Abstract
Efficient market hypothesis (EMH) states that financial markets are "informationally efficient", implying that current prices fully reflect all available information. The present study aims at testing the weak form of market efficiency of the individual stocks listed on the Bahrain Bourse for the period 2011 to 2015. Weak form of EMH is tested using the Kolmogorov-Smirnov goodness of fit test, run test and autocorrelation test. The K-S test result concludes that in general the stock price movement does not follow random walk. The results of the runs test reveals that share prices of seven companies do not follow random walk. Autocorrelation tests reveal that share prices exhibit low to moderate correlation varying from negative to positive values. As the study shows mixed results, it is difficult to conclude the weak form of efficiency of Bahrain Bourse.

Keywords random walk, efficient market hypothesis, run test, autocorrelation test

JEL Classification G100, G140

INTRODUCTION
Efficient market hypothesis (EMH) states that financial markets are “informationally efficient”, implying that current prices fully reflect all available information. According to Fama (1970), there are three forms of EMH. They are: “weak”, “semi-strong” and “strong”. Weak form states that prices already reflect all past publicly available information. Semi-strong EMH states that price changes reflect past information, as well as reflect new public information. Strong EMH claims that prices instantly reflect even hidden or “insider” information.

The present study tests the weak form of EMH of the individual stocks listed on the Bahrain Bourse for the period 2011 to 2015. Bahrain Stock Exchange established in 1987, officially began operations in 1989, with 29 listed companies and a manual trading system. However, in 2010, Bahrain Bourse (BHB) was established as a shareholding company to replace Bahrain Stock Exchange. The market capitalization of the Bourse at the end of 2015 was BD 7, 199, 907, 825 with 46 listed companies. The Bahrain All-Share Index lists shares under six sectoral indices: commercial banks, investment, insurance, services, industrial and hotels and tourism.
1. LITERATURE REVIEW

A study into the literature reveals large number of publications having examined the existence of the EMH theory in various developed and underdeveloped markets with varying results (Ananzeh, 2014). Iqbal and Mallikarjunappa (2008, 2010, 2011) studied on Indian Stock Market and found that Indian Stock Market is not efficient in weak and semi-strong form.

Awan and Subayyal (2016) studied six stock exchanges in Gulf region (Oman, UAE, Kuwait, Saudi Arabia, Bahrain and Qatar) for the period 2011 to 2015. The results provide evidence that the stock prices at the Gulf markets do not follow the random walk model. Asiri (2008) measured the performance of the Bahrain Stock Exchange (BSE) by applying the Dickey Fuller unit root tests, the ARIMA model, and exponential smoothing techniques.

Dahel and Laabas (1999) compared the stock markets of Bahrain, Kuwait, Saudi Arabia and Oman. Rao and Shankaraiah (2003) investigated the stock market efficiency and suggested strategies for Gulf Co-operation Council (GCC) stock markets. They concluded that these markets were neither developed nor informationally efficient and recommended that there must be better networking between these markets.

Sharma (2005) tested the daily returns series of Gulf Co-operation Council (GCC) stock markets and reported that the returns follow a normal distribution.

Elango and Hussein (2007) examined market efficiency across the stock markets in the GCC countries using daily indices data from October 2001 to October 2006. Kolmogorov-Smirnov test has been applied for analysis and the study rejects the null hypothesis that the returns follow a normal distribution for all seven markets. Run test has been used for randomness. It is concluded that the market is not efficient in its weak form.

Very few studies (Solnik, 1973; Ang & Pohlman, 1978; Buttler & Malaikah, 1992; Rao & Shankaraiah, 2003; Moustafa, 2004) have tested the efficiency of individual stocks. Using serial correlation test, Solnik (1973) investigated market efficiency for 234 securities in eight major European stock markets using daily prices.

Ang and Pohlman (1978) examined 54 stocks of five stock exchanges of Japan, Singapore, Australia, Hong Kong and the Philippines and concluded that the markets are slightly efficient in the weakest form.

2. RESEARCH GAP

There have been very few studies (Gharaibeh & Hammadi, 2013; Hawaldar, 2015; Hawaldar, 2016a; Hawaldar, 2016b; Hawaldar, Shakila, & Pinto, 2017) on Bahrain Bourse. This has led the researchers to undertake the present study and contribute to the existing literature on weak form of market efficiency of Bahrain Bourse. The study tests the weak form efficiency of the EMH for individual securities listed on the Bahrain Bourse using run test, Kolmogorov-Smirnov test and autocorrelation test.

3. OBJECTIVES OF THE STUDY

Based on the review of literature, the following objectives are set and hypotheses are developed to fill the research gap in Bahrain Bourse.

1. To test the weak form efficiency of individual stocks listed on Bahrain Bourse.
2. To examine the randomness of individual stock prices.
3. To test the independence of individual stock price changes.
Hypotheses

H01: The individual stock prices follow a random walk.

Ha1: The individual stock prices do not follow a random walk.

H02: The individual stock prices are efficient in weak form of efficient market hypothesis.

Ha2: The individual stock prices are not efficient in weak form of efficient market hypothesis.

H03: The price changes in individual stocks are independent.

Ha3: The price changes in individual stocks are not independent.

4. METHODOLOGY

The present study uses daily prices of the companies listed in the Bahrain All Share Index. The period of study is from 2011 to 2015. The sample consists of 43 companies listed on the Bahrain Bourse for which data are available.

The stock returns are defined as follows:

\[ R_t = \frac{\log p_t}{\log p_{t-1}}, \]

where \( R_t \) is the return at time \( t \), \( \log p_t \) is the logarithmic price at time \( t \) and \( \log p_{t-1} \) is the logarithmic at time \( t - 1 \).

The study analyzes and tests the weak form of efficiency for the individual stock movements. Weak form of EMH is tested using the run test, Kolmogrov-Smirnov goodness of fit test and autocorrelation test.

Run test: run test is a nonparametric test. It is a statistical procedure that examines whether a string of data is occurring randomly given a specific distribution (Pandey, 2003; Elango & Hussein, 2007; Omar et al., 2013). The run test analyzes the occurrence of similar events that are separated by events that are different. The mean and variance is calculated as follows:

\[ \mu = \frac{2n_1 \cdot n_2}{n_1 + n_2} + 1. \]  
\[ \sigma^2 = \frac{2n_1 \cdot n_2 \cdot (2n_1 \cdot n_2 - n_1 - n_2)}{(n_1 + n_2)^2 \cdot (n_1 + n_2 - 1)}. \]

The standard normal Z-statistic used to conduct a run test is given by:

\[ Z = \frac{\text{Observed} - \text{Expected}}{\text{Variance}}. \]

Kolmogrov-Smirnov goodness of fit test (K-S test): the K-S test is a nonparametric test and is used to determine how well a random sample of data fits a particular distribution (Mobareket et al., 2008; Salam, 2013).

\[ \max_x |F(x) - S_n(x)| \leq D_{n,a}. \]

Autocorrelation: Autocorrelation is defined as a mathematical representation of the degree of similarity between a given time series and a lagged version of itself over successive time intervals (Hamid et al., 2010). A higher value of autocorrelation indicates greater correlation in values. Fama (1970) proposes that by using a less restrictive condition of submartingale sequence, low serial correlation may persist in an efficient market.

\[ LB = n \cdot (n + 2) \sum_{k=1}^{m} \frac{2^k}{n - k} \sim \chi^2, \]

where \( P^k \) – auto-correlation coefficients at \( lag_k \), \( n \) – sample size.

Descriptive statistics of the returns of the listed companies on the Bahrain Stock Exchange is presented in Table 1. Delmon Poultry Co. (POLTRY) records the highest mean returns of 1.528%. The returns of companies that have thin trades are GLOBAL, INVCORP, TAKAFUL, UFC and UPI. Bahrain Telecommunication Co. (BATELCO) having the highest number of trading days has a mean return of –0.057% with standard deviation of 1.272%. The Bahrain All Share Index records a mean return of –0.013% and standard deviation of 0.455%. The results for GLOBAL, TAKAFUL and UPI are not arrived at due to lack of data.
| Company     | N    | Mean (%) | Std. deviation (%) | Minimum (%) | Maximum (%) |
|-------------|------|----------|-------------------|-------------|-------------|
| ABC         | 182  | 0.023    | 3.949             | −10.54      | 9.53        |
| AHLIA       | 79   | −0.646   | 4.717             | −29.95      | 9.19        |
| ALBH        | 808  | −0.071   | 1.840             | −10.44      | 9.49        |
| ARIG        | 220  | −0.030   | 3.652             | −10.54      | 9.53        |
| AUB         | 956  | 0.063    | 1.937             | −10.54      | 9.29        |
| BANADER     | 70   | −0.212   | 3.433             | −10.38      | 15.63       |
| BARKA       | 473  | −0.161   | 2.634             | −14.95      | 9.53        |
| BASREC      | 59   | 0.280    | 4.983             | −10.29      | 9.53        |
| BATELCO     | 1014 | −0.057   | 1.272             | −12.61      | 6.9         |
| BBK         | 551  | 0.027    | 1.452             | −9.53       | 6.12        |
| BCFCC       | 268  | 0.192    | 2.403             | −9.96       | 8.96        |
| BFN         | 48   | −0.112   | 3.197             | −9.98       | 9.53        |
| BHOTEL      | 117  | 0.222    | 3.857             | −13.44      | 9.53        |
| BISB        | 396  | −0.068   | 2.942             | −10.54      | 9.53        |
| BKIC        | 69   | 0.138    | 3.981             | −10.44      | 9.53        |
| BMB         | 25   | −3.423   | 8.619             | −21.94      | 9.53        |
| BMNI        | 326  | 0.072    | 2.204             | −19.53      | 8.91        |
| BHN         | 100  | −0.062   | 5.412             | −10.82      | 9.33        |
| BTC         | 121  | −0.304   | 3.392             | −10.38      | 9.19        |
| CINEMA      | 79   | 0.885    | 4.354             | −18.19      | 9.53        |
| CPARK       | 66   | 0.073    | 5.531             | −10.54      | 9.53        |
| DUTYF       | 387  | 0.021    | 2.708             | −34.79      | 9.35        |
| ESTERAD     | 359  | −0.103   | 3.048             | −10.54      | 9.53        |
| FAMILY      | 34   | 0.025    | 4.217             | −10.05      | 8.34        |
| GFH         | 474  | −0.085   | 8.031             | −42.2       | 136.61      |
| GLOBAL      | 0    | 0        | 0                 | 0           | 0           |
| INOVEST     | 195  | −0.546   | 5.914             | −50.46      | 21.87       |
| INVNCORP    | 6    | −0.125   | 12.730            | −35.67      | −0.02       |
| ITHMR       | 842  | −0.043   | 3.538             | −14.66      | 12.26       |
| KHCB        | 753  | −0.146   | 2.336             | −9.68       | 9.53        |
| NASS        | 873  | −0.045   | 1.828             | −10.46      | 9.47        |
| NBB          | 631 | 0.063    | 2.051             | −10.18      | 9.53        |
| NHOTEL      | 32   | −1.232   | 3.911             | −11.44      | 9.07        |
| POLTRY      | 26   | 1.528    | 4.290             | −10.54      | 9.37        |
| SALAM       | 988  | 0.034    | 2.798             | −10.54      | 12.52       |
| SEEF        | 672  | 0.039    | 1.402             | −7.11       | 9.53        |
| TAKAFUL     | 1    | −69.31   | 0                 | −69.31      | −69.31      |
| TRAFCO      | 122  | −0.197   | 2.696             | −9.76       | 9.38        |
| UFC         | 2    | 3.9      | 5.515             | 0           | 7.8         |
| UGB         | 129  | −0.020   | 4.828             | −10.82      | 9.53        |
| UGIC        | 118  | 0.019    | 4.922             | −15.86      | 9.53        |
| UPI         | 5    | 0        | 0                 | 0           | 0           |
| ZAINABH     | 31   | −0.032   | 0.602             | −1.01       | 1.98        |
| Bahrain Index| 1231| −0.013   | 0.455             | −2.84       | 1.6         |
### Table 2. Results of K-S test

| Company     | Z-value | p-value | Company     | Z-value | p-value |
|-------------|---------|---------|-------------|---------|---------|
| ABC         | 3.377   | 0.000*  | CPARK       | 2.173   | 0.000*  |
| AHLIA       | 2.609   | 0.000*  | DUTYF       | 5.504   | 0.000*  |
| ALBH        | 7.087   | 0.000*  | ESTERAD     | 5.402   | 0.000*  |
| ARIG        | 4.230   | 0.000*  | FAMILY      | 1.701   | 0.006*  |
| AUB         | 6.487   | 0.000*  | GHF         | 6.108   | 0.000*  |
| BANADER     | 3.379   | 0.000*  | INOVEST     | 3.701   | 0.000*  |
| BARKA       | 5.468   | 0.000*  | INVCORP     | 0.456   | 0.985   |
| BASREC      | 2.060   | 0.000*  | ITHMR       | 7.751   | 0.000*  |
| BATELCO     | 7.342   | 0.000*  | KHCB        | 8.222   | 0.000*  |
| BBK         | 6.064   | 0.000*  | NASS        | 7.215   | 0.000*  |
| BCFC        | 4.303   | 0.000*  | NBB         | 5.226   | 0.000*  |
| BFM         | 2.840   | 0.000*  | NHOTEL      | 2.467   | 0.000*  |
| BHOTEL      | 1.774   | 0.004*  | POLTRY      | 1.447   | 0.030*  |
| BISB        | 4.992   | 0.000*  | SALAM       | 6.996   | 0.000*  |
| BKIC        | 2.703   | 0.000*  | SEEF        | 7.578   | 0.000*  |
| BMB         | 0.872   | 0.433   | TRAFCO      | 3.401   | 0.000*  |
| BMMI        | 4.192   | 0.000*  | UFC         | 0.368   | 0.999   |
| BHOTEL      | 0.846   | 0.471   | UGB         | 2.440   | 0.000*  |
| BTC         | 2.894   | 0.000*  | UGIC        | 2.653   | 0.000*  |
| CINEMA      | 2.378   | 0.000*  | ZAINABH     | 2.124   | 0.000*  |

*Source: authors’ calculations.*

**Note:** *significant at 0.05 level.

Table 2 presents the results of Kolmogorov-Smirnov goodness of fit test (K-S test). It provides evidence whether or not the distribution conforms to a normal distribution. Results for 40 out of 43 companies are available. The K-S test result shows 0.000 significance at 0.05 level for 36 out of 43 stocks. This indicates that the frequency distribution of the daily prices of the shares does not fit normal distribution, thereby rejecting the null hypothesis and concluding that the share price movements do not follow random walk model according to the K-S tests (refer to Ha1). The results for GLOBAL, TAKAFUL and UPI are not arrived at due to lack of data.

Table 3 presents the results of the run test for the companies listed in the Bahrain Stock Exchange. The p-values for Arab Banking Corporation (ABC), Aluminum Bahrain B.S.C (ALBH), Al Baraka Banking Group (BARKA), GFH Financial Group (GFH), INOVEST, National Bank of Bahrain (NBB) and Al Salam Bank – Bahrain B.S.C (SALAM) is less than 0.05 and hence reject the null hypothesis. It can be concluded that share prices of these companies do not follow random walk (refer to Ha2). The results for GLOBAL, TAKAFUL and UPI are not arrived at due to lack of data.

From Table 4, it can be observed that results are obtained for 39 of 43 companies. The share prices exhibit low to moderate correlation. The results for the individual companies are mixed, varying from negative to positive values. Ahli United
Table 3. Results of run test

| Company  | Test value | Cases < Test value | Cases ≥ Test value | Total cases | Number of runs | Z-value | p-value |
|----------|------------|--------------------|--------------------|-------------|---------------|---------|---------|
| ABC      | 0.0239     | 135                | 47                 | 182         | 60            | -2.084  | 0.037*  |
| AHLIA    | -0.6468    | 19                 | 60                 | 79          | 31            | 0.3548  | 0.723   |
| ALBH     | -0.0710    | 215                | 593                | 808         | 340           | 2.1114  | 0.035*  |
| ARIG     | -0.0305    | 48                 | 172                | 220         | 70            | -1.202  | 0.229   |
| AUB      | 0.0631     | 660                | 296                | 956         | 404           | -0.432  | 0.666   |
| BANADER  | -0.2128    | 9                  | 61                 | 70          | 15            | -0.923  | 0.356   |
| BARKA    | -0.1618    | 131                | 342                | 473         | 208           | 2.0195  | 0.043*  |
| BASREC   | 0.2800     | 44                 | 15                 | 59          | 21            | -0.826  | 0.409   |
| BATELCO  | -0.0572    | 300                | 714                | 1014        | 423           | -0.037  | 0.971   |
| BBK      | 0.0274     | 380                | 171                | 551         | 229           | -0.783  | 0.433   |
| BCFC     | 0.1923     | 177                | 91                 | 268         | 122           | 0.109   | 0.913   |
| BFM      | -0.1125    | 5                  | 43                 | 48          | 11            | 0.4398  | 0.66    |
| BHOTEL   | 0.2222     | 75                 | 42                 | 117         | 59            | 0.8387  | 0.402   |
| BISB     | -0.0682    | 109                | 287                | 396         | 171           | 1.5149  | 0.13    |
| BKIC     | 0.1381     | 56                 | 13                 | 69          | 21            | -0.441  | 0.659   |
| BMB      | -3.4236    | 11                 | 14                 | 25          | 9             | -1.585  | 0.113   |
| BMMI     | 0.0729     | 228                | 98                 | 326         | 134           | -0.539  | 0.59    |
| BHN      | -0.0626    | 42                 | 58                 | 100         | 51            | 0.2641  | 0.792   |
| BTC      | -0.3049    | 33                 | 88                 | 121         | 49            | 0       | 1       |
| CINEMA   | 0.8856     | 52                 | 27                 | 79          | 33            | -0.893  | 0.372   |
| CPARK    | 0.0736     | 44                 | 22                 | 66          | 32            | 0.4661  | 0.641   |
| DUTYF    | 0.0215     | 262                | 125                | 387         | 159           | -1.31   | 0.19    |
| ESTERAD  | -0.1034    | 82                 | 277                | 359         | 125           | -0.381  | 0.703   |
| FAMILY   | 0.0252     | 24                 | 10                 | 34          | 15            | 0       | 1       |
| GHF      | -0.0855    | 117                | 357                | 474         | 159           | -2.257  | 0.024*  |
| INOVEST  | -0.5467    | 53                 | 142                | 195         | 65            | -2.396  | 0.017*  |
| INVCORP  | -18.125    | 2                  | 4                  | 6           | 4             | 0       | 1       |
| ITHMR    | -0.0431    | 205                | 637                | 842         | 329           | 1.6689  | 0.095   |
| KHCB     | -0.1469    | 173                | 580                | 753         | 277           | 0.9786  | 0.328   |
| NASS     | -0.0455    | 232                | 641                | 873         | 345           | 0.2872  | 0.774   |
| NBB      | 0.0633     | 439                | 192                | 631         | 295           | 2.5267  | 0.012*  |
| NHOTEL   | -1.2125    | 6                  | 26                 | 32          | 11            | 0       | 1       |
| POLTRY   | 1.5288     | 17                 | 9                  | 26          | 9             | -1.452  | 0.147   |
| SALAM    | 0.0347     | 709                | 279                | 988         | 365           | -2.862  | 0.004*  |
| SEEF     | 0.0394     | 514                | 158                | 672         | 230           | -1.364  | 0.173   |
| TRAFCO   | -0.1975    | 27                 | 95                 | 122         | 41            | -0.543  | 0.587   |
| UFC      | 3.900      | 1                  | 1                  | 2           | 2             | 0       | 1       |
| UGB      | -0.0200    | 37                 | 92                 | 129         | 53            | -0.168  | 0.867   |
| UGIC     | 0.0194     | 80                 | 38                 | 118         | 45            | -1.595  | 0.111   |
| UPI      | 0          | 0                  | 5                  | 5           | 1             | 0       | 1       |
| ZAINABH  | -0.0329    | 5                  | 26                 | 31          | 9             | 0       | 1       |

Note: *significant at 0.05 level.
Table 4. Results of autocorrelation of individual stocks

| Lag Company | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| ABC         | 0.104 | 0.063 | 0.079 | -0.016 | -0.051 | 0.001 | 0.008 | -0.032 | 0.044 | 0.014 | 0.069 | -0.023 | 0.027 | 0.050 | 0.006 | -0.010 |
| AHLIA       | -0.072 | -0.209 | -0.053 | -0.169 | 0.018 | 0.139 | -0.030 | -0.075 | 0.010 | 0.036 | -0.126 | 0.081 | 0.019 | -0.005 | 0.143 | -0.070 |
| ALBH        | -0.055 | 0.051 | 0.105* | 0.055* | 0.059* | 0.018* | 0.124* | 0.099* | 0.028* | 0.064* | 0.013* | 0.062* | -0.039* | 0.008* | 0.001* | -0.042* |
| ARIG        | 0.018 | -0.113 | -0.042 | -0.093 | 0.047 | -0.072 | -0.048 | 0.108 | -0.041 | 0.091 | 0.003 | -0.034 | 0.014 | 0.001 | -0.011 | -0.057 |
| AUB         | -0.064* | -0.125* | -0.020* | -0.033* | 0.060* | 0.035* | -0.014* | -0.040* | -0.009* | 0.032* | 0.029* | 0.005* | -0.032* | -0.035* | -0.018* | 0.070* |
| BANADER     | 0.142 | -0.216 | 0.109 | 0.120 | -0.083 | -0.002 | -0.053 | -0.125 | 0.092 | 0.079 | -0.001 | 0.070 | 0.122 | -0.004 | -0.092 | -0.021 |
| BARKA       | -0.102* | -0.075* | -0.051* | -0.065* | 0.019 | -0.012 | 0.036 | -0.064 | -0.039 | 0.013 | -0.114* | 0.080* | 0.004* | -0.039* | -0.056* | 0.032* |
| BASREC      | -0.075 | 0.049 | -0.036 | 0.119 | -0.057 | -0.046 | -0.208 | -0.099 | -0.055 | -0.027 | 0.117 | 0.073 | -0.109 | 0.051 | 0.111 | 0.007 |
| BATELCO     | -0.041 | -0.011 | 0.061 | -0.006 | 0.017 | 0.042 | -0.008 | -0.028 | 0.009 | -0.054 | 0.009 | -0.055 | -0.048 | 0.052 | 0.047 | -0.086* |
| BBK         | -0.146* | -0.108* | 0.003* | 0.028* | -0.029* | -0.034* | 0.036* | 0.034* | -0.027* | -0.023* | 0.002* | -0.022* | -0.020* | -0.004 | 0.029 | -0.098* |
| BCFC        | -0.145* | -0.076* | -0.109* | 0.129* | -0.008* | 0.008* | -0.021* | 0.027 | 0.002 | -0.066 | 0.095 | -0.162* | 0.132* | -0.019* | 0.106* | -0.035* |
| BFM         | -0.314* | 0.085* | -0.002 | -0.141 | 0.242 | -0.068 | 0.163 | -0.145 | 0.117 | 0.066 | -0.003 | -0.004 | 0.056 | 0.026 | -0.063 | 0.004 |
| BHOSTEL     | -0.094 | 0.077 | 0.106 | -0.142 | -0.044 | 0.065 | 0.095 | -0.124 | 0.150 | -0.073 | -0.056 | 0.002 | 0.018 | -0.112 | -0.023 | -0.030 |
| BISO        | 0.009 | 0.001 | 0.055 | 0.036 | 0.093 | -0.049 | 0.005 | -0.019 | -0.002 | 0.018 | -0.098 | -0.016 | 0.036 | -0.027 | 0.012 | -0.018 |
| BKIC        | 0.117 | -0.053 | 0.063 | 0.051 | 0.043 | -0.069 | -0.050 | -0.175 | -0.145 | 0.077 | 0.031 | -0.010 | 0.036 | 0.050 | 0.209 | -0.069 |
| BMB         | 0.132 | -0.234 | -0.484* | -0.159* | -0.252 | 0.338* | 0.099* | -0.074 | -0.044 | -0.097 | -0.136 | 0.025 | 0.184 | 0.078 | 0.038 | 0.009 |
| BMII        | 0.032 | -0.034 | -0.017 | 0.021 | 0.078 | 0.025 | -0.075 | -0.038 | 0.010 | -0.040 | 0.048 | 0.001 | -0.031 | 0.010 | 0.007 | -0.007 |
| BHN         | -0.131 | -0.076 | -0.074 | 0.085 | 0.019 | -0.017 | -0.025 | -0.036 | 0.046 | -0.145 | 0.015 | -0.068 | -0.056 | 0.098 | -0.062 | -0.054 |
| BTC         | 0.070 | 0.007 | -0.010 | 0.093 | -0.075 | -0.186 | -0.021 | -0.070 | -0.007 | -0.064 | -0.018 | -0.144 | -0.084 | -0.052 | 0.137 | -0.077 |
| CINEMA      | -0.031 | -0.016 | 0.094 | -0.010 | 0.049 | -0.070 | -0.100 | -0.223 | 0.040 | -0.143 | -0.035 | -0.143 | 0.075 | 0.000 | 0.042 | 0.148 |

Source: authors’ calculations.
Table 4 (cont). Results of autocorrelation of individual stocks

| Lag Company | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   |
|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| CPARK       | 0.009| -0.084| 0.186| -0.091| 0.031| 0.187| -0.181| -0.163| -0.004| -0.003| -0.167| 0.097| -0.089| -0.169| 0.089| 0.019|
| DUTYF      | -0.173*| 0.074*| 0.019*| -0.002*| -0.007*| 0.084*| 0.003*| -0.008*| -0.002| -0.002| -0.045| 0.023| 0.017| -0.016| -0.070| -0.020|
| ESTERAD    | -0.012| 0.067| 0.125| 0.089*| 0.146*| 0.011*| 0.009*| 0.071*| -0.024*| 0.044*| 0.137*| -0.054*| 0.067*| -0.039*| -0.010*| 0.016*|
| FAMILY     | -0.042| -0.245| 0.053| -0.148| 0.141| 0.251| -0.341| -0.280| 0.306*| -0.003*| 0.037*| 0.155*| -0.175*| 0.029*| 0.161*| -0.188*|
| GFH        | 0.017| -0.015| 0.042| 0.080| -0.145*| 0.000*| 0.021*| 0.054*| -0.169*| -0.041*| -0.008*| 0.005*| -0.048*| -0.082*| -0.025*| -0.005*|
| INOVEST    | 0.000| -0.022| -0.042| 0.130| 0.008| 0.038| 0.041| -0.067| 0.028| 0.018| 0.067| -0.036| 0.031| 0.104| -0.015| 0.010|
| INVCORP    | 0.025| -0.138| -0.126| -0.236| - | - | - | - | - | - | - | - | - | - | - | - |
| ITHMR      | 0.049| 0.059| 0.018| 0.028| -0.028| 0.001| 0.016| 0.053| -0.003| 0.007| 0.031| -0.016| -0.032| -0.043| -0.028| 0.000|
| KHCBD      | 0.036| 0.020| 0.099*| -0.047*| 0.059*| 0.022*| -0.010| 0.034| 0.036| -0.040| -0.039| -0.045| -0.071*| -0.025| 0.018| 0.013|
| NASS       | 0.013| -0.013| 0.052| -0.033| -0.097*| -0.094*| -0.051*| -0.014*| 0.022*| 0.009*| 0.019*| 0.025*| 0.051*| 0.007*| -0.033*| -0.002*|
| NBB        | -0.213*| -0.094*| 0.121*| 0.011*| -0.048*| 0.073*| -0.025*| -0.004*| 0.042*| -0.009*| -0.051*| 0.054*| 0.026*| -0.006*| -0.008*| -0.087*|
| NHOTEL     | -0.087*| -0.112| 0.102| -0.239| 0.058| 0.333| -0.319| -0.012| 0.063| -0.080| 0.131| 0.116| -0.265| 0.005| 0.066| -0.053|
| POLTRY     | 0.098| 0.133| -0.038| -0.138| 0.052| -0.076| 0.048| -0.268| -0.101| 0.068| -0.163| -0.113| 0.008| -0.032| 0.137| 0.068|
| SALAM      | 0.115*| 0.036*| -0.027*| 0.075*| 0.021*| -0.008*| 0.041*| 0.065*| 0.043*| 0.031*| -0.061*| -0.006*| 0.010*| -0.010*| 0.001*| -0.026*|
| SEEF       | -0.096*| 0.101*| 0.011*| 0.081*| 0.036*| -0.022*| 0.053*| 0.006*| -0.002*| 0.012*| 0.077*| 0.011*| 0.024*| -0.048*| 0.033*| 0.017*|
| TRAFCO     | 0.044| -0.109| -0.052| -0.051| -0.042| 0.008| -0.086| -0.005| 0.039| -0.016| 0.109| 0.141| -0.080| -0.149| -0.143| 0.002|
| UGB        | 0.213*| 0.228*| 0.135*| 0.085*| 0.018*| 0.065*| -0.066*| -0.086*| 0.128*| -0.174*| 0.021*| -0.021*| -0.140*| 0.043*| -0.035*| -0.129*|
| UGIC       | 0.132| 0.188*| 0.002| 0.024| -0.050| -0.081| -0.203| -0.195*| -0.143*| -0.097*| -0.132*| -0.203*| -0.041*| -0.096*| 0.175*| -0.023*|
| ZAINABH    | -0.004| -0.184| 0.088| -0.187| -0.185| 0.087| 0.176| -0.099| -0.188| 0.088| -0.002| 0.093| 0.095| 0.090| -0.001| -0.183|

Note: *significant at 0.05 level.
bank (AUB), Bank of Bahrain and Kuwait (BBK), National Bank of Bahrain (NBB), Al Salam Bank – Bahrain B.S.C (SAalam), Seef Properties B.S.C (SEEF), United Gulf bank (UGB) have significant correlation values throughout the 16 lags. Aluminum Bahrain B.S.C (ALBH), Esterad Investment Co. (ESTERAD), GFH Financial group (GFH), NASS Corporation (NASS), Khaleeji Commercial Bank (KHCB) exhibit significant correlation values from lag 3 onwards. Share price movements of Al Baraka Banking Group (BARKA), Bahrain Commercial Facilities Co. (BCFC), Bahrain Duty Free Shop Complex Co. (DUTYF), Bahrain Family Leisure Co. (FAMILY) and United Gulf Investment Corporation (UGIC) exhibit significant correlation during some lags. Investcorp Bank (INVCORP) presents correlation only for few lags due to insufficiency of data. Only 6 of 39 companies show significant correlation values, hence, in general, the null hypothesis is rejected. It can be concluded that price changes in individual stocks are not independent (refer to Hₐ3).

CONCLUSION

The present study aims to test the weak form of efficiency of the individual stock listed on Bahrain Bourse for the period 2011 to 2015. Delmon Poultry Co. (POLTRY) records the highest mean returns of 1.528%, while the Bahrain All Share Index records a mean return of −0.013%. The K-S test result concludes that in general, the individual stock returns do not follow random walk. Run test shows that the successive price changes are not random (Elango & Hussein, 2007).

Autocorrelation tests reveal that share prices exhibit low to moderate correlation varying from negative to positive values. The results of the tests do not support the randomness of the returns of the individual stocks. Therefore, it is difficult to conclude that successive returns of the stocks listed on Bahrain Bourse follow a random walk. These conclusions are similar to Solnik (1973), Rao and Shankaraiah (2003), Moustafa (2004), and Elango and Hussein (2007).

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