RANDOMNESS IN CASPI (CSE ALL SHARE PRICE INDEX) : AN EMPIRICAL STUDY

Tahsina Haque Simu

Lecturer, Department of Business Administration
Shahjalal University of Science and Technology,
Bangladesh.

ABSTRACT

The existence of randomness in Chittagong Stock Exchange (CSE) in Bangladesh has been empirically examined in this article using monthly stock returns. The presence of the randomness has been reported in several developed and emerging stock markets. This study investigates the existence of randomness in return series of Chittagong Stock Exchange (CSE) All Share Price Index (CASPI) by calculating the return series using monthly values of the index for the period from 2001 to 2011. It is widely believed that asset prices, such as stock prices or exchange rates follow random walk, that is future prices are not predictable on the basis of past prices and therefore there is no scope for profitable speculation in the stock market. Several statistical and econometric methods were used to measure the randomness of the data series. The findings of the study reveal that the return series deviates from normal distribution. Empirical analysis also finds that the values are statistically dependent. The results do not conform to the existence of random walk in stock returns in CSE. The data series is also found to be stationery, that is does not follow random walk.

Keywords*: Monthly stock returns, Stationarity of returns, Unit root.*

Introduction:

Efficiency in emerging capital market has been an area of great interest to the finance researchers for various reasons. The capital market of Bangladesh is not as effective needed to build a strong and sound economy. Our economy is still emerging and capital market is still in a vulnerable condition, only a small number of researches are available. M. Kabir Hassan, et all, (2000) have identified volatility and market efficiency as the prime determinant for the effectiveness of the stock market in economic development.

Such as presence of a random walk in an emerging capital market has important implications for concerned parties like investors, issuers, regulators and policy makers and financial and economic development. Investors can adopt appropriate trading strategies, issuers can take corrective actions to maintain stability of the market prices of securities and policy makers and regulators can take up appropriate regulations for development of financial market if the random walk characteristics of the stock returns are known.

The presence of randomness in share prices has been studied by many researchers. Bachelier (1900) and Cowels (1933) both supported the random walk behaviour of stock prices. The idea that knowledge of past price changes produce no information about future price changes had also been supported by Kendall (1953) and Alexander (1961).

Cootner (1962) concluded that price movements in the speculative markets are random and returns in this markets tends to follow leptokurtic distribution. Fama (1966) showed that security returns do not confirm to normal distribution. He concluded that the stock price movements are independent and the returns of the stock prices confirms to the leptokurtic distribution.

Kumar and Makhija (1986) investigated the efficiency of non-stationary stock price time series and concluded that non-stationary time series confirms to the efficient Market Hypothesis.

Brown and Eston (1989) made an attempt to study the efficiency of London Stock Exchange. They used serial correlation runs test and found that the London market was efficient in the historical time period. They concluded that the price movements were independent and found serial correlation coefficient close to zero. Dokko and Ed elstein (1989) did a similar study in Livingstone stock market and found that the stock prices follow random walk. Chen Ping (1966) concluded the non-existence of random walk.

Most of the studies conducted in developing and in the less developed markets concluded that stock prices does not follow random walk and markets are not weak form efficient. Hasan and Maroney (2004) examined the issue of nonlinearity and thin trading as a test of for market efficiency in context of Bangladesh (i.e. Dhaka Stock Exchange).No such study has, thus far been conducted on the CSE return series on Bangladesh.

Mobarek and Keasey (2000) examined the behavior of stock price movement in Dhaka Stock Exchange (DSE) in Bangladesh. They concluded that the DSE is not weak form efficient. Rahman, Salat and Bhuiyan (2004) did a similar study in DSE but contradicted with Mobarek and Keasey (2000) and said that the DSE General Index follows a random walk and the market is efficient in weak form. Ahmed (2002) also investigated the behavior of stock prices in the DSE and said that stock prices can not be described in terms of random walk theory rather they follow some dependency. In an earlier study Chowdhury (1944) examined the statistical properties of daily returns in the DSE and found the evidence of positive correlation and conditional heteroscedasticity. So the specific objective of this paper is to find out whether stock price behaviour of CSE follows random walk or not contribute to the finance literature. The findings may be of use to capital market participants like managers, investors as well as regulatory authorities.

The rest of the article is organized as follows. Section II provides a brief overview of CSE. Section III discusses data and methodology. Section IV discusses the statistical properties of the return series and analyses the empirical findings. Section V concludes the article.

Objectives of the Study:

To find out whether randomness exists in CASPI (Chittagong Stock Exchange (CSE) All Share Price Index).

The CSE: A Brief Description:

The SEC approved the establishment of the second stock exchange of the country, Chittagong Stock Exchange (CSE) by issuing the Certificate of Registration to CSE in February, 1995. CSE consists of 70 members representing profession, trade, commerce and industry of Chittagong. It is managed by a Board of Directors, comprising of 12 elected directors and 6 directors to be nominated by the Commission. CSE was incorporated as a public company under the Company Act, 1994 on 1 April, 1995.

Chittagong Stock Exchange Ltd. (CSE) has a policymaking Body of 24 members, of whom 12 are elected and 12 are non elected. This Board comprises of one President, three Vice Presidents and 19 Directors. There is an independent secretariat headed by a Chief Executive Officer (CEO).

In the year 2008, CSE extended its network to Khulna, Moulovibazar, Sylhet, Chhatak, and Hathazary in Chittagong.Up to now CSE trading network is extended to 11 cities and 4 upazillas.

Automated Trading System:

In the secondary market, surveillance is more active and particular than before. Trading has now become automated, led by the Chittagong Stock Exchange through the central depository. In the present automated trading environment, bids/offers, depth and required broker particulars are all recorded and can be retrieved for future reference. The Central Depository Bangladesh Limited (CDBL) was created in August 2000 to operate and maintain the Central Depository System (CDS) of Electronic Book Entry, recording and maintaining securities accounts and registering transfers of securities; changing the ownership without any physical movement or endorsement of certificates and execution of transfer instruments, as well as various other investor services including providing a platform for the secondary market trading of Treasury Bills and Government Bonds issued by the Bangladesh Bank. There are strict rules and guidelines, trading circuit breakers and international standard surveillance to protect investor rights and ensure fair play.

The steady investment atmosphere prevailing with good return prospects, stable market growth and uninterrupted trading attracted a good number of investors to the market. The P/E ratio now stands at 20 times as compared to 14.1 times for emerging markets.

Besides its regular/normal trading facilities, CSE offers additional services, Internet Trading Services (ITS) and Over-the-Counter (OTC) market.

Internet Trading Services (ITS):

CSE is not only the pioneer of establishment of nationwide trading mechanism. CSE introduced internet Based Trading in May 2004 to enable the remote investors to have trading facilities from home and abroad directly. Investors may have access to CSE trading network not only from the premises of the brokers but also from their PC/Laptop/Cell Phone through the internet from any corner of the globe. The CSE network allows its user to use internet as an order routing system for communicating clients' orders to CSE's main trading engine through the brokers. Broker can provide this service to their client on obtaining necessary permission from the exchange. CSE has stipulated the minimum conditions to be fulfilled by brokers to start internet based trading services. The ITS is getting popular and the users of this module are increasing.

CSE Indices:

Like other exchanges around the globe, CSE has also some indices to indicate the relative value of prices or values of listed securities on a particular day compared with a base day/prior day points.

The well-recognized indices of CSE are:

a) CSE All Share Price Index (CASPI)
b) CSE-30 Index
c) CSE selective Categories Index (CSCX)
d) CSE Sector wise index

CSE has been maintaining its All Share Price Index since 10 October 1995 using Chained Paasche method. Considering its limitations, CSE has replaced its old method of calculation by new one following Laspeyres Method where base index was set to 1000 points and the base date was 30 December 1999. This Index came into effect from 1 January 2000.

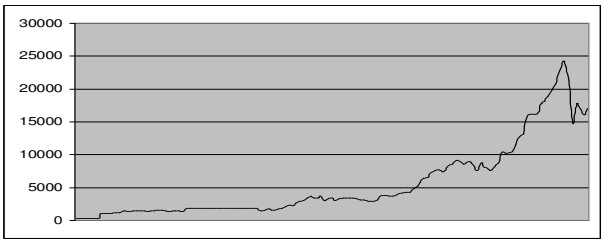

Chart: CASPI over the period from June,1999 to June,2011

Data and Methodology:

Data used in the study includes monthly closing values of CSE All Share Price Index(CASPI) from January 2001 to December 2009. The sample includes 108 monthly observations for the sample period. All the statistical and econometric methods have been applied on the entire sample.

After collecting data monthly returns were calculated using continuously compounded return formula. The returns were calculated as the logarithmic difference between two consecutive prices in the series yielding continuously compounded returns. Monthly returns were calculated using the following formula

$R_t = \ln(P_t) - \ln(P_{t-1})$

Where:

R_t = Return on closing index price

P_t = closing index price at time t

P_{t-1} = closing index price at time (t-1)

ln= Natural logarithm

Results and Discussion:

The frequency distribution of the monthly return series of the CASPI are given below.

Table 1: Descriptive statistics of Monthly return of CASPI

Observations	144
Mean	0.030099875
Median	0.009176018
Maximum	1.626915584
Minimum	-0.377772063
Standard Deviation	0.155394868
Sample Variance	0.024147565
Kurtosis	78.888871
Skewness	7.546207783
J-B Test of Normality	35912.16
Probability	

Table-1 presents the descriptive statistics of the monthly return series of the CSE All Share Price Index. The coefficients of skewness indicates that the distributions are not normally skewed. The findings contradict with the findings of Poshokwale, S. (1996) in the Indian Market and Mobarek and Keasey (2000) in the Bangladesh stock market. Generally a value of zero for skewness and three for Kurtosis represent that the distribution is perfectly normally distributed. The value of kurtosis>3 means leptokurtic distribution. That means flatter tails than the normal distribution. So the excessive value of skewness and Kurtosis implies that the distributions are deviant. The Jarque-Bera test also proves that the distributions are not normal.

Bekaert et all.(1998) provide evidence that 17 out of 20 emerging countries examined(the sample does not include Bangladesh) have positive skewness and 19 out of 20 have excess kurtosis, so that normality was rejected for a majority of the sample countries.

Table 2: Kolmogorov-Smirnov goodness of Fit test results

Absolute	Positive	Negative	Kolmogorov-Smirnov Z	Asymp. Sig. (2-tailed)
.223	.223	-.209	2.672	.000

From the table 2 we can see that the value of Z is 2.672 which clearly indicate unusual distribution of return series in CASPI.

Table 3: Results of Auto-correlation of monthly return series of CSE All Share Price Index

Lag	AC	PAC	Q-Stat
1	-.047	-.047	.323
2	-.010	-.012	.337
3	.024	.023	.423
4	-.023	-.021	.505
5	.002	.001	.505
6	.035	.034	.694
7	-.016	-.012	.733
8	-.060	-.062	1.291
9	.041	.034	1.549
10	-.027	-.023	1.666
11	-.025	-.025	1.767
12	-.027	-.035	1.884
13	-.067	-.067	2.608
14	.003	.000	2.610
15	-.026	-.032	2.723
16	.001	-.001	2.724
17	-.044	-.043	3.044
18	-.037	-.044	3.274
19	-.030	-.035	3.428
20	-.022	-.031	3.513
21	-.027	-.037	3.635
22	-.026	-.030	3.751
23	-.002	-.013	3.751
24	.133	.133	6.868
25	-.023	-.022	6.965
26	-.012	-.020	6.992
27	.035	.025	7.213
28	.014	.016	7.248
29	-.013	-.021	7.280
30	.002	-.025	7.281
31	.019	.016	7.350
32	.014	.023	7.384
33	.008	-.015	7.397
34	-.012	-.017	7.425
35	.006	.008	7.432
36	.001	.002	7.432
37	.011	.018	7.455
38	-.011	-.021	7.479
39	-.033	-.031	7.700
40	-.008	-.014	7.713
41	-.004	.001	7.716
42	-.014	-.008	7.755

*Autocorrelation at two standard error limits.
*Ljung-Box Q-statistics significant at 1% level of significance

Table- 3 shows auto-correlation (AC) coefficient in 2nd column, partial correlation (PAC) in 3rd column and Ljung-Box Q-statistic in 4th column. From the table it is clearly evident that there is significant positive auto-correlation at 3rd, 6th, 9th, 24th, 27th, 31st, 32nd, 33rd, 37th lags and significant negative auto-correlation at 2nd , 7th , 23rd, 26th ,29th , 34th ,38th,40th, 41st, 42nd lags over the entire period.

The existence of non-zero auto-correlation coefficient in the monthly return series of CASPI suggests that there is a serial dependence among the values. The nonzero auto-correlation of the series linked with Ljung-Box Q statistics, which are jointly significant at 1% level at 42 degrees of freedom (lags); suggest that the series is not random.

To test the stationarity (or nonstationarity) of CSE index return series we also use the unit root test which has become widely popular over the past several years.

Table 4: Unit Root test results

	Test Statistics	1% Critical Value	5% Critical Value	10% Critical Value
DF	-12.447	-3.496	-2.887	-2.577
Phillips-Perron	-12.449	-3.496	-2.887	-2.577
DF-GLS				
Lags	**Test Statistics**	**1% Critical Value**	**5% Critical Value**	**10% Critical Value**
1	-8.042	-3.527	-2.977	-2.687
2	-5.970	-3.527	-2.965	-2.676
3	-5.193	-3.527	-2.952	-2.665
4	-4.369	-3.527	-2.939	-2.652
5	-4.157	-3.527	-2.924	-2.639
6	-4.065	-3.527	-2.909	-2.625
7	-4.157	-3.527	-2.892	-2.610
8	-4.040	-3.527	-2.875	-2.594
9	-4.035	-3.527	-2.857	-2.577
10	-4.030	-3.527	-2.838	-2.560
11	-4.036	-3.527	-2.819	-2.542
12	-4.193	-3.527	-2.800	-2.524
13	-4.000	-3.527	-2.780	-2.505

From table 4 we can see that in case of DF,DF-GLS and PP unit root test, test statistic exceed the critical values at 1%,5%, and 10% significant level. Thus the null hypothesis of a unit root is rejected. The results clearly indicate that CASPI return series are stationary data series and do not contain a unit root. In other words, the return series lacks randomness

Conclusion:

In this study we have used statistical and econometric tests to determine whether the monthly stock return series in CSE is appropriately modeled by randomness. Whether stock price behavior in the CSE is appropriately modeled by a random walk is the focus of the study. The study investigates the existence of randomness in the monthly stock returns of CSE All Share Price Index (CASPI). Descriptive statistics indicates unusual distribution in the monthly returns. Jarque-Bera test and Kolmogorov-Smirnov goodness of fit test indicates that the data series are out of the ordinary. In the Dicky-Fuller unit test it is evident that there is no unit root. In the ACF and PACF test shows that there is a serial dependence among the values which suggest that the time series is stationary .The findings of the study indicate that stock returns in CSE are not entirely random. As a result, timing of investment is crucial because investors may take the opportunity to capitalize on it. Before we reach any conclusion further study involving other stock indices of CSE such as CSEX and CSE 20 index is needed.

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