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Testing the Market Index Efficiency at the Weak Form - The Case of Iraq Stock Exchange

Abdulhadi Rashaq Al-Hatem[a], Husham Abdulkhudhur Alothman[b], Lyath Khaleel Ibrahim[c], [a]Thi Qar University, College of Administration and Economics, Thi Qar, Iraq, bMinistry of Eduction, Thi Qar Directorate, Thi Qar, Iraq, cThi Qar University, College of Administration and Economics, Thi Qar, Iraq,

The study aimed to test the efficiency of the Iraq Stock Exchange index (ISX60) at a weak form using the random walk model for daily returns for the period from 2015 to 2019 with 1,164 observations. In addition to Serial Correlation test and Unit Root tests, Variance Ratio and Rescaled Range test were used to investigate the study hypothesis. The study found that the returns of the ISX60 market index do not follow a random pattern, and thus the Iraqi stock market is inefficient at a weak level and the possibility of achieving abnormal returns by some rational investors.

Key words: *Market Efficiency, Random Walk Model, Iraq Stock Exchange.*

Introduction

The stock market is one of the essential and important pillars in the economies of countries because it has an important role in accumulating savings and attracting different investments that directly affect the achievement of economic growth rates, which can be reflected in the index prices for the financial assets that listed in it, especially those indices that are carefully formulated. So, the index is a mirror that reflects the economic conditions in the country.

The efficiency of financial markets also is one of the important issues that have dominated the literature on investment and financial markets since the 1960s to the present. It deals with realistically in speed and objectivity by responding to new information in the prices of securities, as efficiency came in the assumption that the prices of securities fully and impartially reflect all available information. The efficiency can be achieved in the financial market when there is a quick and unbiased response for all the new information released at

securities price whether this political or economic information or any information that could change the opinion of traders.

Oftenly, the prices move up or down depending on the nature of the information, whether optimistic or pessimistic. So, for the market to be efficient, several investors must presume that the market is not efficient. This presumption motives the investors to obtain information and analyse it to benefit from it. Then, they achieve abnormal profits which lead to a rapid change in the market value of the stock to be equal to its real value so that the market achieves the efficiency (Saunders and Cornett, 2007: 274). Hence, for the financial markets to play an active role by collecting savings from surplus units and directing them towards deficit units, the market must be characterized by efficiency so that it reflects all available information. So, this relationship between stock prices and financial information is very important to all parties that constituent the stock market.

Basically, Fama (1970) proposed three efficient forms of the financial market: weak form, Semi - strong form and strong form. The weak form of efficiency indicates that the market price of shares fully reflects all historical information such as the rate of return and trading volume and any other information provided by the financial market such as conducting special deals and trading operations (Copeland, 2008: 325). Therefore, the investor does not have the ability to achieve abnormal returns due to analysing historical information as it is available and popular for everyone as well as it can be obtained it without cost, thus the investor cannot rely on it for forecasting purposes. So, future price movements are completely independently from the historical movements and the prices respond only for new information (Al-Amiri, 2010: 123).

On the other hand, the **s**emi - strong form of efficient indicates that investors are unable to earn abnormal profits by relying on available public information such as historical prices, the volume of traded deals, accounting data, financial statements, announcements of dividends distribution and the issuance of shares, because the semi-strong market will reflect in advance all this information. The security market prices, in this form, include all of the publicly available information (Saunders & Cornett , 2007: 275). The strong form of efficient market suggests that the stock prices fully reflect all information, whether this information is publicly available or private information that is not public "hidden", and that dealers in the financial market cannot achieve abnormal returns because stock price changes are random variables. So, there is no way to monopolize a method to access the necessary confidential information, as well as the lack of confidentiality of the information in the strong form of capital market efficiency (Krugman & Obstfeld, 2006: 357). The efficient financial market hypothesis states that information related to any security must be available to all dealers in the financial market and that the price should reflect a fair value for the security (Ross, et al, 2008: 382).

Theoretically, the weak form of efficiency hypothesis is related to of random walk. The hypothesis of the weak form of efficiency is a methodological extension of the hypothesis of the random walk of prices. According to the weak form of efficiency it is assumed that historical information about events that took place in the past, whether days, months or years, cannot influence the current share price, and then cannot be used to predict changes that will occur in future prices. On other words, the successive changes in stock prices are independent of one another.

Hence, the weak level of market efficiency is called the random walk of prices, given that the change in the share price does not proceed in a specific pattern from day to day (Zubaidi, 2012:176). Accordingly, the random walk hypothesis is linked to the efficiency of financial markets as the receiving of information at the efficient financial market will be reflected the stock prices quickly and rationally. So, the prices tend to fluctuate randomly around the real value and fully reflect the latest information available on the market. The random walk hypothesis is an important model that has been studied as it is a sufficient condition for achieving efficiency in financial markets (Nayak, 2012).

Hence, to rationalize the investment decision and the provisions of the monitoring on the market performance, this study conducted an analysis of the efficiency of the Iraq Stock Exchange index at the weak form to check if the information is reflected on the market index ISX60 by testing the random walk model.

So, the study structure is represented in five sections. After the introduction in the first section, the second section was allocated for the literature review of the previous studies. The third section presents the study gap and contribution. The fourth section describes the methodology of the study. The fifth section focuses on the results. The study ended with the conclusions and recommendations in the sixth section.

Literature Review

There have been numerous of empirical studies applying the weak-form of financial market efficiency around the world. Fama (1965) was the earliest study - which is one of the first studies - that tested the efficiency of the financial market on the weak form through which he randomly measured the stock prices of thirty stocks registered in the Dow Jones Index for the period 1956-1961. The correlation coefficient between the changes in the logarithm of stock prices was calculated from one to ten days' lags. The study used the Autocorrelation test and the Runs tests; Serial autocorrelation and Runs test. This study concluded that the stock price behaves randomly and there is no correlation between the data used in the study. The study also found that the serial correlation coefficients are close to zero in most cases (about 0.03). It concluded that the result confirmed the random walk of share prices, and,

then, the investor cannot rely on past prices to form a strategy through which he may achieve abnormal profits. Recently, many studies have been focused on testing the capital markets efficiency at the weak form in the developed and underdeveloped markets to enhance the literature concerning the market efficiency. Al-Jafari and Altaee (2011) tested whether prices in Egypt emerging capital market follow the random walk pattern as proposed by the efficient market hypothesis.

Therefore, the study investigated the weak-form of market efficiency in the stock market by testing the random walk hypothesis (RWH) by the use of multi-approaches, specifically unit root test, Runs test and variance ratio test on the daily price of EGX 30 index over the period from January 1998 until December 2010. The results rejected the RWH at the weak-form level, suggesting that stock prices do not fully reflect all historical information. Elbarghouthi et al. (2012) applied runs test - runs up and down, distributions of runs by length, and runs above and below -to examine whether Amman Stock Exchange (ASE) is weak form efficient. The empirical results obtained in this paper suggest that the price behavior in ASE does not follow the random walk model over time.

However, this does not necessarily imply a violation of weak form efficiency (vice versa is not correct). Omar et al. (2013) targeted to check the random walk pattern in the Karachi Stock Market (KSE) which is an emerging capital market of the Republic of Pakistan. Daily, weekly and monthly stock returns of KSE 100 index covered the period from 1st Jan. 1998 to 29th Feb. 2012 was tested by the use of VAR test, Runs test, KS test and unit root tests. The results indicated that the KSE 100 did not follow random walk behavior, and thus not weak-form efficient, and there are chances of abnormal profits for the technical investors. Muhammad & Nawaz (2014) studied the weak form efficiency of Karachi Stock Exchange. The daily index data from November 2010 to November 2011 was taken from the official website of KSE. It investigated that whether the investors in KSE gaining abnormal profits or not by the use of historical prices. For this purpose, three econometric tests including Runs test, Unit root and Autocorrelation test were applied. The results rejected the null hypothesis and concluded that the KSE is weak form inefficient. The findings of the study were in line with the previous studies.

Angelovska (2018) investigated emerging Macedonian Stock Exchange (MBI10) and examined the weak form of the stock market efficiency. Tests were conducted for daily returns of MBI10 index on a sample spanning from January 4th 2005 to April 2nd 2018. The application of Random Walk Model and GARCH (1,1) model provides evidence that Macedonian Stock Market is not weak form efficient. Awan and Subayyal (2016) studied six capital markets in Gulf countries for the period of five years is taken as samples. Daily closing stock indices of Saudi Arabia, Kuwait, Oman, Bahrain, UAE and Qatar are taken from 1st January 2011 to 31 December 2015, Autocorrelation and Runs test were used to

examine the Weak Form Market Efficiency. The results of the parametric tests provided evidence that the stock prices in all the capital Markets were not following the random walk model and the significant autocorrelation coefficient at different lags has rejected the null hypothesis of weak form efficiency. Hawaldar and Rohit (2017) aimed at testing the market efficiency at the weak form of the individual stocks listed on the Bahrain stock market for the period 2011 to 2015. Weak form of EMH was tested by using the K-S goodness of fit test, Runs test and autocorrelation test. The K-S test found that the stock price movement does not follow random walk. Runs test revealed that the share prices of seven companies do not follow random walk. The autocorrelation tests concluded that stock prices showed low to moderate correlation varying from negative to positive values. Since the study reached mixed results, it is difficult to conclude the weak form of efficiency of Bahrain stock market.

Tokić et al. (2018) examined capital markets in four developing countries; Croatia, Serbia, Slovenia and Slovakia by using daily returns of their respective stock market indices from January 1, 2006 till December 31, 2016, timeframe which was rarely tested. Analysis was applied by various statistical test techniques, specifically serial correlation test, runs test, Augmented Dickey-Fuller test, unit root test, variance ratio test and test of January effect. The results provided that all analysed indices, except BelexLine (Serbia), confirmed the weak form of efficient market hypothesis. On the other hand, the results on index BelexLine index are mixed and it can be suggested that it does not follow weak form of EMH. The study suggested additional test and more complex models are necessary in order to confirm this conclusion.

In the context of Iraq, Al-Zubaidi (2012) aimed at testing the random walk pattern for the purpose of analysing the stock price behaviour of companies listed on the Iraq Stock Exchange ISE, as well as analysing the behaviour of general index price for the market and its component sectors in order to know the level of efficiency of the Iraqi market for securities. A series of monthly closing prices for the number of companies 24 companies as well as the general index of the market and its constituent sectors for the year 2009 were used to test the autocorrelation for the random error. Also Runs Test was applied to check the results the autocorrelation in addition to the use of correlation analysis to analyse the relationship between the general index returns with the market. The study reached several conclusions. The most important is that the stock prices in the Iraqi Stock Exchange and the prices of the general index and the stock prices did not follow the random walk hypothesis.

Therefore, The Iraqi market for securities is not efficient at the weak level. The study recommended the preparation of similar studies to determine the level of efficiency of the Iraqi market for securities. Alzyoud & Alrgaibat (2013) tested the efficiency of the Iraqi market for securities at weak level through the examination of monthly closing prices

behaviour for shares of 73 companies listed at ISE during the period (2005-2011). The study applied statistical models such as serial correlation Runs Test in order to determine the degree of independence or random series of consecutive prices, and used K-S test to measure the degree of normal distribution. The study found that the closing prices are not normally distributed, the series of consecutive prices are not independent and, then the Iraqi stock market is not efficient at low level.

Study Gap and Contribution

There are few studies concerning the application of EMH in Iraq stock markets. The scarce of the studies in the Iraq market motivates conducting more examinations and testing research in the Iraq stock market to enhance the existing literature on weak-form of market efficiency theory. In addition, this study applies further econometrics models such as Unit Root test, Variance Ratio test, Rescaled Range test that have not been applied by the previous studies in Iraqi stock market. Furthermore, the time series that used in this study covered the new calculated formula of Iraqi Stock Exchange ISX60. The application of the new formula of the index started in 2015, while the previous studies test the Iraqi stock market by the published data before 2015.

Methodology

This study aims to test the efficiency of the market index ISX60 at the weak form by using the random walk model, and consequently, the measurement of the possibility of achieving abnormal profits by some investors. Additionally, the study examines whether the market is efficient at the weak form by following the random walk. The results and recommendations will benefit the investors and increase the efficiency of the market.

The Study Problem

The study addresses the problem that represented by the following question: Does the Iraq Stock Exchange index is efficient at the weak form?

Statistical Methods

Serial Correlation Test

This test is the first entry for the random walk test of stock returns. It is used to determine the relationship between the current observation and its previous one. (Darwish, 2011:97). The auto-correlation hypothesis takes the following form (Muhammad, 2014:419):

H0= $\rho_k = 0$
H1=$\rho_k \neq 0$
And (Ljung –Box) statistics is used for the test as well (Ljung –Box) (Chung , 2006: 69).

$$Q_{LB} = n(n+2)\sum_{k=1}^{m}\frac{\rho^2{}_k}{(n-k)}$$

whereas:
n: the sample size.
$\rho\, k$: Autocorrelation coefficients.
K: specific lag period.
m: the number of (lag) that testing at hypothesis H0.
The calculation is made from the following formula:

$$\rho_k = \frac{cov(r_t, r_{t-k})}{var(r_t)}$$

The aim of this method to determine the independence of the market return series by testing statistically the variations in coefficients of autocorrelation from the zero, which indicates that the market returns are auto-correlated. Hence, the rejection of the null hypothesis will be in the case if the value of the autocorrelation coefficient is outside the period (1.96^{+}_{-}) at a significant level less than 5%. Alternatively, we will accept the alternative hypothesis that suggests the existence of autocorrelation for market returns for ten lags which means that the series of market returns is reliable, non-independent and does not follow the random walk pattern.

Runs Test

Runs test is one of the non-parametric tests. It is used to detect the degree of independence of the successive returns that cannot be detected through parametric test as the non-parametric tests neglect the properties of the normal distribution .So, it is used for the series that do not have a normal distribution. Runs test is defined as the sequential change of returns in the same direction, that is, the number of runs is calculated as a sequence of consecutive returns with the same sign (++,00, --). Then, the actual number of runs is compared to the expected number of runs regardless the signal (Khaled, 2015:117). This test is based on the null hypothesis that the expected number of runs is equal to the actual number, and therefore, the returns walk randomly and the efficiency hypothesis is accepted on the weak level (Muhammad, 2014:419).

The expected number of runs (m) is calculated to the following formula: (Darwish, 2011:98)
As:

$$m = \frac{(N(N+1) - \sum_{i=1}^{3} n_i^2}{N}$$

N : number of observations.
n: Number of stock price changes of each sign.
Z statistics is used to test whether the actual number of runs is consistent with the hypothesis of the independence of returns, calculated as follows: (Al-Zubaidi 2012:173):

$$Z = \frac{R - m}{\sigma m}$$

whereas:

R : The actual number of runs.
m: Expected number of runs.
σ : runs deviation.

If the calculated value of Z is greater or equal ±1.96 to the tabular value at the level of significance 5%, the null hypothesis is rejected. So, it is concluded that the returns series are not independent, do not walk randomly, and can be predicted. Therefore, the market is inefficient at the weak form (Muhammad, 2014:419).

Unit Root Test

In this study, the stationary of the time series of returns will be tested by the use of the Augmented Dckey-Fuller (ADF). This test is used to eliminate the problem of autocorrelation of errors. The test is based on the following three expressions (Othmani and others, 2015):
A model without the existence of constant or general trend:

$$\Delta R_t = \rho R_{t-1} + \varepsilon_t$$

A model with the existence of constant and without general trend:

$$\Delta R_t = \alpha + \rho R_{t-1} + \varepsilon_t$$

A model with a constant and general trend:

$$\Delta R_t = \alpha + \beta t + \rho R_{t-1} + \varepsilon_t$$

whereas:

R_t: The time series of market return on the day t and the day before t-1.
ρ : Coefficient of market return per day t-1 (The root of R_t the time series).
α : Constant of the equation.
β : Time trend coefficient t.
ε : Random error.

ADF test depends on the T-test to examine the following hypothesis:
H_0 : $\rho = 1$ $non - stationary\ time - series$
H_1: $\rho < 1$ = Stationary
If the null hypothesis is rejected, it means that the series of returns are stationary. Hence, time series do not walk randomly, and then the market is not efficient at the weak level.

Testing Variance Ratio (VR)

Variance Ratio test, suggested by Lo and Mackinlay, is widely used. The test is based on the hypothesis that the variation of the time series that walks randomly increases linearly with time (Severini, 2018: 56-57). So, If the variance of the difference in the returns of q-period equal q times the variance of the difference in the returns of 1-period returns, then the return series are walking randomly as expressed by follows (Khaled, 2015: 6):

$$Var(R_t - R_{t-1}) = qVar(R_t - R_{t-1})$$

As:
Var: represents the variance.
q: represents any positive number.
The statistical standard test for the Variance is as follows:

$$\text{VR(q)} = \frac{\frac{1}{q}Vq(R_t - R_{t-q})}{Var(R_t - R_{t-1})} = \frac{\sigma^2(q)}{\sigma^2(1)}$$

The test hypothesis can be formulated as follows:

H0: VR (q) = 1 series of returns tracing the random walk pattern

H1: VR (q) ≠ 1 the series of returns do not follow the random walk model (Khaled, 2015:6).
If the random walk hypothesis is rejected and VR (q)> 1, this means that the returns series are positively correlated, but if VR (q) <1, means that the returns are negatively associated (Darwish, 2011: 101).

Rescaled Range Test (Severini, 2018: 58-59)

It is considered that Box- Ljung test, the Variance Ratio test and Runs test are important tests for detecting the correlation between returns in the short time periods. However, there is another method in which the hypothesis of random walk may fail is that if the returns are correlated for a long time period. The Rescaled range test is one of the tests that designed to detect this type of correlation in the long run. The statistical expression of the test is given by the following:

$$H = \frac{max_1 \leq k \leq T \sum_{t=1}^{k}(r_t - \bar{r}) - min_1 \leq l \leq T \sum_{t=1}^{l}(r_t - \bar{r})}{S\sqrt{T}}$$

whereas S is the standard deviation of the sample r_1, r_2, r_t, while H is the range of the variables. The tabular values of the test are as follow:

Table 1: The tabular values of the Rescaled Range test

The critical value	The significance level
1.620	0.10
1.747	0.05
1.862	0.025
2.098	0.005

If H value is smaller than the tabular value in the table 1, the market index ISX60 follows the random walk hypothesis. Then, it is efficient at the weak form. Alternatively, if the value H is greater than the tabular value, it means the index ISX60 does not follow the random walk hypothesis. Hence, the market is not efficient at the weak form at significant levels 0.10, 0.05, 0.025 and 0.005.

Empirical Results

Iraq Stock Exchange Index (ISX60)

The Iraq Stock Exchange started with the launch of the general market index ISX60 as an index of the new electronic trading system X-Stream, which calculates the general market index ISX60 for a sample size 60 stocks of corporations that are listed at the market in every trading session. This index was launched on 09/02/2015. The selection of the corporation shall be under specific principles and criteria, such as the companies that their shares have high turnovers and continuous trading as well as have not been suspended or sanctioned (Iraq Stock Exchange, Annual Report, 2015: 12). The present study used the daily returns of the Iraqi market exchange ISX60 for the period 11th Jan 2015 to 28th Nov 2019 which contains

1,164 observations. All the data were obtained from the Iraqi Stock Exchange (www.isx-iq.net) website.

The daily returns have been calculated through the formula (Chung, 2006:62)

$$R_t = Ln\frac{p_t}{p_{t-1}}$$

where P_t and P_{t-1} are the closing ISX60 prices of the current day and the previous day, respectively.

Table 2 shows the normal distribution of the daily returns of the during the study period. The time series of the ISX60 returns failed to conform to the normal distribution according to Jarque-Bera statistics test. So, it rejects the null hypothesis of the normal distribution of the return series for the sample.

Table 2: Jarque-Bera statistics test

ISX60 index	Jarque-Bera	P-Value
	30756.42	0.000

Serial Correlation Test

To test the efficiency of the ISX60 Index at a weak level by investigate if it follows the random walk, the study considered 1-12 lags of the daily returns of the Iraq Stock Exchange index. Table 3 shows the test results rejected the null hypothesis. So, according to the statistical values (Q_{LB}) as well as the values of the column (AC) that are not equal to zero at (0.05) significant level. Therefore, it can be concluded that the ISX60 market index does not follow a random walk. Hence, the Iraqi stock market is not efficient at the weak level, and there is the possibility of achieving abnormal returns by some investors.

Table 3: Results of Autocorrelation test

Lag	AC	PAC	Q_{LB}-Stat	Prob
1	0.195	0.195	44.177	0.0000
2	0	-0.039	44.178	0.0000
3	0.008	0.016	44.248	0.0000
4	0.022	0.019	44.837	0.0000
5	0.065	0.06	49.823	0.0000
6	0.063	0.041	54.474	0.0000
7	0.08	0.065	61.989	0.0000
8	0.048	0.022	64.695	0.0000
9	0.011	-0.002	64.828	0.0000

10	0.034	0.029	66.148	0.0000
11	0.054	0.036	69.593	0.0000
12	0.068	0.043	74.982	0.0000
13	0.043	0.015	77.201	0.0000
14	0.049	0.034	80.006	0.0000
15	0.036	0.014	81.548	0.0000
16	-0.006	-0.024	81.592	0.0000

Runs Test

The results of Runs test are shown in table 4. The results show that (Z) test statistic was greater than the tabular value $(1.96\pm)$ which indicates that the actual number of runs is less than the expected number. It is also noticed that the (P-value) is equal to (0.000) which is smaller than the significant level (% 5). Therefore, the null hypothesis is rejected. So, it is concluded that the returns of index market ISX60 are not independent from each other and do not walk randomly. Thus, the market index ISX60 returns are characterized by reliability, dependent, predictability, and then, the possibility of achieving abnormal returns by some investors. Accordingly, the Iraq Stock Exchange is inefficient at the weak level of efficiency.

Table 4: Runs Test Results.

Index	Cases ≥ Test Value	Cases < Test Value	Z	P-value
ISX 60	332	832	-5.295	0.000

The of Unit Root Test

Table 5 illustrates the results reached by the use of ADF. The value of t-test statistic of the daily returns series of ISX60 is negative and more than the critical value at significant levels of 1%, 5% and 10%. So, the null hypothesis is rejected which means that the series of returns of Iraq stock market are stationary. Hence, the time series do not walk randomly, and then the market is not efficient at the weak level.

Table 5: Unit Root Test for ISX60

			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-28.12484	0.0000
Test critical values:	1% level		-3.435758	
	5% level		-2.863816	
	10% level		-2.568032	

The of Variance Ratio Test

As shown in Table 6, the returns series of the Iraq stock market index does not follow the random walk as the variance ratios are significantly different from 1 at the 5% level of significance as well as the test of Z(q) statistic is completely greater than the critical value ± 1.96 at the 5% level of significance. Thus, the null hypothesis is rejected. Accordingly the alternative hypothesis was accepted which suggests that the series returns the market index ISX60 does not follow the random walk. So, it can be concluded that the Iraq stock market is inefficient at the weak level of efficiency.

Table 6: The Results of Variance Ratio Test for ISX60

Individual Tests				
Lags	Var. Ratio (q)	Std. Error	Z(q)	Probability
2	0.621986	0.097933	-3.85991	0.0001
4	0.304906	0.152133	-4.56899	0.0000
8	0.148855	0.192103	-4.43066	0.0000
16	0.079693	0.226817	-4.05749	0.0000
32	0.040352	0.263525	-3.641583	0.0003

Rescaled Range Test

Table 7 presents the results of the Rescaled Range test of ISX60. It provides that H value compared to the tabular values shown in Table No. 1 at the level of significance % 5 is 8.711. So, since the calculated value of H is greater than the tabular value, the null hypotheses is rejected and accept the alternative hypothesis that suggests the ISX60 index does not follow the random walk hypothesis. Therefore, the Iraq Stock Market is inefficient at the weak level and the possibility of achieving abnormal returns by some investors. Obviously, the results of this test support the Serial Correlation test, Runs test, Unit Root test and Variance ratio test.

Table 7: The results of the Rescaled Range test

Period	H
11th Jan 2015 to 28th Nov 2019	8.711

Conclusion

Serial Correlation test indicating that the ISX60 index does not follow a random walk, and it is not efficient at the weak level. Also, the Runs test supported the same results that concluded by the Serial Correlation test of the inefficiency of the Iraq stock market. Similarly, the Variance Ratio test revealed that the ISX60 does not walk randomly, and then it is inefficient at the weak form. Rescaled Range test was used to detect the long-range

dependence of the returns series of ISX60. The results also concluded the inefficiency of the market. So, all the tests used in this study have provided evidence that ISX60 did not follow the random walk pattern, which implies that the Iraq stock market is inefficient at the weak form. The study suggests conducting more tests and examinations concerning the efficiency of the Iraq stock market by the use of the returns of the individual stocks listed in ISX60.

REFERENCES

Al-Amry, M. A. I. (2010). *Advanced financial management*, first edition. Athraa for Publishing and Distribution, Jordan.

Al-Jafari, M. and Altaee, H. (2011). Testing the random walk behavior and efficiency of the egyptian equity market. *Journal of Money, Investment and Banking*, Issue 22. (132-146).

Al-Zubaidi, S. Abdul Hussein, (2012). Analysis of the behavior of stock prices using the random walk model, an applied study in the iraq stock exchange. Al-*Qadisiyah Journal of Administrative and Economic Sciences*, Volume 14, No. 2.142-152.

Alzyoud, H. & Alrgaibat, G. (2013). The efficiency of the iraqi market for securities at weak level for the period 2005-2011. *Arabic Journal for Management*. Vol 33. No. 2. (3-20).

Angelovska Julijana (2018) *Testing Weak Form of Stock Market Efficiency at the Macedonian Stock Exchange. UTMS Journal of Economics* 9 (2): 133–144.

Awan, U. F., & Subayyal, M. (2016). Social science research network. Retrieved December 19, *2016 from Social Science Research Network https://papers.ssrn. com/sol3/papers2.cfm? abstract_* id=2787816 (218-231).

Chung, H. Y. (2006). Testing weak-form efficiency of the chinese stock market", *Master of Science, Lappeenranta University of Technology. Department of Business Administration, Section of Accounting and Finance*.

Copeland, L. (2008). Exchange rates and international finance ", 5th ed, prentice Hall.

Daily reports of the Iraq Stock Exchange for the years 2015, 2016, 2017, 2018, 2019.

Darwish, M. J. (2011). Testing the efficiency of the palestine stock exchange at the poor level, *Al-Quds Open University Journal for Research and Studies*, No. 23 (2). 147-152.

Elbarghouthi, S. Qasim, A. and Yassin, M. (2012). *The Use of Runs Test in Amman Stock Exchange*. *International Business Research*, Vol. 5, No. 2; February. (159-172)

Fama, E. F. (1965). *The behavior of stock market prices*. Journal of Business, vol 38. 147-169.

Hawaldar, I. T., Rohit, B., & Pinto, P. (2017). Testing of weak form of efficient market hypothesis: evidence from the Bahrain Bourse. Investment Management and Financial Innovations, 14(2), 376-385.

Iraq Stock Exchange, Annual Report. (2015). Iraq stock exchange, department of research and studies, Traded Stock Price Index, No. 43, 2015.

Khaled, A. (2015). "The New York stock market efficiency test at the poor level (dow jones industrial index case study from 1928 to 2014). *PhD Thesis in Financial and Economic Studies, College of Economic and Commercial Sciences and Management Sciences*, Kassadi Murbah University of Ouargla.

Krugman, P. & Obstfeld, (2006). Naurice, *international economics. Theory and Policy*, 7th ed, Addison Wesley.

Muhammad, R. & Nawaz, S. (2014). Random walk behavior of emerging stocks markets: Evidence from Karachi stock exchange. *Studies in Business and Economics* No. 9(3). 97-106.

Muhammad, S.S. (2014). The randomness of prices and the level of efficiency of the financial market: The case of the amman stock exchang. *Administrative Sciences Studies*, Volume 41, No. 2. 111-116.

Nayak, K.M. (2012). A study of random walk hypothesis of selected scripts listed on NSE, *Journal of Economics and Management* Vol. 1, (1): 48- 59.

Omar, M., Hussain, H., Bhatti, G. A., & Altaf, M. (2013). Testing of random walks in Karachi stock exchange. Finance Management, 54, 12293-12299.

R, Development Core Team (2016). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna.

Ross, S. A., Randolph, W. Westerfild, J. J. & Bradford, D. J. (2008). *Modern financial management*, 8th ed, N. Y: McGraw-Hill Irwin.

Saunders, A. and Cornett, M. M. (2007). *Financial markets and institutions*. International Edition McGraw Hill, New York, USA.

Severini, A., Thomas, (2018). *Introduction to statistical methods for financial models text in statistical science*, CRC Pres., Boca Raton, FL.

Terminal, Fawzi, H. S. (2012). The impact of monetary policy on common stock returns (An applied study on the iraq stock exchange for the period 2004-2010"). *Master Thesis in Economic Sciences, submitted to the Board of the College of Administration and Economics*, University of Qadisiyah.

Tokić, S., Bolfek, B., & Peša, A. R. (2018). Testing efficient market hypothesis in developing Eastern European countries. Investment Management and Financial Innovations, 15(2), 281.-291.