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Performance Level of Dhaka Stock Market: A Quantitative Analysis

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Abstract: The stakeholders of the stock markets in Bangladesh are trying their best to make better infrastructure of stock markets in comparison to other stock-markets in Asian nations. To bring the stock market in an operational and informational order, two stock markets have been set up in Bangladesh of which the Dhaka Stock Exchange (DSE) is one of them. Consequently, the traders of the markets are rolling fund, stakeholders and other philanthropist organizations are using data for estimating indices such as price per share, price earning ratio, current market price of the share etc. mainly to know whether the markets are running efficiently. The data on these indicators of 1st quarter of the financial years 2004, 2005, 2006 & 2007 have been collected to test the EMH (Efficient Market Hypothesis) because this hypothesis states that market prices instantaneously or fully reflect all relevant available information. It means that the market prices of the securities will always equal their intrinsic values. Thus, the hypothesis holds that the share price movements are random and systematic. According to this hypothesis, it is possible to earn normal returns by randomly choosing securities at a given risk level. This research attempts to test whether the series on the industry such as bank, insurance, service, food and allied and textile really follow the behavior of normal distribution. The different descriptive statistics, non-parametric estimators and ARCH models are used for testing the hypotheses. The results may be important to the planners, security analysts, investors and security exchange regulatory bodies for improving the market status in this connection. The estimated results are found very useful.

1. Introduction

The available securities to investors are numerous and of various types. Dhaka stock exchange (DSE) and Chittagong stock exchange (CSE) are the two markets in Bangladesh, which are used by investors for trading securities. The basic strategy in security investment is to buy under priced and overpriced securities. Thus the task of the traders is to identify the overpriced and under priced securities.

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Regarding the profit making strategy, stock traders always were found interested in evaluating the returns (compared to risks) of the portfolios. It is both expensive and time consuming to analyze and select securities for a portfolio, so an individual company or industry or institution must determine whether this effort is worth of time and money. Portfolio manager should evaluate their performance as one or several professional money managers (Irwin, 1970).

It is believed that changes happen in the price of a stock only because of certain changes in the economy, industry or company. Depending on the nature of information, the stock price and the stock move to a new level either upwards or downwards. This reveals price change because each change occurred on addition of new information received each and every day.

The random walk theory believes that stock markets are so efficient and competitive that price adjustment goes immediately because of good communication system through which information can spread over. Thus the random walk theory is based on hypothesis that the stock markets are efficient subsequently which is called efficient market hypothesis (EMH).

Two approaches are generally used to test the weak form of the efficient market hypothesis – statistically significance patterns in security price changes and alternatively searching profitable short-term trading rules. In the efficient market hypothesis, it is possible for an investor to earn normal returns by randomly choosing securities of a given risk level (Kevin, 2006). The study thus attempts to find the evidence for supporting the presence of at least weak form of EMH in an emerging market like DSE.

In testing this hypothesis, earning per share, total profit, current price of the share and price earning ratios are used. The ex-post data on those indicators are used for finding out the ex-ante line of development. Analyst uses the price earning ratio to predict how the stock price may react to a change in the levels of company's earnings (Richard and David, 1997). This component is also used to know how the stock market apparently is capitalizing the current earnings.

This hypothesis is to be tested on the performance series of five individual industries, such as: bank, insurance, textile, food & allied industry, and service, along with overall performance on price earning ratio of DSE.

The article is presented in the sections as follows: section 1 includes the introduction; section 2 incorporates the literature review. Section 3 and section 4 discuss methodology and results respectively. In the section 5 conclusions and recommendations are presented. Finally, the paper ends with policy implications.

2. Literature Review

The volume of study on the test of efficient market hypothesis in emerging markets is less significant compared to the volume of studies on developed markets (Mobarak and Kevin 2000). Samuels (1981) defined the emerging market as "prices of stock cannot be assumed to fully reflect all the related information". It can be presumed that investors are able to interpret the information that is released over time. It is the corporation which has greater potentiality to influence its own stock market price developing appropriate polices suited for the stakeholders of the market and thus it can move in a manner justified by the available information.

Fama (1970) mentioned that the markets of developed countries are weak–form efficient. This implies that successive returns are independent and follow the random walk model. However, Poshakwale (1996), Harvey (1994) and Khaba (1998) find non-randomness behavior in stock price and reject the weak form efficiency both for developing and emerging markets.

In Bangladesh, stock markets are moving forward with limited investments and inadequate supply of capital market instruments (recent release in Financial Express, Nov, 2007). The market capitalization to GDP is only 6.5%, whereas in other neighboring countries these ratios are: India (56%), Pakistan (30%), Sri-Lanka (18%). The reasons of low capitalization rate may be due to low confidence of investors on financial disclosure of companies listed in the stock markets, slow development of underlying market infrastructure, and lack of strong supervisory system, and vulnerability in the capital market support system etc.

The previous studies state that the developed and developing markets are weak-form efficient. But the periodical analysis of the performances of stock market may provide some sort of indication of better investments. Considering this, the study attempts to seek answers of the following questions:

a. How the stock market capitalization rate is changing in the market?
b. How strong is the degree of performances of individual industries compared to that of the total performance of the market?
c. Whether the performances are deviated from the EMH?
d. Is it possible to develop a predictable model?
e. What are the implications of the findings?

3. Objectives of the Study

The objectives are:

a. to understand the relationship of earning per share and price earning ratio,
b. to measure the relationship among the price earning ratios of the enterprise under DSE with the performance of total market ratios,
c. to verify whether the DSE market is contributing to the economy as an efficient market,
d. to identify the factors which influence the earning per share and price earning ratio,
e. to identify the predictable model,
f. to make suggestions for improving the level of contribution of the enterprises of the DSE to the total economy.

4. Methodology

4.1 The Data

The data used in the study are the price earning ratio (PER) of the industry, such as: bank, insurance, service, textile, and food & allied industry under DSE. These data series are not available in the CSE or DSE. The office of "The Financial Express" is recording related information and building daily statistics on this ratio by estimating earning per share and current market price of the shares of different industries in the DSE market. The daily statistics on these indicators for the period of 1st quarter of 2004, 2005, 2006, and 2007 were collected (Deniel, 1993).

4.2 The Variables

The variables of the study are the series on price earning ratios of the industry such as: bank, insurance, textile, food and allied industry, service and total performance of the Dhaka stock market. All data are converted to natural logarithms because the financial series exhibit growth that is approximately exponential in the long run. The series of this type tend to grow by a certain percentage per year on average. Kenedy (1988) pointed that the logarithmic transformation of the financial series improves the linearity reducing the non-linearity scales to some extent.

4.3 Tests used in analyzing the data

4.3.1 Descriptive Statistics

The study uses descriptive statistics, non-parametric and parametric approaches to analyze the collected data in this connection. Descriptive statistics such as standard deviation, variance, co-efficient of variation, skewness and kurtosis help detect variability among the data series. The series having greater C.V. is said to be more variable (unstable) than the series having smaller C.V. On the other hand, a series is said to be more consistent (stable/homogenous) compared to those having higher C.V. The skewness measures the lack of symmetry in the data. The degree of kurtosis is measured by a quantity $\beta_2 - 3$. The distribution having positive, negative and zero value of the quantity are called leptokurtic, platykurtic and mesokurtic respectively.

4.3.2 Non-parametric test

The study also uses the non-parametric test for testing the goodness of fit. The study attempts to test the hypothesis to know whether the samples have come from a symmetric continuous distribution. In this regard tests such as: Runs test, and Kolmogorov-Smirnov (one tailed) test are performed.

Runs test

Runs test can detect the types of patterns in output quality that are associated with the systematic variation. It is used effectively in quality control situations i.e. the variation in quality performance is either systematic or random. If it is known that the variation is systematic, it can be corrected (Richard and David, 1997).

Kolmogorov – Smirnov test

Like chi-square, Kolmogorov- Smirnov (K-S) test is another goodness of fit test. The K-S test is used to determine how well a random sample of particular data fits particular distribution (uniform, or normal).The study uses normal parameters to test the nature of the distribution.

4.3.3 Parametric test

Auto Regressive Conditional Heteroskedasticity (ARCH) Model

In forecasting financial time series, such as stock prices, inflation rates, interest rates, exchange rates, etc. it is observed that their ability to forecast such variables varies considerably from one time period to another. For some periods, it is relatively small and

for some periods it is relatively large, and again small for time length. This variability could vary due to volatility in markets resulted from rumors, political upheavals, changes in government monetary and fiscal policies. This postulates that the variance of forecast errors is not constant but varies from period to period. Consequently, a type of autocorrelation in the variance of forecast errors comes forth. The data for the collected period are used for estimating the parameters. In order to show whether the data follow the ARCH model and the disturbances are serially correlated, transformation in the data series were made (Engle, 1982).

Thus, ARCH models are developed after variable transformation to test the weak form of efficient market hypothesis as follows:

P_t = Price earning ratio;

y_t = log of P_t ;

$\Delta y_t = y_t - y_{t-1}$ = relative charge in the price earning ratio;

$\Delta \hat{y}_t$ = Mean of Δy_t ;

$X_t = \Delta y_t - \Delta \hat{y}_t$;

Where, X_t is the mean adjusted relative change in the price earning ratios. Thus X_t^2 measures the volatility. As a squared quantity, its value will be high in periods where there are big changes in the prices of the shares and its value will be comparatively small during the modest changes in the stock prices.

Considering X_t^2 as a measure of volatility it can be used to test how the individual series have changed over time.

Thus, the ARCH model can be written as:

$$X_t^2 = \beta_1 + \beta_2 X_{t-1}^2 + u_t$$

Where u_t is the white noise term and β_1 and β_2 are parameters. This model postulates that volatility in the current period is related to its value in the previous period plus a white noise term. If β_2 is positive, it suggests that high volatility in the previous period; will lead to high volatility in the current period indicating volatility clustering. If β_2 is zero, then there is no volatibility clustering. The statistical significance of the estimated parameter β_2 can be judged by the usual test (Stock and Watson, 2004).

The error variance may depend not only on one lagged term but also on several lagged terms. If there is no autocorrelation in error variance, the following hypothesis is drawn to test.

Ho: $\beta_1 = \beta_2 = 0$

This is tested by estimating usual F statistic and nR^2 which follows the chi-square distribution with n degrees of freedom, where n is the number of auxiliary variable(s) included in the model. If the lagged squared disturbance term is statistically significant, the error variances then seem to be correlated, that is, there is an ARCH effect. Engle developed ARCH model to study volatile variance. It helps us know the magnitude of the observed difference among several sample proportions being significant or only due to chance (Beria and Higgins, 1995).

4.3.4 Development of predictive model

The empirical study will identify the predictive model for the performance series of the selected industry under Dhaka Stock Market. In this regard, the study identified the best ARIMA for the total performance of time series of 2006 and 2007 respectively. The estimated values and the values of model selection criteria are presented in the sections ahead.

5. Results and Discussions

Table 1 represents the estimated values of the descriptive statistics such as: skew ness, kurtosis, standard deviation and co-efficient of variation of the performance series of five industries along with total performances of the DSE market for the first quarter of 2004, 2005, 2006 and 2007 respectively. The larger values of skewness and kurtosis indicate that the performance series are not systematic. The estimated values of these two statistics for the year 2004 are different from the minimum values of the normal distribution. As a result, it can be concluded that the weak form of efficient market hypothesis is rejected for each and every performance series for the 1st quarter of 2004 (Jarque and Berra, 1987).

Table 1 also states the estimated values of the same indicators for 2005. The estimated values (of the indicators) of the insurance and service sectors are seen to be negatively skewed and others are positively skewed. On the other hand, service and food industries are showing leptokurtic behavior. Consequently, it can be concluded that the weak form of efficient market hypothesis is rejected for each and every performance series for the 1st quarter of 2005.

In T**able 1** the estimated values of the same indicators for the year 2006 are presented. The estimated values of the indicators of the total performance and food and allied services sectors are seen negatively skewed and others positively skewed. On the other hand, kurtosis for the performances of textile industry shows leptokurtic behavior and others are showing platykurtic behavior. Consequently, it can be concluded also in this case that the weak form of efficient market hypothesis is rejected for each and every performance series for the 1st quarter of 2006.

Table 1 also consists of the estimated values of the same indicators for the year 2007. The estimated values of the indicators of the bank and food allied industry are seen positively skewed and others are shown negatively skewed. On the other hand, only the performance of insurance company is showing leptokurtic behavior and others are showing platykurtic behavior. As a result, it can be concluded that the weak form of efficient market hypothesis is rejected for each and every performance series of the 1st quarter of the stock market players of the year 2007.

The average capitalization rates are obtained from the mean price earning ratio presented in **Table 1**. The mean capitalization rates for the year 2004 through 2007 are estimated at 7.8%; 7.06%; 8.64% and 5.67% respectively. The estimated values may be considered very poor compared to the industry performance of the neighboring countries. The precision level of the business can be compared by measuring an index like a value reciprocal of the standard deviation. The study shows that the precision levels of performance are not systematic (Kothari, 2005).

Table 1: Estimates of descriptive statistics for measuring variation

Year	Industry	Descriptive Statistics					
		Mean	**S.D.**	**Variance**	**Skewness**	**Kurtosis**	**C.V.**
2004	Bank	12.220	1.353	1.831	0.313	-1.300	11.07%
	Insurance	15.754	2.118	4.485	0.788	-0.275	13.44%
	Textile	10.505	0.661	0.437	0.749	0.321	6.29%
	Service	13.402	0.637	0.406	1.119	0.940	4.75%
	Food	10.476	0.260	0.067	0.796	0.558	2.48%
	Total	13.121	1.087	1.183	0.365	-1.156	8.28%

2005	Bank	14.708	1.032	1.066	0.095	-1.648	7.01%
	Insurance	11.187	2.588	6.699	-0.217	-1.827	23.13%
	Textile	10.277	0.314	0.098	0.048	-0.735	3.05%
	Service	12.125	0.236	0.056	0.173	-0.424	1.94%
	Food	10.898	0.460	0.212	1.480	1.133	4.22%
	Total	13.950	0.682	0.465	1.260	0.856	4.88%
2006	Bank	12.670	1.491	2.225	0.044	-1.445	11.76%
	Insurance	6.543	0.257	0.066	-0.377	-0.501	3.92%
	Textile	9.637	1.037	1.075	0.862	1.918	10.76%
	Service	11.022	0.479	0.229	0.357	-1.008	4.34%
	Food	15.145	0.409	0.167	0.428	0.553	2.70%
	Total	11.512	1.076	1.158	-0.182	-1.550	9.34%
2007	Bank	17.991	1.758	3.090	0.326	-1.515	9.77%
	Insurance	14.073	1.098	1.206	-0.074	-0.287	7.82%
	Textile	12.080	1.208	1.459	-0.728	0.108	10.00%
	Service	9.390	1.034	1.070	-1.034	0.684	11.01%
	Food	16.409	2.125	4.517	0.131	-1.081	12.95%
	Total	17.988	1.489	2.217	0.100	-1.465	8.27%

Table 2 represents the estimated values of the runs test, chi-square test, and K-S test in order to test the weak form of efficient market hypothesis of the selected industries. If it is found that the number of runs is equal to or less than 9 or equal to or greater than 20, one can reject the hypothesis that the observed sequence is random at .05 level of significance (Gujarati, 1988).The number of runs is less than 9 in all the cases under DSE which states that the series of returns of the industries are not following the criteria of random walk model. As a result, the null hypothesis that the performance series follows random walk model can be rejected.

Table 2: Results of non-parametric tests

Year	Industries	Runs test		K-S test			K-S (Assymp.Z)
		No. of runs	Z	Most Extreme Difference			
				Absolute	Positive	Neagtive	
2004	Bank	2	-7.939 (0.000)	0.142	0.142	-0.091	1.156 (0.138)
	Textile	3	-7.691 (0.000)	0.095	0.095	-0.061	0.775 (0.585)
	Service	7	-6.699 (0.000)	0.155	0.155	-0.107	1.260 (0.084)
	Insurance	8	-6.451 (0.000)	0.141	0.141	-0.128	1.150 (0.142)
	Food & Allied	7	-6.699 (0.000)	0.114	0.114	-0.087	0.928 (0.358)
	Total	2	-7.939 (0.000)	0.142	0.142	-0.087	1.157 (0.137)
2005	Bank	3	-7.756(0.000))	0.192	0.192	-0.170	1.572 (0.014)
	Textile	9	-6.771 (0.000)	0.105	0.105	-0.096	0.895 (0.452)
	Service	12	-5.534 (0.000)	0.058	0.058	-0.049	0.474 (0.978)
	Insurance	4	-7.509 (0.000)	0.275	0.275	-0.273	2.247 (0.000)
	Food & Allied	10	-6.032 (0.000)	0.271	0.271	-0.182	2.217 (0.000)
	Total	5	-7.263 (0.000)	0.212	0.212	-0.100	1.731 (0.005)
2006	Bank	4	-7.030 (0.000)	0.120	0.120	-0.107	0.926 (0.358)
	Textile	4	-7.612 (0.000)	0.199	0.189	-0.199	1.538 (0.018)
	Service	8	-5.990 (0.000)	0.159	0.159	-0.091	1.230 (0.097)
	Insurance	8	-5.958 (0.000)	0.095	0.091	-0.095	0.733 (0.658)
	Food & Allied	10	-5.339 (0.000)	0.129	0.129	-0.084	0.998 (0.273)
	Total	2	-7.551 (0.000)	0.147	0.147	0.124	1.141 (0.148)
2007	Bank	4	-7.625 (0.000)	0.206	0.206	-0.199	1.710 (0.006)
	Textile	2	-8.084 (0.000)	0.326	0.184	-0.326	2.707 (0.000)
	Service	3	-7.774 (0.000)	0.309	0.179	-0.309	2.564 (0.000)
	Insurance	6	-7.150 (0.000)	0.140	0.088	-0.140	1.162 (0.134)
	Food & Allied	4	-7.578 (0.000)	0.167	0.167	-0.132	1.384 (0.043)
	Total	4	-7.634 (0.000)	0.158	0.141	-0.158	1.315 (0.063)

In order to justify the results of runs test, χ^2 test was also performed. The quantity of χ^2 test is used to ascertain how well the theoretical distribution (uniform or normal) fits empirical distribution obtained from sample data. If the calculated value of χ^2 is less than the tabulated value at 1% or 5% level of significance, the fit is considered to be a good one., which means that the divergence between the observed and the expected frequencies is attributed to fluctuations of sampling. The estimated results show that for each and every case the fit was found to be good.

The Kolmogorov-Smirnov test is another non-parametric test which is used to determine how well a random sample of data fit a normal, binomial, Poisson or uniform distribution. The test compares the cumulative distribution function of a normal variable to test whether the distribution is homogeneous. The estimated results (Table 2) are showing that the distribution which represents the price earning ratio of the industry under DSE does not fit by normal distribution.

5.1 Serial correlation and correlation test

Kevin (2006) states that weak form of EMH postulates independence between successive price changes, such independence or randomness in stock price movements can be tested by calculating the correlation between price changes in one period and changes for the same stock in another period. The estimated value of coefficient (termed as r) can take on a value ranging from -1 to 1; a positive number indicates a direct relation, a negative value implies an inverse relationship and a value close to zero implies no relationship. Thus, if correlation co-efficient is close to zero the price changes can be considered serially independent.

Table 3: The matrix of correlation coefficients

Period of Performance	2004	2005	2006	2007
2004	1	-.125	.893(**)	.857(**)
	.	.316	.000	.000
2005		1	-.506(**)	-.327(**)
		.	.000	.007
2006			1	.885(**)
			.	.000
2007				1

** Correlation is significant at the 0.01 level (2-tailed).

The sign of r indicates the direction of the relationship between the performance series of individual industry and that of the total performances of the market. The higher and positive value indicates the direct relationship. On the other hand, the smaller and negative values of r indicates the weak and opposite relationship between the performance series.

Table 4 through Table 5 represents the results of autoregressive conditional heteroscedasticity model. The model postulates that the volatility in the current period is related to its value in the previous and current period. If the estimated value is positive, it suggests that the volatility is high in the previous period and it will continue to be high in the current period, indicating the period of volatility clustering. If β_2 is zero there is no volatility clustering. In all the cases, if the lagged term is highly significant; volatility clustering seems to be present in the present instance. On the other hand, if there is no autocorrelation in the error variances, it is required to be tested through the hypothesis as follows:

Ho: $\beta_1 = \beta_2 = 0$

This is tested by using the usual F tests. The estimated values of F statistics for indicating the joint effects of the parameters are found significant in all the cases. Thus the hypotheses of no auto-correlation in the error variances are rejected in almost all the situations.

Table 4: Results of Autoregressive Conditional Heteroscedasticity Model

Year	Industry	Variables	Co-efficients	S.D.	t-ratio	p-values
2004	Bank	β_1	0.001	0.001	1.165	0.249
		β_2	1.011	0.021	49.056	0.000
		$R^2 = 0.974$	DW = 1.701	$F_{Ratio} = 2406.49(0.000)$		
	Insurance	β_1	0.000	0.001	0.259	0.795
		β_2	1.034	0.031	33.392	0.000
		$R^2 = 0.946$	DW = 1.362	$F_{Ratio} = 1114.375(0.000)$		
	Textile	β_1	0.000	0.000	0.913	0.365
		β_2	1.016	0.046	21.941	0.000
		$R^2 = 0.884$	DW = 1.393	$F_{Ratio} = 481.414(0.000)$		

	Service	β_1	0.000	0.000	0.380	0.705
		β_2	1.210	0.134	9.059	0.000
		$R^2 = 0.566$	DW = 1.339	$F_{Ratio} = 82.059(0.000)$		
	Food & Allied	β_1	0.000	0.000	1.008	0.317
		β_2	0.980	0.079	12.452	0.000
		$R^2 = 0.711$	DW = 2.253	$F_{Ratio} = 155.048(0.000)$		
	Total	β_1	0.000	0.000	0.778	0.438
		β_2	0.996	0.040	24.787	0.000
		$R^2 = 0.906$	DW = 1.851	$F_{Ratio} = 614.384(0.000)$		
2005	Bank	β_1	0.001	0.000	1.686	0.097
		β_2	0.887	0.060	13.359	0.000
		$R^2 = 0.736$	DW = 1.795	$F_{Ratio} = 178.452(0.000)$		
	Insurance	β_1	0.004	0.003	1.418	0.161
		β_2	0.928	0.047	19.690	0.000
		$R^2 = 0.858$	DW = 1.905	$F_{Ratio} = 387.709(0.000)$		
	Textile	β_1	0.000	0.000	2.025	0.047
		β_2	0.281	0.005	14.220	0.000
		$R^2 = 0.760$	DW = 1.499	$F_{Ratio} = 202.195(0.000)$		
	Service	β_1	0.000	0.000	2.135	0.037
		β_2	0.652	0.082	7.914	0.000
		$R^2 = 0.495$	DW = 2.108	$F_{Ratio} = 62.631(0.993)$		
	Food & Allied	β_1	0.000	0.000	0.672	0.504
		β_2	0.865	0.022	40.094	0.000
		$R^2 = 0.962$	DW = 1.649	$F_{Ratio} = 1607.52(0.000)$		
	Total	β_1	0.000	0.000	0.450	0.654
		β_2	0.887	0.039	22.914	0.000
		$R^2 = 0.891$	DW = 1.917	$F_{Ratio} = 525.070(0.000)$		

The estimated values are tested at 0.01% and 0.05% level of significance. All the estimated values are found significant at the selected levels. As a result, it can be concluded that the behavior of the performance series is almost running alike in the market.

Table 5: Results of Autoregressive Conditional Heteroscedasticity Model

Year	Industry	Variables	Co-efficients	S.D.	t-ratio	p-values
2006	Bank	β_1	0.001	0.001	1.073	0.288
		β_2	0.928	0.036	26.133	0.000
		$R^2 = 0.923$	DW = 1.275	$F_{Ratio} = 682.919(0.000)$		
	Insurance	β_1	0.000	0.000	1.371	0.176
		β_2	0.791	0.071	11.071	0.000
		$R^2 = 0.683$	DW = 1.399	$F_{Ratio} = 122.566$		
	Textile	β_1	0.002	0.002	0.892	0.376
		β_2	0.957	0.128	7.646	0.000
		$R^2 = 0.485$	DW = 1.884	$F_{Ratio} = 55.718(0.000)$		
	Service	β_1	0.001	0.000	2.852	0.006
		β_2	0.573	0.109	5.233	0.000
		$R^2 = 0.325$	DW = 2.009	$F_{Ratio} = 27.387(0.000)$		
	Food & Allied	β_1	0.000	0.000	2.495	0.016
		β_2	0.471	0.116	4.044	0.000
		$R^2 = 0.223$	DW = 2.111	$F_{Ratio} = 16.358(0.000)$		
	Total	β_1	0.000	0.000	1.289	0.203
		β_2	0.920	0.035	26.021	0.000
		$R^2 = 0.922$	DW = 1.290	$F_{Ratio} = 677.106(0.000)$		
2007	Bank	β_1	0.001	0.001	1.707	0.092
		β_2	0.892	0.056	16.052	0.000
		$R^2 = 0.796$	DW = 1.820	$F_{Ratio} = 257.65(0.000)$		
	Insurance	β_1	0.002	0.001	3.070	0.003
		β_2	0.507	0.075	6.736	0.000
		$R^2 = 0.407$	DW = 2.347	$F_{Ratio} = 45.377(0.000)$		
	Textile	β_1	0.004	0.002	2.240	0.028

		β_2	0.711	0.091	7.811	0.000
		$R^2 = 0.480$	DW = 2.494	$F_{Ratio} = 61.008(0.000)$		
	Service	β_1	0.001	0.001	1.373	0.174
		β_2	0.952	0.046	20.908	0.000
		$R^2 = 0.869$	DW = 1.761	$F_{Ratio} = 437.133(0.000)$		
	Food & Allied	β_1	0.001	0.001	1.124	0.265
		β_2	0.908	0.045	20.239	0.000
		$R^2 = 0.861$	DW = 1.754	F_{Ratio} 409.621(0.000)		
	Total	β_1	0.000	0.000	1.074	0.287
		β_2	0.936	0.042	22.363	0.000
		$R^2 = 0.883$	DW = 1.462	$F_{Ratio} = 500.084$ (0.000)		

The performances of the market are also evaluated using the estimated values of the bi-variate correlation co-efficients. The estimated values are showing relationships of individual industry with the position of total performances. The estimated values and its significance levels are presented in **Table 6** through **Table 9**.

Table 6: Correlation co-efficients with the total performance series of the market in 2004

Industry	Bank	Textile	Service	Insurance	Food	Total
Bank	1	.942(**)	.405(**)	.886(**)	.707(**)	.991(**)
	.	.000	.001	.000	.000	.000
Textile		1	.580(**)	.897(**)	.836(**)	.950(**)
			.000	.000	.000	.000
Service			1	.418(**)	.640(**)	.398(**)
				.000	.000	.001
Insurance				1	.866(**)	.930(**)
				.	.000	.000
Food					1	.762(**)
					.	.000
Total						1

** Correlation is significant at the 0.01 level (2-tailed).

Table 7: Correlation co-efficients among the selected industries with the total performance series of the market in 2005

Industry	Bank	Textile	Service	Insurance	Food	Total
Bank	1	.842(**)	.655(**)	-.325(**)	.294(*)	.770(**)
	.	.000	.000	.007	.016	.000
Textile		1	.896(**)	-.118	.583(**)	.802(**)
		.	.000	.343	.000	.000
Service			1	.021	.713(**)	.731(**)
			.	.867	.000	.000
Insurance				1	.649(**)	.339(**)
				.	.000	.005
Food					1	.773(**)
					.	.000
Total						1

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Table 8: Correlation co-efficients among the selected industries with the total performance series of the market in 2006

Industry	Bank	Textile	Service	Insurance	Food	Total
Bank	1	.802(**)	.605(**)	.716(**)	-.191	.991(**)
	.	.000	.000	.000	.143	.000
Textile		1	.746(**)	.626(**)	-.048	.845(**)
		.	.000	.000	.716	.000
Service			1	.353(**)	.161	.663(**)
			.	.006	.218	.000
Insurance				1	-.097	.722(**)
				.	.461	.000
Food					1	-.106
					.	.418
Total						1

** Correlation is significant at the 0.01 level (2-tailed)

Table 9: Correlation co-efficients among the selected industries with the total performance series of the market in 2007

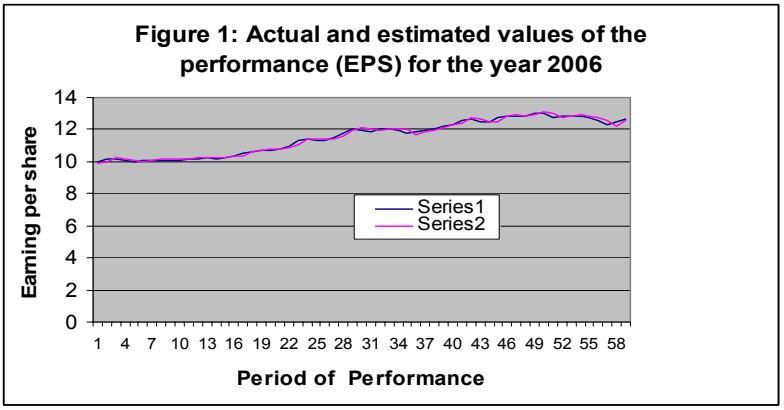
Industry	Bank	Textile	Service	Insurance	Food	Total
Bank	1	-.682(**)	-.680(**)	.812(**)	.879(**)	.983(**)
	.	.000	.000	.000	.000	.000
Textile		1	.921(**)	-.522(**)	-.622(**)	-.631(**)
		.	.000	.000	.000	.000
Service			1	-.531(**)	-.608(**)	-.618(**)
			.	.000	.000	.000
Insurance				1	.808(**)	.858(**)
				.	.000	.000
Food					1	.907(**)
					.	.000
Total						1

** Correlation is significant at the 0.01 level (2-tailed).

5.2 Estimated ARIMA models

(i) An estimated model of the performance series of DSE for the year 2006

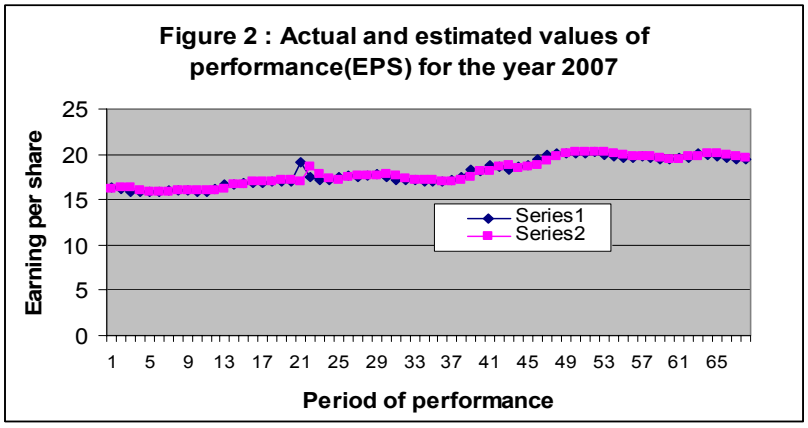
Variables	Estimated values	SD	t-ratio	p-value
Constant	0.004	0.002	2.593	0.027
AR_1	0.326	0.126	2.269	0.012



(ii) An estimated model of the performance series of DSE for the year 2007

Variables	Estimated values	SD	t-ratio	p-value
Constant	0.002	0.002	1.281	0.204
AR_1	-0.217	0.120	-1.809	0.074

The estimated values of the variables are found very close to the actual values. Figure 2 presents the actual and estimated values of the ARIMA model of the performance series (Price Earning Ratios) for the 2007.



6. Conclusion and recommendations

On the basis of the estimated results following conclusions and recommendations are made:

i. The results suggest that the industry under Dhaka stock market is not weak form efficient. But the estimates which are based on data may not be above the limitations because it is not known whether all information contained in the historical prices of securities fully reflected the current price level. This includes non-availability of refined information on current market price per share, earnings per share, profit making strategy, trading and non-trading policies of the industry. As a result, price earning ratio of individual industry is not following the principle of random walk model. Ko and Lee (1991) pointed out that violations of the random walk model are not evidence of market efficiency in weak form. If the random walk hypothesis holds, the weak-form of the efficient market hypothesis must hold, but not the reverse.

ii. The indication of the serial correlation in the return series of individual industry does not mean that the returns are unpredictable. The reasons may be the loose disclosure of required information for the investors, rumors, less sincerity towards the efficient handling of the business, slow and sluggishness in trading (Errunza and Losq, 1995).

iii. Rumor on non-declaration of any dividends may affect the movements of share price. This gives evidence that the share prices of UCB sharply dipped by 11.34 % (The Financial Express, November 30, 2007).As a result, the registered companies under the Stock markets need to give clear picture about the boards, greater disclosures of the performance, and interactive and dynamic corporate governance environment in the annual report. This may increase the level of supports stakeholders and creditors for survival, growth, and developing competitiveness.

iv. Warning issued to investors from the supervising authority in the time when bad practices already started can be held responsible to bring about a disruption in the market. The warning if needed to be imposed should be imposed well ahead of that incidence. Example may be the recent fall in the generalized index of DSE. (FE: 29th November, 2007).

v. The extended loan facility by the merchant bank and some brokerage houses to the retail investors have played an important role in setting a bullish trend in the market for the past few months. This may be a backdrop of overheated market. As a result, Securities and Exchange Commissions (SEC) asked the merchant banks and brokerage houses to suspend portfolio loan disbursement until further order (FE, 20th November, 2007). On the other hand, SECs withdraw the banning of loan disbursement by the merchant banks keeping the suspension continued on brokerage houses with some modification such as loan to retail investors in the ratio 1:0.5 instead of 1:1 basis. Consequently, the share market is becoming risky because of large gap between demand for, and supply of quality shares.

vi. The stock-market information relating to highlights of performance including major gainers and major losers and market capitalization leaders on the basis of daily performances need wide spread circulation on daily basis.

vii. SEC extending their trading network to different destinations of the country in order to facilitate more investors. This extension program may be taken after building required infrastructure. Otherwise, extension program may go ahead unpredictable with disturbances which may be irrepairable.

viii. Unsystematic risk which is called industry specific risk may create some sort of swing in their investment behavior. Regular and systematic releases from the SEC may play role in reducing the volatility behavior of investors.

ix. Reasons of cluster volatility required periodic analysis in terms of economic, political, socio-economic and build friendly environmental directions.

Policy Implications

The estimated results of different models help the policy makers, researchers, and analysts for undertaking further researches in order to make the Bangladesh stock markets a most transparent market which will be compatible in the form of semi-strong , and strong efficient market hypotheses.

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