r_t - \bar{r})^2} \qquad (2)$$

where ρ_k is the corelation coefficient of the time series r (t) with its lagged values, r_t represents the return on an index at time t, and K is the lag length where $k = 1, 2, 3, 4$ and 5 days.

changing direction very frequently. By contrast, if the number of runs is lower than expected, this indicates that there may be a trend in the index price series[3].

Moving Average Strategies

This study examines the profitability of moving average strategies and compares trading rule profits to those of a buy-and-hold strategy. Specifically, these tests explore whether different moving average rules outperform a buy-and-hold strategy. If any moving average strategy based on historical data produces excess returns relative to the naive buy-and-hold strategy, then the weak form of the EMH is rejected, and the market is inefficient. However, the weak form of the EMH is accepted if the moving average strategy returns are not significantly different from the buy-and-hold strategy returns (Fifield *et al.*, 2005).

The weak form of the EMH was examined for KSE using 10 moving average rules. Accordingly, buy and sell signals were generated after comparing the index's short-run moving average to its long-run moving average. This study adopted the Variable Length Moving Average (VMA) rule utilized by Brock *et al.*, (1992):

> "[it] initiates buy (sell) signals when the short moving average is above (below) the long moving average by an amount larger than a band [width]. If the short moving average is inside the band [width], no signal is generated." (Brock *et al.*, 1992, pp. 1735-6)

A bandwidth is applied to avoid frequent trading when the short-run moving average is higher or lower than its long-run moving average counterpart by only a small amount. Fifield *et al* (2008) argue that the purpose of bandwidth is:

(3) The actual runs (A) are then counted and matched to the expected number of runs (E) under the assumption of independence as in the formula (3):

$$E = \frac{[N(N+1)-\sum_{i=1}^{3} n_i^2]}{N} \qquad (3)$$

where N is the total number of return observations, and n_i is the sum of the price change for each sign. For a large number of observations ($N > 30$), E approximately corresponds to a normal distribution with a standard error (σ_E) of runs as identified in formula (4):

$$\sigma_E = \left[\frac{\sum_{i=1}^{3} n_i^2[\sum_{i=1}^{3} n_i^2 + N(N+1)] - 2N(\sum_{i=1}^{3} n_i^3 - N^3)}{N^2(N-1)}\right]^{\frac{1}{2}} \qquad (4)$$

The Z-statistic $\left(Z = \frac{(A-E)}{\sigma_E}\right)$ tests the null hypothesis, which states that the number of actual runs is equal to that which would be expected in a random series. A positive (negative) Z value is obtained when the actual number of runs exceeds (falls below) the expected number of runs. A positive (negative) Z value indicates negative (positive) serial correlation in the return series.

> "To avoid 'whiplash' signals, which may occur if the short-run and long-run moving averages are close to each other (Brock*et al.*, 1992). The bandwidth also lowers the incidence of trading and reduces transaction costs to some extent." (p1521)

Shares are purchased when a buy signal is detected and held until a sell signal appears. Several VMA rules are used to examine the performance of moving average rules; three short-run periods (1, 2 and 5 days), three long-run periods (50, 150 and 200 days) and two bandwidths (0.0 and 0.01) were selected following similar investigations in different countries (Bessembinder and Chan, 1998; Hudson *et al.*, 1996; Brock *et al* 1992). For example, a moving average rule (1, 150, 0.01) is applied with a short-run period of 1 day, a long-run period of 150 days, and a 1.0% bandwidth. The profitability of these moving average strategies is then compared to the returns of a buy-and-hold strategy to test whether excess returns are achieved.

In applying the moving average rules, we use the assumptions of Fifield*et al.* (2008, 2005). First, we assume that an investor begins with a buy position. After observing a buy signal, the investor holds the index until a sell signal is generated. Following the sell signal, the investor sells the index and stays out of the market until a subsequent buy signal emerges. This pattern is repeated for the entire analysis period. The returns are calculated for all buy-sell transactions and compared with the returns obtained from a corresponding buy-and-hold strategy in which the investor buys the index on the first day and holds it until the last day of the period when the same investor sells the index. The returns calculated from both the moving average rules and the buy-and-hold strategy include transaction costs of 0.125%. These assumptions make the trades realistic and avoid a common criticism in the literature regarding the consequences of ignoring transaction costs (Huang, 1995; Sweeney, 1988).

Second, we assume that each investor has a limited amount of cash and invests all his/her money in each buy transaction. No borrowing is allowed for either the purchase or the sale of securities. Third, profits are not reinvested. Fourth, no short selling is allowed, as this is not permitted in KSE. Moreover, multiple buys (sells) are not permitted; the purchase of the index must be followed by a sale before any other purchase can be made[(4)]. Finally, any interest earned while an investor is out of

(4) Some studies of trading rules (e.g., Gunasekarage and Power, 2001) permit one buy transaction to follow another, assuming that the investor can borrow unlimited funds to leverage any existing long position. However, this method was not adopted in the current work.

the market is not considered in this analysis[5]. These assumptions make the study more realistic and bias the results against evidence of moving average rule profitability.

Empirical Results

The results of the autocorrelations are presented in Table 2. A visual inspection of this table shows that the autocorrelation coefficients for KSE returns over the whole period and in the three sub-periods are generally small. However, when the first lag is considered,the autocorrelation coefficients for KSE index's returns are statistically significant with relatively large values, particularly for the entire series and the earliest sub-periods (0.218, 0.183 and 0.356). For Sub-2, the autocorrelation coefficients are significant with relatively large values for lags 1, 2, 3 and 5; the findings indicate evidence of serial dependence in KSE returns during the financial crisis. The findings provide some evidence for rejecting the null hypothesis, which posits that past returns can help predict current index price changes.

Table 3 presents the results of runs tests. Unlike the autocorrelation findings, this test does not require the data to be normally distributed. The table shows that the Z-value for KSE index's returns for the entire series is -9.552 ($p = 0.00$); for the sub-periods, the Z-values are smaller but still significant at the 5% level (± 1.96). The Z-values are negative for the whole period as well as in the sub-periods, indicating that there are fewer runs than expected; the findings suggest that trends may be present in the price changes of KSE index.

Table 3
Results of the Runs Test

Sample	Sample Size	Cases < 0	Cases ⩾ 0	Expected No. of Runs	Actual No. of Runs	Z-Statistic
Full Study Period	3816	1798	2018	1902.66	1622	-9.552*
Sub-1	1950	937	1013	974.519	799	-7.747*
Sub-2	385	159	226	187.670	134	-4.235*
Sub-3	1479	688	791	736.913	649	-4.656*

This table shows the results of the runs test using daily returns of the Kuwait Stock Exchange Official Index for the full study period and the sub-periods. The column entitled Cases < 0 is the number of negative values for the return series over that period, while the column entitled ≥ 0 indicates the number of positive or zero values for the return series. The table also illustrates the expected number of runs and the actual number of runs that are present in the data. The Z-statistic tests the null hypothesis, which states that the number of actual runs is equal to that which would be expected in a random series. Numbers marked with * are significant at the 5 percent level.

(5) It assumes that no investment is made, such as investing at the risk-free interest rate when the investor is out of the market. However, the inclusion of investment at the risk-free rate would not fundamentally affect the results shown in Table 4.

Panel A of Table 4 compares the performance of the 10 moving average rules to that of the buy-and-hold strategy for the full series. The analysis reveals that the buy-and-hold strategy achieved substantial returns of 332.74%, suggesting that the market value rose over the 15-year study period. A visual inspection of Panel A in Table 4 shows that the average number of trades ranged from a high of 140 for the (1, 50, 0.0) rule to a low of 26 for the (2, 200, 1.0) rule. Moreover, introducing the bandwidth decreased the number of trades significantly. For instance, with the (1, 50, 0.0) strategy, a bandwidth of 1.0% reduced the number of trades from 140 to 60

The results suggest that eight of the ten moving average rules examined are profitable. However, a comparison of the performances with the buy-and-hold strategy suggests that only four of the ten rules are profitable and outperform the passive alternative. On average, the buy-and-hold strategy achieves profits of 332.74%.This return exceeds the mean gain recorded for the moving average rules overall (247.65%). In fact, the moving average strategy underperforms the buy-and-hold approach by 85.08%. Therefore, investors who follow this technical strategy throughout the study period do not generate sizeable profits, while the naive strategy achieves returns of 332.74%. Overall, the best moving average rule (1, 150,0.0) achieves profits of 479.03%, while the worst moving average strategy (2, 200, 1.0) generates returns of -11.17%.

Table 4
Moving Average Rule Results, Including Sub-periods

Panel A: Full Study Period											
Rule	(1 50 0.0)	(1 50 1.0)	(1 150 0.0)	(1 150 1.0)	(1 200 0.0)	(1 200 1.0)	(2 200 0.0)	(2 200 1.0)	(5 150 0.0)	(5 150 1.0)	AVG
No. Trades	140	60	72	34	52	28	48	26	48	30	53.8
B & H Profits (in %)	332.74										332.74
Rule Profits (in %)	320.11	294.65	479.03	457.27	477.11	453.6	-3.26	-11.17	2.33	6.8	247.65
Diff (in %)	-12.63	-38.09	146.29	124.53	144.37	120.86	-336	-343.91	-330.41	-325.89	-85.08
Panel B: Non-overlapping Sub-periods											
	Sub-1				Sub-2				Sub-3		
	All Rules	Short-1	Short- 2	Short-5	All Rules	Short-1	Short- 2	Short-5	All Rules	Short-1	Short- 2	Short-5
Sample Size	1950				385				1479			
AVG. No. Trades	25	28.6	19	20	2.5	2.5	N/A	N/A	23.6	27.4	16	17
B&H Profits (in %)	741.02				-34.10				-23.66			
AVG. Rule Profits (in %)	235.96	374.45	20.52	35.92	2.89	2.89	N/A	N/A	5.47	16.45	-11.47	-10.50
Diff (in %)	-505.06	-366.56	-720.5	-705.09	36.99	36.99	N/A	N/A	29.13	40.11	12.18	13.15

This table presents the findings for 10 moving average rules taking transaction costs into account. Specifically, it highlights the number of trades (No. Trades) produced by following each moving average rule. In addition, it shows, in percentage terms, the sum of the profits for each moving average rule and the profits from the buy-and-hold strategy; moreover, the difference between the rule and the buy-and-hold profits is presented in the table. AVG indicates the average of number of trades, rule profits and the difference between the rule and corresponding buy-and-hold profits. All profits from the moving average rules and the buy-and-hold strategy are reported net of the transaction costs of KSE. The results for the sub-periods are given in Panel B. N/A means that no trade is generated.

An analysis of these findings reveals that a short-run period of one day yields the most profitable rules; when the short-run period is increased to two or five days, however, the rules' performances deteriorate. Indeed, a short-run period rule of one day generates mean returns of 413.63%, while short-run periods of two and five days produce mean returns of -1.31%. This finding suggests that the profits from moving average rules on KSE decrease as the short-run period increases.

The introduction of a bandwidth seems to have different impact on the moving average strategies. For example, the introduction of a 1% bandwidth in the (1, 50, 1.0) strategy negatively impacts the rule's profitability. By contrast, the introduction of a 1% bandwidth in the (5, 150, 1.0) rule has a positive impact on the profitability of this specific strategy.

Panel B of Table 4 reports the findings of all rules for the non-overlapping sub-periods. An analysis of this panel shows that the buy-and-hold strategy for the earliest sub-period (Sub-1) achieves large returns of 741.02% across different time spans but losses are documented with the passive approach for the most recent sub-periods (Sub-2 and Sub-3). This result is presumably due to the global financial crisis,which affected the performance of KSE index.

For individual sub-periods, moving average rules for only the earliest sub-period (Sub-1) underper form; even though a large positive return of 235.96% was earned, on average, this level of performance was less than the buy-and-hold result. Moving average rules were profitable in Sub-2 and Sub-3 and outperformed the buy-and-hold approach by 36.99% and 29.13%, respectively.

A more detailed analysis of Panel B for all short-run periods suggests similar findings to those of Panel A. A short-run period of one day yields the most profitable strategies, and the rules' performances weaken when the short-run period increases to two or five days. Indeed, a short-run period of one day generates a mean return of 374.45% for Sub-1, while short-run periods of two and five days produce a mean return of 28.22%[6].

Conclusion

This study uses a number of statistical analyses and trading rules, including autocorrelation, runs test, and moving average rules to examine the behavior of

(6) The analysis also shows that no trade is generated from short-run rules of two and five days for Sub-2, which from the global financial crisis and its contribution to a sharp decline in KSE index.

returns of KSE price index in the wake of the new regulations with respect to the increase in accounting disclosure imposed on Kuwaiti listed companies and the development of market microstructures. It investigates daily data for a full series of KSE index and for sub-periods spanning the 15 years from 2000 to 2015. The analysis indicates that KSE neither displays a weak form market efficiency nor follows a random walk, as returns for KSE Price Index can be predicted, particularly for a short lag. Further, the findings suggest that the selection of moving average rules is extremely important for determining the overall profitability of the trading strategy.This finding is consistent with the substantial literature that suggests that emerging stock markets are generally inefficient (Almujamed *et al*, 2015; Fifield *et al*., 2008, 2005). In particular, Al-Shamali (1989) and Al-Loughani and Moosa (1999) suggest that KSE violates the weak form of the EMH.

Further, the current study suggests that recent developments, such as the increase in corporate disclosure, relaxed restrictions on foreign firms and investors, the introduction of the CMA, and the upgraded KSE trading system have not led to considerable efficiency improvement regarding KSE price index returns.

The current research proposes that the degree of inefficiency present in KSE may be explained by the characteristics of Kuwaiti stock market participants, including unsophisticated investors and unqualified analysts and stockbrokers. In addition, a lack of information and transparency, psychological biases and noise trade cause long-horizon returns to deviate from market efficiency (Lim and Brooks, 2011), might also play a role.

Market regulatory authorities should pay closer attention to increasing the level and quality of accounting disclosure, improving the transparency of KSE-listed companies and developing a policy for educating market participants (i.e., investors, analysts and stockbrokers) on investment decision making. The current research may indeed identify and fill the gap between actual practice and academic research with regard to the performance of trading strategies (such as moving average rules) in developing stock markets such as KSE.

The limitations of this effort include the common limitations of empirical investigations of large returns achieved by a buy-and-hold strategy for uptrend data and how trading rules, such as moving average, actually perform in the Kuwaiti stock market. Future research on KSE should examine different data and trading rules,and should employ an event study method to examine whether

regulatory changes in accounting disclosure have affected the efficiency of KSE. Future studies may even use more sophisticated statistical tests, such as variance ratio tests, spectral analyses orARCH tests.

References

Abraham, A., Seyyed, F. J. and Alsakran, S. A. 2002. Testing the Random Walk Behavior and Efficiency of the Gulf Stock Markets. *Financial Review*, 3: 469-480.

Aguiar, M. and Gopinath, G. 2007. Emerging Market Business Cycles: The Cycle is the Trend. *Journal of Political Economy*, 115(1): 69-102.

Alfraih, M., and Alanezi, F. 2015. The Value Relevance of Mandatory Corporate Disclosures: Evidence from Kuwait. *International Journal of Business and Finance Research,* 9(3): 1-18.

Alfraih, M., and Alanezi, F. 2012. The Effectiveness of the Joint Auditors Requirement in Promoting Corporate Disclosure Quality. *Arab Journal of Administrative Sciences* 19(2): 245-270.

Al-Khazali, O. M., Ding, D. K. and Pyun, C. S. 2007. A New Variance Ratio Test of Random Walk in Emerging Markets: A Revisit. *Financial Review*, 2: 303-317.

Al-Loughani, N. E. 1995. Random Walk in Thinly Traded Stock Markets: The Case of Kuwait. *Arab Journal of Administrative Sciences*, XXXIV: 25-47.

Al-Loughani, N. E. and Moosa I. 1999. Testing the Efficiency of an Emerging Stock Market Using Trading Rules: The Case of Kuwait. *Journal of the Gulf and Arabian Peninsula studies*, 95: 217-237.

Al Mutawaa, A. and Hewaidy, A, M. 2010. Disclosure Level and Compliance with IFRSs: An Empirical Investigation of Kuwaiti Companies. *International Business and Economics Research Journal,* 9(5): 30-50.

Almujamed, H., Fifield, S. and Power, D. 2013. An Investigation of the Role of Technical Analysis in Kuwait. *Qualitative Research in Financial Markets,* 5: 43-64.

Almujamed, H., Fifield, S. and Power, D. 2012. Share Valuation Methods and Data Sources based Accounting information Emerging Stock Market: The Case of the Kuwaiti Stock Market. *International Business and Economic Research*, 11(7): 713-730.

Almujamed, H., Mardini, G. and Salama, M. 2015. Market Efficiency of the Amman Stock Market: Evidence from the Examination of Trading Rules. *Studies in Business and Economics*, 18(1): 51-68.

Al-Shamali, M. 1989. *Weak Form Efficiency and Factors Leading to Market Efficiency in the Kuwait Stock Market*. Unpublished Ph.D thesis, Loughborough University, Loughborough.

Al-Shammari, B., Brown, P., and Tarca, A. L. 2008. An Investigation of Compliance with International Accounting Standards by Listed Companies in the Gulf Co-Operation Council Member States. *International Journal of Accounting*, 43(4): 425-447.

Al-Yaqout, A. 2006. *The Usefulness of Quarterly Financial Reports*. Unpublished Ph.D thesis, Loughborough University, Loughborough.

Ball, R. and Brown, Ph. 1968. An Empirical Evaluation of Accounting Income Numbers. *Journal of Accounting Research*, Autumn: 159-178.

Bessembinder, H and Chan, K. 1998. Market Efficiency and the Returns to Technical Analysis. *Financial Management*, 27(2): 5-17.

Blundell-Wignall, A., Atkinson, P. and Lee, S. H. 2008. *The Current Financial Crisis: Causes and Policy Issues*. Financial Market Trends - OECD.

Butler, K., and Malaikah, C.1992. Efficiency and Inefficiency in Thinly Traded Stock Markets: Kuwait and Saudi Arabia. *Journal of Banking and Finance*, 16(1): 197-210.

Brock, W., Lakonishok, J., and Lebaron, B. 1992. Simple Technical Trading Rules and the Stochastic Properties of Stock Returns. *Journal of Finance*, 47(5): 1731-1764.

Cootner, P. 1964.*The Random Character of Stock Market Prices*. Cambridge MA: MIT Press.

Cooper, J. 1982. World Stock Market: Some Random Walk Test. *Applied Economics*,14(5): 512-531.

El-Erian, M., and Kumar, M. 1995. Emerging Equity Markets in Middle Eastern Countries. *IMF Staff Paper*, 42(2): 313-43.

Elango, R. and Hussein, M. I. 2008. An Empirical Analysis on the Weak-Form Efficiency of the GCC Markets Applying Selected Statistical Tests. *International Review of Business Research Papers*, 4(1). available at SSRN: http://ssrn.com/abstract=1026569.

Fama, E. F. 1965. The Behavior of Stock-Market Prices. *Journal of Business*, 38(1): 34-105.

Fama, E. F. 1970. Efficient Capital Market: A Review of Theory and Empirical Work. *Journal of Finance*, 25(2): 383-417.

Fama, E. F., and Blume, M. E. 1966. Filter Rules and Stock-Market Trading. *Journal of Business*.39(1): 226-241.

Fifield, S., Power, D. and Sinclair, C. 2005. An Analysis of Trading Strategies in Eleven European Stock Markets. *European Journal of Finance*, 11(6): 531-548.

Fifield, S., Power, D. and Sinclair, C. 2008. The Performance of Moving Average Rules in Emerging Stock Markets. *Applied Financial Economics*, 18(19): 1515-1532.

Gandhi, D. K., Saunders, A. and Woodward, R. S. 1980. Thin Capital Markets: A Case Study of the Kuwaiti Sock Market. *Applied Economics*, 12(2): 341-349.

Gunasekarage, A. and Power, D. 2001. The Profitability of Moving Average Trading Rules in South Asian Stock Markets. *Emerging Markets Review*, 2(1): 17-33.

Gore, C. 2010. The Global Recession of 2009 in a Long-term Development Perspective. <http://ideas.repec.org/a/wly/jintdv/v22y2010i6p714-738.html> Journal of International Development, 22(6): 714-738.

Hassan, K. M., Al-Sultan, W. S. and Al-Saleem, J. A. 2003. Stock Market Efficiency in the Gulf Cooperation Council Countries (GCC): The Case of Kuwait Stock Exchange. *Scientific Journal of Administrative Development*, 1(1): 1-21.

Huang,Y. S. 1995. The Trading Performance of Filter Rules on the Taiwan Stock Exchange. *Applied Financial Economics*, 5(6): 391-395.

Hudson, R., Dempsey, M., and Keasey, K. 1996. A Note on The Weak Form Efficiency of Capital Markets; The Application of Simple Technical Trading Rules to UK Stock Prices - 1935 to 1994. *Journal of Banking and Finance*, 20(6): 1121-1132.

Kendall, M. 1953. The Analysis of Economic Time-Series-Part I: Prices. *Journal of the Royal Statistical Society, Series A (General)*, 16(1): 11-34.

KSE. 2015. Several Bulletins from Kuwait Stock Exchange. Available: <http://kuwaitse.com/PORTAL/A/KSE/Broker.aspx>, 11.8.2015.

Lesmond, D. A. 2005. Liquidity of Emerging Markets. *Journal of Financial Economics*, 77(2): 411-452.

Lim, K. P. and Brooks, R. D. 2011. The Evolution of Stock Market Efficiency over Time: A Survey of the Empirical Literature. *Journal of Economic Surveys,* 25(1): 69-108.

Smith, G. 2007. Random Walks in Middle Eastern Stock Markets. *Applied Financial Economics*, 17(7): 587 - 596.

Sweeney, R. J. 1988. Some New Filter Tests: Methods and Results. *Journal of Financial and Quantitative Analysis*, 23: 20-26.

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