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Evaluating Efficiency of Tehran Stock Exchange: Case Study for Top Fifty Most Active Companies (TSE-50)

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Abstract
Economics of information has been developing increasingly in economics literature in recent decades. Accordingly, the information plays a crucial role in efficiency of any market particularly capital market which deals more with this issue. As for the importance of information in stock exchange efficiency, the market efficiency is studied under three data sets in three forms including: 1- Information concerning the past prices, 2- All the released information and, 3- General Information and Confidential private information. Given these three types of information, market efficiency is checked in three weak, semi-strong and strong levels, respectively. This paper in order to examine the efficiency in the weak level employs a decomposed pattern with two stochastic and random terms for Top Fifty most active companies (TSE-50) in Tehran stock exchange based on both long and short horizons. The findings demonstrate that the indicator does not have efficiency in long horizon. This is while; the efficiency is verified in short horizon.
Keywords: Efficiency, Long and Short Horizons, Tehran Stock Exchange.
JEL Classification Codes: C51, G14, G11, G02.

Tahran Borsası'nın Verimliliğinin Değerlendirilmesi: En Aktif 50 Şirket Örneği[*]

Öz
Son 10 yıldır, bilgi ekonomisi çok önemli gelişmeler kaydetmiştir. Bu bağlamda bilgi herhangi bir pazarın verimliliği açısından çok önemli bir role haizdir. Bilginin borsanın verimliliğine ilişkin kullanımı bu çalışmada 3 başlık altında değerlendirilmiştir. 1) Geçmiş fiyatlara ilişkin bilgiler 2) Sahip olunan tüm bilgiler ve 3) Genel ve özel bilgiler. Bu bağlamda, pazarın verimliliğinin değerlendirilmesi zayıf, orta ve güçlü seviyelerde ortaya koyulabilmektedir. Bu çalışma, Tahran Borsası'ndaki kısa ve uzun dönemli dalgalanmaları en aktif 50 şirket örneğinden hareketle zayıf seviyede analiz etmeyi amaçlamaktadır. Bulgular, kullanılan göstergelerin uzun dönemli dalgalanmalar için geçerli olmadığını ancak kısa dönemli dalgalanmalar için anlam ifade ettiğini ortaya koymuştur.
Anahtar Kelimeler: Verimlilik, Kısa ve Uzun Dönemli Dalgalanmalar, Tahran Borsası.
JEL Sınıflandırma Kodları: C51, G14, G11, G02.

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Bu çalışmanın İngilizce başlık ve özeti, Yayın Kurulu tarafından Türkçe'ye çevrilmiştir.

Atıfta bulunmak için…|
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1. Introduction

Many ways as random-walk and price changes distribution models have been developed by experts to measure market efficiency (Fama, 1970, 1976, 1991). From the classical perspective, a market is efficient when its prices always reflect the information that is available in the market (Fama, 1970). Based on efficiency hypothesis, There are three types of efficiency as weak, semi-strong (strong quasi) and strong market efficiency. This classification of market efficiency stems from a data set (Makiel, 1992). Efficiency according to data (information) set implies that it is not possible to earn economic profits by trading based on that information set. Under this classification, the weak-form efficiency is related to the past stock prices, semi-strong with publicly available information and strong form with private and confidential information about a certain share (Campbel & Mackinley, 1997). Although, i can discuss this type of classification, but only the weak-form of market efficiency can easily be expressed in mathematical form. Additionally, there are many statistical tools to measure this kind of efficiency. From a statistical standpoint, the efficient market (weak-form) hypothesis can be assessed using the random-walk model of stock prices. In fact, if the market is efficient with respect to the past prices, any new information will be reflected in new prices. As the data are unpredictable, then price changes depend only on new information and they do not depend on past changes of prices. Therefore, price changes are unpredictable and they are stochastic during times (Campbell & Mackinley, 1997 cited in Pele & Voineagu, 2008).

A large number of researchers have made many statistical tools to test the random walk hypothesis with a lot of assumptions. These tools are the variance ratio test innovated by Lo and Mackinlay (1988) and its general form called Multiple Variance Ratio Test (based on Studentized Maximum Modulus) which was made by Chow and Denning (1993). The Kalman filter also has been familiar in the literature to evaluate the efficiency. Point of difference between this study and other local studies is that both short and long time horizons are used in the current study to evaluate the weak form efficiency. It should also be noted that a significant number of data are used in this study to improve the results concerned with the small samples.

2. Literature review

The performed studies about markets efficiency during decades have been somehow contradictory. For example, in 1937 Cowles and Jones during the study of the US capital market rejected the efficient market assumption. However, Fama in 70s found better and more acceptable results related to this assumption. In the light of this section, the latest national and international studies related to the topic of this paper have been reviewed.

Osamah & Ding (2007) in their research of emerging markets random walk variance ratio new test, evaluated the performance of stock markets in eight countries in the MENA region (Middle East and North Africa) using the non-parametric variance ratio test. The researchers in this study showed that the non-parametric variance ratio test is a proper test to survey the emerging markets efficiency and also given the results of the study, proved that the random walk assumption cannot be rejected for MENA region countries.

Traian & Voineagu, (2008) in their study as Testing Market Efficiency via Decomposition of Stock Returns, Application to Romanian Capital market, checked the Market efficiency given the daily data of stock returns index using the econometric model which divides the stock market into two parts of stochastic trend and white noise. The results of this study show that it is not possible to reject the market efficiency assumption for Romanian capital market. Although, Dragota & Metrica (2004) who investigated this market over 1998-2000, rejected the assumption.

Dorina & Simina, (2007) in their paper as "Testing Efficiency of the Stock Market in Emerging Economies" investigated the weak form of efficiency in eight emerging economies stock markets (Romania, Hungary, Czech Republic, Lithuania, Poland, Slovakia, Slovenia and Turkey). Results showed that the majority of stock markets in emerging countries studied were not efficient in the weak form.

Srinivasan (2010) in his study with the topic" Testing weak-form efficiency of Indian Stock Markets" analyzed the efficiency of two Indian stock markets. Daily data through 1997-2010 were utilized to survey the markets efficiency. Results revealed that Indian stock markets were not efficient in the weak form and also the stock prices were predictable in those markets. Therefore, this gives traders the opportunity to profit by predicting future prices unconventional gain.

Broges (2010) assessed the performance of European stock markets with variance ratio test to study the stock markets of England, France, Spain, Greece, Germany and Portugal in the period from 1993 to 2007. The results of this study indicated that among these markets, only the German and Spain markets were efficient in the weak-form.

Akbar & Muhammad (2013) in their study titled as" Is Pakistan Stock Market moving towards Weak-form efficiency?" examined the weak-form of market efficiency in 20 companies for the period 1992 to 2013using parametric and non-parametric tests. The results show that the random walk hypothesis is not followed by the Karachi stock market and traders in this market can predict the market pieces based on old data and get an unusual benefit.

Allahyari (1999) in his article entitled as "Examining the weak-form efficiency of capital markets in Tehran stock exchange" assessed Tehran stock exchange efficiency in weak-form using daily stock prices of 95 companies over the period of 1999 to 2006. The results of this research showed that Tehran stock exchange is inefficient and some special investors having particular and confidential information could profit unusually and also the random walk function results showed that the price trends of about 97% of studied companies were not stochastic.

Salimi Far & Shirzoor (2010) in their research with the topic of "examining the Information efficiency of stock market with variance ratio test approach" investigated the presence or absence of information efficiency or information rents led to unusual profits in Tehran stock exchange. The results implied that Tehran stock exchange had the weak-form information efficiency and there is no possibility of predicting the price trends and consequently gaining unconventional profit.

Abbasian & Zolfaghari (2013) in their article titled as "Dynamic Analysis of weak-form efficiency in Tehran Stock Exchange by Kalman filter" evaluated the market performance in weak-form based on GHARCH model with variable coefficients and Kalman filter. They attempted to make an analysis of the gradual changes of efficiency in Tehran stock exchange for the period of 2000 to 2010. The results of this analysis gives the point that there are signs of efficiency improvement be felt in Tehran stock exchange and the most important causes of inefficiency in this market include low liquidity and lack of timely disclosure of market information. In the line of this study's results, in order to increase market size and liquidity, it is necessary to attempt to develop and increase the depth of activities in this market.

3. Theoretical Principles

Basically, three types of efficiencies are considered in economics: Operational efficiency, informational efficiency and allocative efficiency (Frankfurter & Mcgoum, 1996). Operational efficiency refers to the state of the market that a trader in both directly entering or by using financial intermediaries receives the services with fair prices and real costs. This happens when financial intermediaries system as most developed financial markets are sufficiently competitive. Informational efficiency as the efficient market hypothesis describes the state of a market that stock market or securities price reflects all relevant information to the mentioned asset pricing. Finally, the allocative efficiency stipulates that capital markets are able to conduct the available funds to the projects with most returns. This requires both allocative and informational efficiency. In this case, it is necessary to determine the price of securities in such a way that the adjusted risk-return rate of all securities is equal meaning that the securities which have the same level of risk will provide the same level of returns

(Arouri et al., 2010). Since stock prices are affected by different types of information, Robert (1967) for the first time distinguishes between three types of informational efficiency based on what kind of basic information are available to market participants: weak, semi-strong and strong form. If the current stock prices includes past data about prices, markets are efficient in weak form. In this case, price changes are not predictable and no one can earn abnormal returns based on historical prices and trading volume. Using yesterday's prices, it cannot be concluded about tomorrow and the market has no memory. Data entry into the market and its impact on prices is stochastic and has no affiliation, tendency and bias. Thus, price changes are stochastic and irregular and price is a function of random walk (Dobinz et al., 1994 cited in Pele & Voineagu, 2008).

In the semi-strong form of efficient market hypothesis, it is asserted that current stock prices reflect all available and public information. Here public information includes all data available in the market and related to companies, such as expectations about market performance and macroeconomic factors, financial statements, related statements of income and profit sharing, plans related to the merger or acquisition, the financial position of the company's direct competitors etc. Obviously, this collection of information also includes past prices and trading volumes meaning that a market which is efficient in semi-strong form, it is necessarily efficient in weak form. However, this type of efficiency is somehow stronger than the type. Hence, more capabilities (e.g., ability to understand and analyze economic concepts and financial data from multiple sources) is required in order for someone to earn higher returns (Arvery et al, 2010). If the market is efficient in the strong form, the current stock prices reflect all existing information including both private and public types. In other words, in this market, in order to earn unusual returns, individuals must have continuous access to confidential information of the companies (Dobbins et al, 1994). Fiscal and economic reforms such as trade liberalization, privatization, banking reform and currency reform could promote market efficiency. Stock markets may have different stages of development, resulting in varying degrees of market efficiency over time. Therefore, models with sustainable structure of parameters could not describe the variable adjustments in the level of efficiency in emerging markets over time. The motivation to survey the evolving efficiency is reinforced by this insight that the dynamic changes in the market structure, skills of market activists, the availability and quality of information makes the market efficiency to vary over time (Arouri et al., 2010). Therefore, the method presented in this research work focuses on the evolving efficiency or dynamic analysis of efficiency (Abbasian & Zolfaghari, 2013).

4. Modeling

4.1. A Model for Long-Horizon Returns

An alternative for random-walk model is the Long-horizon returns model that was first introduced by Mouth in 1961. Basically, this model is obtained from decomposing the natural logarithm of prices time series into the summation of a random-walk function and a stationary component. This model's form can be stated as (Pele & Voineagu, 2008):

$$p_t = w_t + y_t \qquad (1)$$

In which, $w_t = \mu + \rho w_{t-1} + \varepsilon_t, (\varepsilon_t) \sim IID(0,\sigma^2)$. ε_t is a function of random variables distributed independently and uniformly with mean zero (i.e., white noise) having the following features:

y_t is a stationary process with mean zero:

$$\begin{cases} E[y_t] = 0, \ \forall t, \\ Cov[y_t, y_s] = 0, \forall t \neq s \\ E[y_t^2] < \infty \end{cases} \qquad (2)$$

$(w_t)_t$ and $(y_t)_t$ are independent processes.

In the common interpretation of this model, random walk model, as the main part of model reflects the capital market efficiency. Whereas, $(y_t)_t$ is a stationary process indicating the short-run deviations from the Efficient Market Hypothesis (EMH). $(y_t)_t$ represents the combination of abnormal and unpredictable behavior of capital market which is not significant in the long-term. This feature of the stationary component implies that its expected value is equal to the mean in the long-term whose value is zero and its impact will be solely on the prices of financial assets in the short-term.

If i use the logarithmic price instead of long-horizon returns, it reveals:

$$\gamma_t = \log \frac{p_t}{p_{t-1}} = p_t - p_{t-1} \qquad (3)$$

Where, P_t is the asset price in time t.

According to the Mouth model, the following formula reflects logarithm of price in two successive times:

$$\begin{cases} p_t = w_t + y_t \\ w_t = \mu + w_{t-1} + \varepsilon_1 \end{cases} \& \begin{cases} p_{t-1} = w_{t-1} + y_{t-1} \\ w_{t-1} = \mu + w_{t-2} + \varepsilon_{t-1} \end{cases} \Rightarrow (\varepsilon_1)_t \sim IID(0,\sigma^2) \qquad (4)$$

Thus, the asset return can be written as:

$$\begin{aligned} &\gamma_t = p_t - p_{t-1} = w_t + y_t - w_{t-1} - y_{t-1} = \\ &w_t - w_{t-1} + y_t - y_{t-1} = w_t + y_t \end{aligned} \qquad (5)$$

Where, $W_t = w_t - w_{t-1}$ and $Y_t = y_t - y_{t-1}$.

Given the features of the original Mouth model, the behavior of the new parts of the model can be specified. So:

$$\begin{aligned} W_t = w_t - w_{t-1} &= \mu_t + w_{t-1} + \varepsilon_t - (\mu + w_{t-2} + \varepsilon_{t-1}) \\ &= w_{t-1} - w_{t-2} + \varepsilon_t - \varepsilon_{t-1} = \mu + \varepsilon_t \end{aligned} \qquad (6)$$

$Y_t = y_{t-1} - y_t$ is a stationary process. Also, the independence between W_t and Y_t is considered. Therefore, The Mouth model for the logarithm of return is stated as:

$$\gamma_t = w_t + y_t \qquad (7)$$

So that: $W_t = \mu + \varepsilon_t, (\varepsilon_t) \sim IID(0,\sigma^2)$

Additionally, Y_t is a stationary process with mean zero:

$$\begin{cases} E[y_t] = 0, \ \forall t, \\ Cov[y_t, y_s] = 0, \forall t \neq s \\ E[y_t] < \infty \end{cases} \qquad (8)$$

Meanwhile, $(W_t)_t$ and $(Y_t)_t$ are independent. Although, this model seems simple, its measurement in reality is actually difficult.

4.2. A Model with Stochastic Processes and Random Component

Obviously, if in the model 3, the impact of random-walk component is substantially greater than the impact of static component, it is not possible to predict the future prices. Now if we reverse this reason, then it can be assumed that the stock price is equal to the sum of $AR(1)$ and static mean zero processes.

$$p_t = w_t + y_t \tag{9}$$

In which, $w_t = \mu + \rho w_{t-1} + \varepsilon_t, (\varepsilon_t) \sim IID(0, \sigma^2)$. This statement means that $(\varepsilon_t)_t$ term is an independent function distributed uniformly with mean zero (one white noise). Also, the y_t is an static process with mean zero:

$$\begin{cases} E[y_t] = 0, \ \forall t, \\ Cov[y_t, y_s] = 0, \forall t \neq s \\ E[y_t^2] < \infty \end{cases} \tag{10}$$

Besides, $(Y_t)_t$ and $(W_t)_t$ are the two independent processes. Therefore,

If $\rho < 1$, then $(W_t)_t$ is stationary and predictable.

If $\rho = 1$, then, $(W_t)_t$ is a random-walk function.

According to model 4, as for return, the following statement for return logarithm is obtained:

$$\begin{aligned} r_t &= p_t - p_{t-1} = w_t + y_t - w_{t-1} - y_{t-1} = \\ & w_t - w_{t-1} + y_t - y_{t-1} = w_t + y_t \end{aligned} \tag{11}$$

Where, $W_t = w_t - w_{t-1}$ ، $Y_t = y_t - y_{t-1}$.

More additionally:

$$\begin{aligned} W_t &= w_t - w_{t-1} = \mu + \rho w_{t-1} + \varepsilon_t - \mu - \rho w_{t-2} - \varepsilon_{t-1} \\ &= \rho(w_{t-1} - w_{t-2}) + \xi_t = \rho w_{t-1} + \xi_t \end{aligned} \tag{12}$$

Thus,

$$r_t = W_t + Y_t = \rho W_{t-1} + Y_t = \rho(W_{t-1} + Y_{t-1}) + Y_t - \rho Y_{t-1} = \rho Y_{t-1} + r_t \tag{13}$$

So that $\gamma_t = Y_t - \rho\, Y_{t-1}$ is a static process with mean zero. Equations 12 and 13 lead us to conclude that if the systematic component $(W_t)_t$ in the price model is a $AR(1)$ process, return can be decomposed into two parts. Therefore, it is concluded that the random process model for the logarithmic stock returns is written as:

$$r_t = W_t + Y_t \quad (14)$$

In which, r_t is the logarithmic stock return at time t and W_t is a first-order autoregressive in which we will have: $W_t = \rho W_{t-1} + \xi_t$ So that, ξ_t is the white noise.

Y_t is stationary process with mean zero

W_t and Y_t is independent process

The auto-regressive component of the model can be regarded as the act or the impact of macroeconomic environmental variables and Y_t implies the effect of non-systematic random factors.

If the coefficient ρ is equal to 1, then W_t is a stochastic variable (in fact random-walk) and it not accepted to reject the market efficiency hypothesis. However, if ρ is smaller than 1, W_t is a first-order stationary auto-regressive and as for it, we can predict the future value of logarithmic return and do not reject the market efficiency hypothesis. Although, this cannot be an absolute conclusion and even if W_t is first-order stationary auto-regressive, if the return variance is low, it is not possible to use the past values of return to predict future measures (Pele & Voineagu, 2008).

5. Estimations and Results

This index is determined as the Dow Jones index measuring approach. In calculating this indicator, the number of shares outstanding of the company will not be effective and its value is obtained only of the sum of the stock prices of 50 companies divided by the number of the companies. In Tehran stock exchange, top companies are identified based on a combination of the power of stock liquidity and the companies' effect on the market and according to the three following criteria:

- The amount traded in trading forum
- Frequency of trading in trading forum
- The variables of the degree of influence on the market

The specified effects by the macroeconomic variables (which may be existent in variables for a long period) and the random effects that usually do not appear in the courses with a long horizon (The horizon of these random effects often emerge in a few days or a few months) in have addressed in some studies by researchers. To build a model of stock market returns, it is assumed that the returns of financial assets are affected by two types of effects: effects of the macroeconomic environment (which have medium and long-term effects) and resulting effects of random factors (which have short-term act).

The formula of the stock return logarithm can be considered as follows:

$$r_t = w_t + Y_t \tag{15}$$

In which, $r_t = W_t + Y_t$ is the return due to macroeconomic environment and Y_t indicates the effect of non-systematic stochastic factors.

According to model 9, it is assumed that the parameter W_t (the systematic factor) is a first-order auto-regressive process which confirms the linear equation of $W_t = \rho W_{t-1} + \xi_t$. In this equation, $(\xi_t)_t$ is a white noise component.

The non-systematic factor is also, a white noise process. Estimating this parameter of autoregressive process, the result on capital market efficiency related to its economic perspective is revealed.

So, if $\rho = 1$, then the market is efficient and the autoregressive model is a random walk process.

While if $\rho \neq 1$, then the efficient market feature can be rejected.

For testing the stationary of stock return index, the generalized Dickey-Fuller Test is utilized. In fact, this test as for the model $r_t - r_{t-1} = (u-1)r_{t-1} + u_t$ and the null hypothesis of $H_0 : u = 1$ is applied versus the hypothesis of $H_1 : u < 1$. The results of checking this hypothesis Is reported in Table2.

Table 1: Results of Dickey-Fuller Test Statistics Evaluation for Stock Return

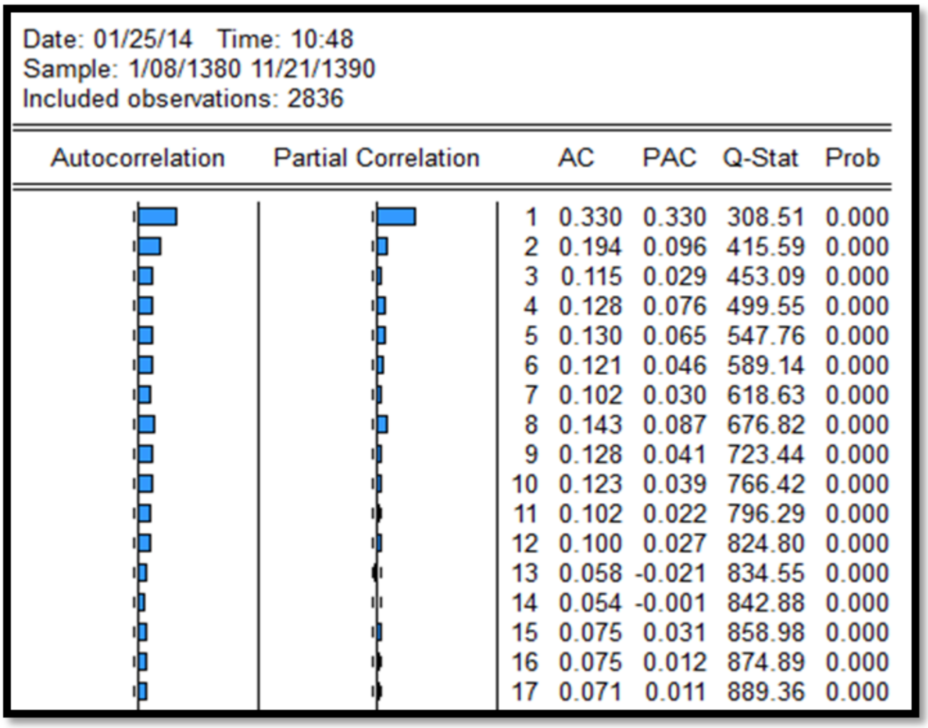
Critical Values	Tao Statistic	Prob
Test statistic of generalized Dickey-Fuller	-17.79325	0.000
1% Significance level	-3.9668	0.000
5% significance level	-3.4140	0.000
10% significance level	-3.1288	0.000

Table 2: Goodness of Fit Statistics Associated with the Dickey-Fuller Test of Stationary

R2-Squared	0.348212
Adjusted R2- Squared	0.346827
Regression standard errors	0.007959
Sum of squared residuals	0.178889
Durbin-Watson statistic	2.0056

By rejecting the null hypothesis, the stationary of the studied process can be resulted.

Using auto-correlation function (ACF) and partial auto-correlation function ($PACF$), the behavior of the top 50 companies return index can be studied as:



Date: 01/25/14 Time: 10:48
Sample: 1/08/1380 11/21/1390
Included observations: 2836

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.330	0.330	308.51	0.000
		2	0.194	0.096	415.59	0.000
		3	0.115	0.029	453.09	0.000
		4	0.128	0.076	499.55	0.000
		5	0.130	0.065	547.76	0.000
		6	0.121	0.046	589.14	0.000
		7	0.102	0.030	618.63	0.000
		8	0.143	0.087	676.82	0.000
		9	0.128	0.041	723.44	0.000
		10	0.123	0.039	766.42	0.000
		11	0.102	0.022	796.29	0.000
		12	0.100	0.027	824.80	0.000
		13	0.058	-0.021	834.55	0.000
		14	0.054	-0.001	842.88	0.000
		15	0.075	0.031	858.98	0.000
		16	0.075	0.012	874.89	0.000
		17	0.071	0.011	889.36	0.000

Figure 1: ACF **and** $PACF$ **Functions**

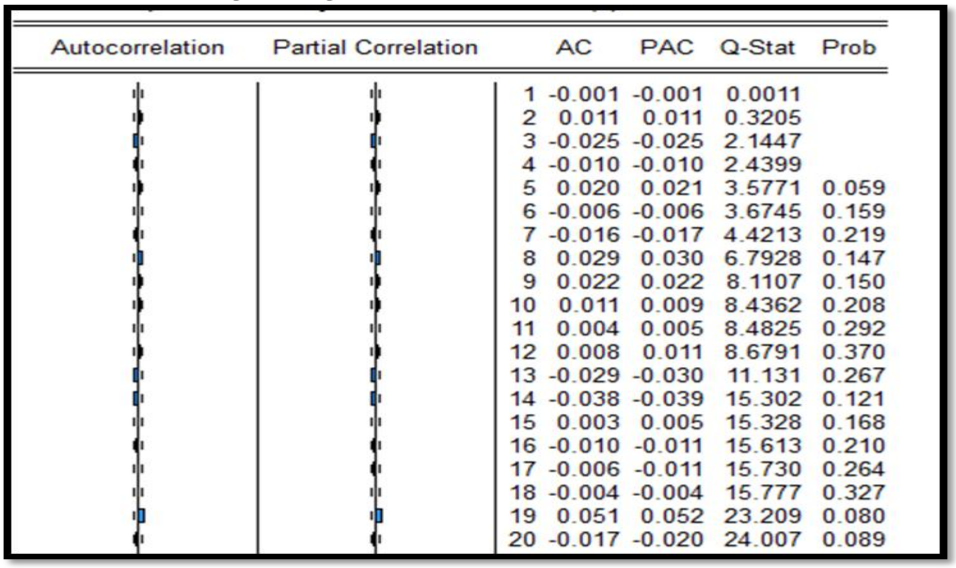
Given the observed trends in ACF and $PACF$ Correlogrames it is guessed that this variable follows different order of autoregressive and moving average processes. According to the significance of the obtained coefficients and the lowest Akaike and schwartz indices, the best result was taken as below:

Table 3: The Results of Fitting Model 8

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000932	0.000493	-1.891109	0.0587
AR(1)	0.273931	0.018454	14.84426	0.0000
AR(2)	0.883112	0.028834	30.62711	0.0000
AR(3)	-0.209245	0.023421	-8.933927	0.0000
MA(2)	-0.827572	0.034091	-24.27524	0.0000
R-squared	0.137812	Mean dependent var		-0.000969
Adjusted R-squared	0.136593	S.D. dependent var		0.008513
S.E. of regression	0.007910	Akaike info criterion		-6.839630
Sum squared resid	0.176940	Schwarz criterion		-6.829131
Log likelihood	9693.336	F-statistic		113.0072
Durbin-Watson stat	1.999753	Prob(F-statistic)		0.000000
Inverted AR Roots	.96	.23	-.93	
Inverted MA Roots	.91	-.91		

Meantime, it is mentioned that all the classical assumptions are confirmed in this test.

In order for studying the behavior of Y_t to be white noise, the Box-Ljung Q-statistic and the Histogram figure are used as below:



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.001	-0.001	0.0011	
		2	0.011	0.011	0.3205	
		3	-0.025	-0.025	2.1447	
		4	-0.010	-0.010	2.4399	
		5	0.020	0.021	3.5771	0.059
		6	-0.006	-0.006	3.6745	0.159
		7	-0.016	-0.017	4.4213	0.219
		8	0.029	0.030	6.7928	0.147
		9	0.022	0.022	8.1107	0.150
		10	0.011	0.009	8.4362	0.208
		11	0.004	0.005	8.4825	0.292
		12	0.008	0.011	8.6791	0.370
		13	-0.029	-0.030	11.131	0.267
		14	-0.038	-0.039	15.302	0.121
		15	0.003	0.005	15.328	0.168
		16	-0.010	-0.011	15.613	0.210
		17	-0.006	-0.011	15.730	0.264
		18	-0.004	-0.004	15.777	0.327
		19	0.051	0.052	23.209	0.080
		20	-0.017	-0.020	24.007	0.089

Figure 2: Box-Ljung Q-statistic and the Histogram figure

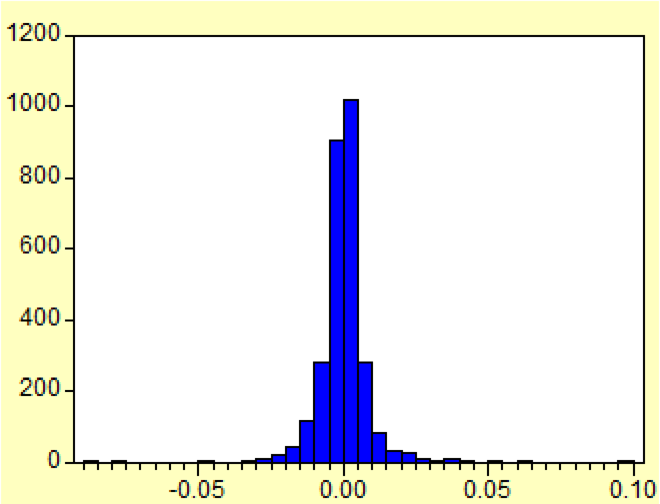


Figure 3: The Histogram for Y_t

This Histogram accompanied by the probability values of the ***Q***-statistic confirm that Y_t follows a white noise process. Therefore, since the value of fitted autoregressive parameter is obtained between zero and unity ($0 < \rho < 1$), 0.27, it can be concluded that the top 50 companies' index cannot confirm the efficiency hypothesis in the long horizon. More additionally, given the value of the goodness of fit statistic (as an index for the goodness of fitting the regression model) which is near to 0.14, it can be understood that solely 14% of the dependent variable is explained by the independent factors of the model and it can also be used to express a lack of explanation for long-term relationships. Based on this issue that the non-systematic factor has had a significant effect, it can be resulted that the market efficiency hypothesis cannot be rejected in weak form. (This conclusion has been confirmed in some studies by Salimifar & Shirzoor, 2009 and Abbasian & Zolfaghari, 2013).

6. Summary and Conclusions

Many methods as random walk model, kalman filter and price changes distribution model for measuring market efficiency have been developed by experts. This paper seeks to examine market efficiency using a model that accounts for two time horizons, short and long. Hence, this model with some adjustments decomposes the stock return into two factors: a stochastic trend and a white noise component to reach the main goal of it. To test the stationary of stock return index, the generalized Dickey-Fuller test and for analyzing the return index behavior, I used the auto-correlation function and partial auto-correlation function and also in order to survey the process to be white noise, the Box-Ljung Q-statistic was utilized. In fact, looking at this issue, I tried to reach a result related to capital market efficiency in continuous with the economic situation by estimating the auto-regressive process parameter. The results showed that it is not possible to reject this hypothesis in weak level and also there is no possibility of earning unconventional profit in this market. Besides, stock return is unpredictable and in other words, stock return is a white noise.

References

Allahyari, A. (2008). Examining the weak-form efficiency of capital markets in the Tehran Stock Exchange. *Stock Exchange Quarterly,* 4, 75-108.

Abbasian, A., & Zolfaghari, M. (2013). Dynamic analysis of poor performance in Tehran Stock Exchnage by the Kalman filter. *Journal of Economic researches and Policies*, 21(65), 231-154.

Akbar, U., & Muhammad, N. (2013). Is Pakistan Stock Market moving towards Weak-form efficiency? Evidence from the Karachi Stock Exchange and the Random Walk Nature of free- oat of shares of KSE 30 Index, Available at: http://mpra.ub.uni-muenchen.de/49128/.

Arouri, M., Jawadi, F., & D. Nguyen. (2010), *The Dynamics of Emerging Stock Markets: Empirical Assessments and Implications*, Springer.

Brockwell, P.J., & Davis, R.A. (1991). *Time Series: Theory and Methods*, 2 edition, Springer Verlag.

Broges, M. (2010). Efficient Market Hypothesis in European Stock Markets. *European Journal of Finance,* 16, 711-726.

Campbell, J.Y. LO, W. & Mackinlay, C. (1997). *The Econometrics of Financial Markets*, Princeton University.

Chow, V. K. & Denning, K. C. (1993). A simple multiple variance ratio test, *Journal of Econometrics*, 58(3), 385-401.

Cootner, P. H. (1962). Stock Prices: Random vs. Systematic Changes, *Industrial Management Review*, 3(2), 24-45.

Dobbins, Richard, Stephen Witt & John Fielding. (1994), *Portfolio Theory and Investment Management*, 2d, Blackwell.

Dorina, L. & Simina, U. (2007). *Testing Efficiency of the Stock Market Emerging Economies,* Faculty of Economics and Business Administration, Babes-Bolyai University, Romania, Working Paper, 827-831.

Dragotă V. & Mitrică, E. (2004). Emergent Capital Markets' Efficiency: The Case of Romania, *European Journal of Operational Research*, 155, 353-360.

Dragotă, V. Stoian, A. Pele, D.T., Mitrică, E. & Bensafta, M. (2007). Development of Romanian Capital Market: Evidences on Informational Efficiency, available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2191764.

Durlauf, S.N., & Phillips, P.C.B. (1988). Trends Versus Random Walks In Time Series Analysis, *Econometrica*, 56(6).

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

Fama, E. (1991). Efficient Capital Markets: II, *Journal of Finance,* 46, 1575-1617.

Fama, E. & French, K. (1988). Permanent and Temporary Components of Stock Prices, *The Journal of Political Economy*, 96(2). 246-273.

Frankfurter, G.M., & Mcgoum, E.G.. (1996). *Toward Finance with Meaning the Methodology of Finance: What it is What it Can be*, JAI Press Inc.

Lo, A., & Mackinlay, C. (1988). Stock Market Prices do not Follow Random Walks: Evidence from a Simple Specification Test, *The Review of Financial Studies*, 1(1), 41-66.

Mandelbrot, B. (1963). The Variation of Certain Speculative Prices, *The Journal of Business*, 36(4), 394-419.

Muth, J. (1961). Rational Expectations and the Theory of Price Movements, *Econometrica*, 29(3), 315-335.

Pele, D.T., & Voineagu, V. (2008). Testing Market Efficiency via Decomposition of Stock Returns. Application to Romanian Capital Market, *Romanian Journal for Economic Forecasting*, 5(3), 63-79.

Osamah, M.A. & Ding, D. (2007). A New Variance Ratio Test of Random Walk in Emerging Markets, *Financial Review*, 42, 303-317.

Srinivasan, P. (2010). Testing Weak-Form Efficiency of Indian Stock Markets, *Asian Journal of Research in Business Management*, l(1), 134-140.

Salimifar, M., & Shirzoor, Z. (2010). Measuring the informational efficiency of Stock market variance ratio test, *journal of knowledge and Development*, 31, 29-58.

Tehrani, R., &Tehrani, M. R. (2009)S. Volatility Forecasting Performance Comparison of Different Models on the Tehran Stock Exchange and Analyzing the Impact of Some Factors on the Behavior of Return Volatility. *Journal of Iranian Economic Researches*. 40, 149-170.

Todea, A. (2002). Teoria pieţelor eficiente şi analiza tehnică :cazul pieţei româneşti, *Studia Universitatis Babeş-Bolyai, Oeconomica,* XLVII, 1, 2002 http://www.bvb.ro.