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Stock Market: A Comparative Study between S&P 500 and DSE General Index

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I. Introduction

Capital formation is very core of economic development. No economic development is possible without capital formation. Capital formation indeed plays a decisive role in determining the level and growth of national income, hence economic development. Thus, in any programme of planned economic development capital formation must be assigned a significant role on account of a very close connection between economic growth and capital growth. [see also Dewett, K. K., pp-642-643].

For any country one of the most important sources of capital formation is financial market of that country. Financial markets also play a crucial role in helping individuals or corporations invest in financial assets. They offer alternative investment opportunities for individuals or corporations with excess funds. The main participants in financial market transactions are households, business (including financial institutions), and governments that purchase or sell financial assets. Financial markets facilitate the flow of funds form surplus units of deficit units. Those financial markets that facilitate the flow of short-term funds (with maturities of less than one year) are known as money markets, while those that facilitate the flow of long-term funds are known as capital markets.

Securities with a maturity of one year or less are called money market securities, whereas securities with a maturity of more than one year are called capital market securities. [see also Madura, J.,(1998)] Three common types of capital market securities are bonds, mortgages, and stocks. The stock market is a pivotal institution in the financial system of a country. Stock market tends to very efficient in the allocation of capital to its highestvalue users. These markets also help increase savings and investment, which are essential for economic development. [see also Madura, J., pp. (1998)]. Stock markets are categorized as efficient or inefficient or less efficient market where an efficient market is one which reacts quickly and in an unbiased manner to the release information. Stock market tends to very efficient in the allocation of capital to its highest-value users. These markets also help increase savings and investment, which are essential for economic development. An equity market, by allowing diversification across a variety of assets, helps reduce the risk the investors must bear, thus reducing the cost of capital, which in turn spurs investment and economic growth.

The stock market plays a vital role on financial condition of any country. There is a great impact of the 1987 stock market crash on financial markets all over the world. On October19, 1987, the Dow Jones industrial Average declined to 1798.42 form 2246.74 on the previous trading day. This represents a 22.6 percent decline, significantly exceeding the 12.8 percent oneday decline on October 28, 1929 . Various financial markets and institutions were affected by the stock market crash. (See also Madura, J., 1998, pp.266-267).

From the above it is clear that the stock market of the developed countries have some impact on the economy of lower developed countries. Here, in this study we compare two stock market indices SP500 and DSE General Index.

II. Data

a) DSE General Index

Bangladesh capital market is one of the smallest in Asia but the third largest in the south Asia region. It has two full-fledged automated stock exchanges namely Dhaka Stock Exchange (DSE) and Chittagong Stock Exchange (CSE). Both the stock markets are operated by Security and Exchange Commission (SEC).

Dhaka Stock Exchange (Generally known as DSE) is the main stock exchange of Bangladesh. It was incorporated in 1954. Dhaka stock exchange is the first stock exchange of the country. Several indices are available for Dhaka Stock Exchange. The data set we

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use is the DSE General index from 01st January 2002 to 19th August 2012.

b) S&P 500 Index

Standard & Poor's introduced its first stock index in 1923. Before 1957 its primary daily stock market index was the "S&P 90", a value-weighted index based on 90 stocks. Standard & Poor's also published a weekly index of 423 companies. The S&P 500 index in its present form began on March 4, 1957. Technology has allowed the index to be calculated and disseminated in real time. The S&P 500 is widely employed as a measure of the general level of stock prices, as it includes both growth stocks and the generally less volatile value stocks. The S&P 500 is a stock market index containing the stocks of 500 American Large-Cap corporations. The index is owned and maintained by Standard & Poor's, a division of McGraw-Hill. All of the stocks in the index trade on the two largest US stock markets, the New York Stock Exchange and Nasdaq. In this study we use S&P 500 index from 01st January 2002 to 19th August 2012.

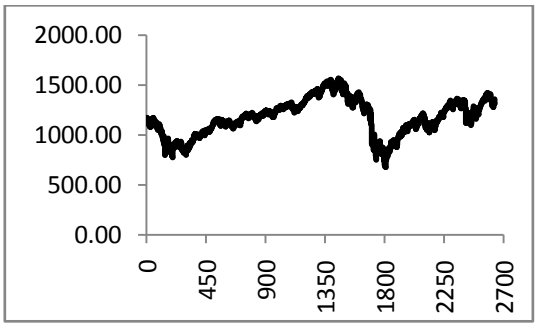

Figure 1 : S&P 500 Index

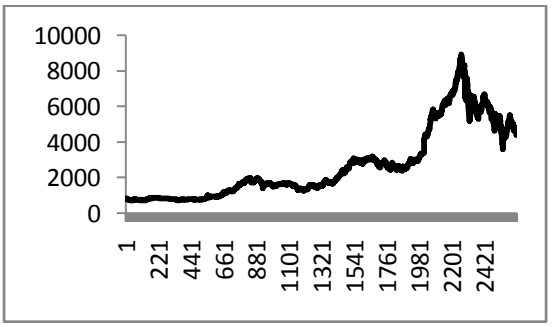

Figure 2 : DSE General Index

Table 1 : Descriptive Statistics

	S&P 500	DSE General Index
Minimum	676.53	742.23
Maximum	1565.15	8918.50
Mean	1174.06	2688.62
Standard Deviation	182.9343	1975.34
Skewness	-0.16989	1.092
Kurtosis	-0.57584	0.120

III. Return Series and Volatility

Returns are defined as the natural logarithm of price relatives; that is, , where is the daily S&P500 or DSE General Index. We obtain the daily volatility simply squaring the return series. To find the volatility period, the monthly volatility will be more friendly then daily volatility. In literature there are a number of ways to obtain monthly volatility series. Here, Merton (1980) and Perry (1982) who calculate the monthly volatility simply as the sum of squared daily returns in that month that is

$$\sigma_T^2 = \sum_{i=1}^{N_T} r_t^2$$

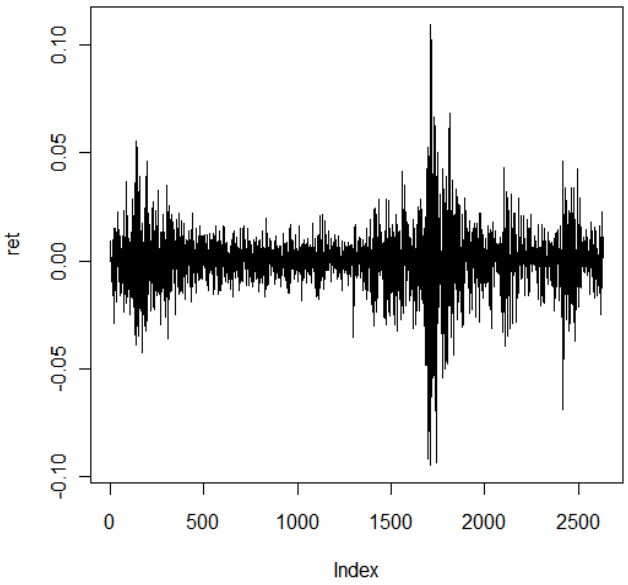

Figure 3 : Return Series (S&P 500 Index)

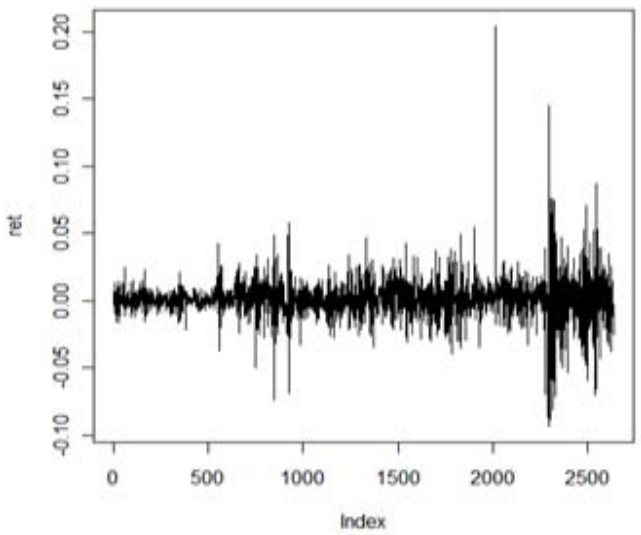

Figure 4 : Return Series (DSE General Index)

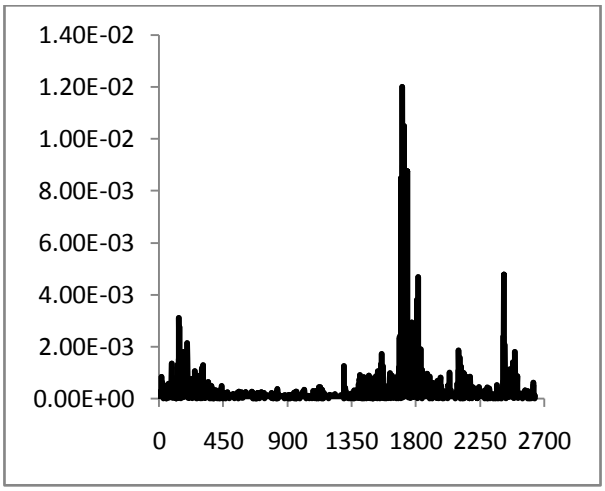

Figure 5 : Volatility Series (S&P 500 Index)

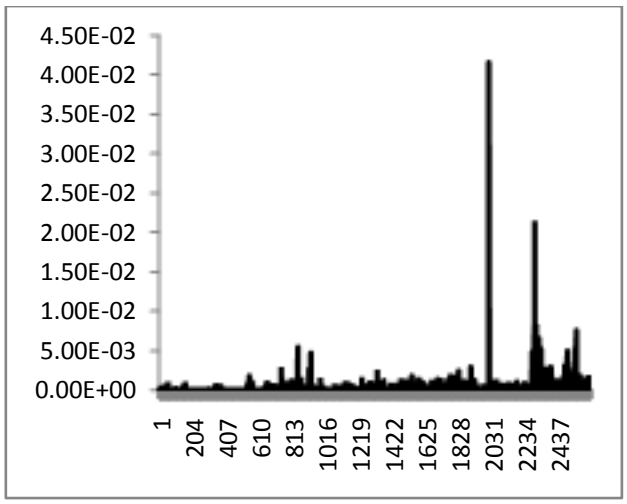

Figure 6 : Volatility Series (DSE General Index)

The table-2 shows the descriptive statistics return series of DSE General Index and S&P 500 index. From these we see that maximum occurs at 2008 in S&P500 and its impact may fall on DSE on 2009. Here also we see from the standard deviation of deferent year the S&P 500 index is more stable than DSE general index, because the standard deviation of return series fluctuates more in DSE General Index than the S&P 500 index. Which is also reveals from the mean, where also the DSE exhibits same scenario. The DSE General Index shows its leptokurtic pattern three times which are: 2003, 2005 and 2009 and the S&P 500 index shows only one time which is in 2008 is slightly over than platykurtic. The S&P 500 index return series shows its nature near the symmetricity in most of the year (i.e., closer to zero) than the DSE General Index.

Table 2 : Descriptive statistics of return series of S&P 500 index and DSE General Index

	Mean		Standard Deviation		Skewness		Kurtosis		Maximum		Minimum	
	DSE	S&P 500	DSE	S&P 500	DSE	S&P 500	DSE	S&P 500	DSE	S&P 500	DSE	S&P 500
2002	0.00006	-0.0009	0.006	0.016	0.252	0.43	1.07	0.64	0.02	0.06	-0.017	-0.042
2003	0.0005	0.0008	0.008	0.011	0.434	-0.01	6.44	0.74	0.04	0.03	-0.037	-0.036
2004	0.0027	0.0003	0.011	0.007	-0.445	-0.11	2.41	-0.14	0.03	0.02	-0.050	-0.016
2005	-0.0006	0.0002	0.014	0.007	-0.515	0.01	6.99	-0.09	0.06	0.02	-0.074	-0.017
2006	-0.0002	0.0004	0.011	0.006	0.185	0.08	0.26	1.26	0.03	0.02	-0.028	-0.018
2007	0.0027	0.00009	0.012	0.010	0.073	-0.49	0.83	1.43	0.05	0.03	-0.035	-0.035
2008	-0.0003	-0.0017	0.013	0.026	0.107	-0.04	0.71	3.71	0.04	0.11	-0.040	-0.095
2009	0.0020	0.0008	0.017	0.017	7.010	-0.07	82.03	1.97	0.20	0.07	-0.035	-0.054
2010	0.0025	0.0005	0.012	0.011	-1.101	-0.22	5.15	2.05	0.04	0.04	-0.070	-0.040
2011	-0.0019	0.0000	0.030	0.015	0.345	-0.52	2.95	2.92	0.14	0.05	-0.093	-0.069
2012	-0.0015	0.0005	0.025	0.008	0.083	-0.14	1.33	0.72	0.09	0.02	-0.070	-0.025

IV. Forecasting Model

a) Auto Regressive Conditional Heteroscedasticity (ARCH)

The $ARCH(q)$ model is proposed by Engle(1982) defined by

$$\begin{cases} r_t = \mu + \sigma_t \varepsilon_t \\ \sigma_t^2 = \lambda + \alpha_1 (r_{t-1} - \mu)^2 + ... + \alpha_q (r_{t-q} - \mu)^2 \end{cases}$$

where $\varepsilon_t \sim iidN(0,1)$. Hence the volatility σ_{t+1}^2 can be represented by

$$E((r_{t+1} - \mu)/I_t) = \sigma_{t+1}^2$$
$$= \lambda + \alpha_1 (r_t - \mu)^2 + ... + \alpha_q (r_{t+1-q} - \mu)^2$$

where I_t is the information set at the end of the period t.

b) Generalized Arch (GARCH)

For the ARCH (q) model, in most empirical studies, q has to be large. This motivates Bollerslev (1986) to use the GARCH (p; q) specification which is defined as

$$\begin{cases} r_t = \mu + \sigma_t \epsilon_t \\ \sigma_t^2 = \lambda + \sum_{j=1}^{q} \alpha_j (r_{t-j} - \mu)^2 + \sum_{j=1}^{p} \beta_j \sigma_{t-j}^2 \end{cases}$$

V. Result and Conclusion

The Stock Market is the main pillar of economy of any country and plays very important role for the economic development of any country. The Stock Market can be a reliable source for investing in industrial sector of any country by the investment of the population. The investors be a partner in the development of country by investing in Stock Market. So, the Stock Market is a important one for any economy and that's why we should make a great concern about stock market to make a healthy economy.

In this study we make a comparison between the S&P 500 index and The DSE General Index which may portrait a small impact of American economy to Bangladeshi economy. From the above we see that the Dhaka stock exchange is not a stable market where the American stock market is a very stable one. In 2009 the DSE shows the maximum return (the maximum volatility) and it also makes the mean, skewnes and kurtosis of return series maximum. In 2008 the S&P 500 index shows its maximum return (the maximum volatility) and the DSE General Index's maximum may be the result of it. If we make a look on the table-2 it can be easily seen the standard deviation of DSE General Index fluctuation is very high among the different year where the S&P 500 index shows very smooth fluctuation, which is a sign of very stable economy. And from the skewness it can be easily say, in most of the year the return of series of DSE General Index is very apart from the symmetricity where the S&P 500 index shows closeness to the symmetricity in maximum number of years.

Here, the following table-3 shows different model estimate of both S&P 500 index and DSE General Index volatility. Here, we present those models which significantly forecast the volatility of both index and among the six candidate models, GARCH (2,2) is best for DSE General Index, which is very clear from the value of AIC and BIC and its estimates are highly significant at 0.1% level. But for the S&P 500 index the ARCH(2) model forecast best according to AIC and BIC.

Table 3 : Volatility forecasting by several time series models

		DSE General			S&P 500		
GARCH(1,1)		Estimate	t-value	sig	Estimate	t-value	sig
	μ	0.00145	7.57	0.000(***)	0.00047	2.78	0.006(**)
	λ	0.000012	5.92	0.000(***)	0.0000014	4.52	0.000(***)
	α_1	0.3845	9.94	0.000(***)	0.084	9.22	0.000(***)
	β_1	0.649	26.4	0.000(***)	0.91	95.83	0.000(***)
		AIC=-5.9612	BIC=-5.9522		AIC= -6.28111	BIC=-6.2722	
GARCH(2,1)		Estimate	t-value	sig	Estimate	t-value	sig
	μ	0.00123	7.043	0.000(***)	0.00049	2.93	0.0034(**)
	λ	0.000014	5.448	0.000(***)	0.0000022	4.65	0.000(***)
	α_1	0.2047	6.202	0.000(***)	0.000	0.00	1.00
	α_2	0.3982	8.345	0.000(***)	0.1147	5.71	0.000(***)
	β_1	0.5080	14.25	0.000(***)	0.8702	65.03	0.000(***)
		AIC=-5.9902	BIC=-5.9791		AIC=-6.2954	BIC=-6.2842	
GARCH(2,2)		Estimate	t-value	sig	Estimate	t-value	sig
	μ	0.0012	6.87	0.000(***)	0.000495	2.97	0.0030(**)
	λ	0.000013	5.20	0.000(***)	0.0000024	4.08	0.000(***)
	α_1	0.19	6.03	0.000(***)	0.00	0.00	1.00
	α_2	0.52	10.89	0.000(***)	0.13	5.38	0.000(***)
	β_1	0.20	3.43	0.000(***)	0.66	2.44	0.0148(*)
	β_2	0.23	4.82	0.000(***)	0.20	0.79	0.428
		AIC=-5.9956	BIC=-5.9823		AIC=-6.2948	BIC=-6.2815	
ARCH(2)		Estimate	t-value	sig	Estimate	t-value	sig
	μ	0.00142	7.27	0.000(***)	0.00041	2.08	0.038(*)
	λ	0.000063	16.42	0.000(***)	0.000077	21.45	0.000(***)
	α_1	0.37	9.99	0.000(***)	0.19	6.86	0.000(***)
	α_2	0.58	11.46	0.000(***)	0.41	10.92	0.000(***)
		AIC=-5.351	BIC=-5.9262		AIC=-6.4067	BIC=-6.0317	
ARCH(4)		Estimate	t-value	sig	Estimate	t-value	sig
	μ	0.0013	7.12	0.000(***)	0.00047	2.72	0.0064(**)
	λ	0.000039	11.36	0.000(***)	0.000041	14.96	0.000(***)
	α_1	0.26	7.37	0.000(***)	0.053	3.46	0.000(***)
	α_2	0.57	11.56	0.000(***)	0.26	8.58	0.000(***)
	α_3	0.17	4.99	0.000(***)	0.24	8.65	0.000(***)
	α_4	0.13	5.35	0.000(***)	0.25	8.36	0.000(***)
		AIC=-5.9792	BIC=-5.9658		AIC=-6.1844	BIC=-6.1711	
ARCH(5)		Estimate	t-value	sig	Estimate	t-value	sig
	μ	0.0013	7.15	0.000(***)	0.00048	2.82	0.0049(**)
	λ	0.000033	9.11	0.000(***)	0.000035	13.91	0.000(***)
	α_1	0.25	7.22	0.000(***)	0.03	2.25	0.0245(*)
	α_2	0.58	11.87	0.000(***)	0.20	7.35	0.000(***)
	α_3	0.16	4.568	0.000(***)	0.19	7.47	0.000(***)
	α_4	0.11	4.57	0.000(***)	0.21	7.62	0.000(***)
	α_5	0.095	3.58	0.000(***)	0.17	6.73	0.000(***)
		AIC=-5.9860	BIC=-5.9704		AIC=-6.2213	BIC=-6.2057	

Signif. codes: '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

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