DOES STOCK MARKET DEVELOPMENT CAUSE ECONOMIC GROWTH? A TIME SERIES ANALYSIS FOR BANGLADESH ECONOMY

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Abstract

In this paper the principal purpose has been made to investigate the causal relationship between stock market development and economic growth in Bangladesh. To investigate long-run causal linkages between stock market development and economic growth the Engle-Granger causality and ML tests are applied. In this paper another attempt has been made to investigate the non-stationarity in the series of stock market development and economic growth by using modern econometric techniques. The co-integrated tests are applied to know whether this pair of variables shares the same stochastic trend or not. From our analysis it has been found that the stock market development strongly influences the economic growth in Bangladesh economy, but there is no causation from economic growth to stock market development. Thus unidirectional causality has prevailed between stock market development and economic growth in the Bangladesh economy. Also it has been found that all the variables are integrated of order 1, and both the variables stock market development and economic growth share the same stochastic trend in Bangladesh economy.

JEL Code: C010

Key Words: Stock Market Development, Causal Relationship, Non-stationarity, Unit Root Test, Co-integrated Tests

1 Introduction

Stock market development plays an important role for economic growth in the developed and developing countries. Shahbaz et al. (2008) argues that stock market development is an important factor for economic growth as there is a long-run relationship between stock market development and economic growth. Stock market development has the direct impact in corporate finance and economic development. Gerald (2006) states that stock market development is important because financial intermediation supports the investment process by mobilizing household and foreign savings for investment by firms. It ensures that these funds are allocated to the most productive ways and spreading risk and providing liquidity so that firms can operate the new capacity efficiently. A growing body of literature has expressed the importance of financial system to economic growth. Mishkin (2001) states that an organized and managed stock market stimulate investment opportunities by recognizing and financing productive projects and lead to economic activity, mobilize domestic savings, allocate capital proficiency, help to diversify risks, and facilitate exchange of goods and services. From the view point of Sharpe, et al (1999) stock market is a mechanism through which the transaction of financial assets with life span of greater than one year takes place. Financial assets may take different forms ranging from the long-term government bonds to ordinary shares of various companies. Stock markets are the most important institutions in the capital market where the shares of various companies are traded. Trading of the shares may take place in two different forms of stock market. When the issuing company sells its shares to the investors, the transaction is said to have taken place in the primary market, when already issued shares of companies are traded among investors the transaction is said to have taken place in the secondary market.

Stock markets are very important because they play a significant role in the economy by changing investment where it is needed and can be putted to best (Liberman and Fergusson 1988). The stock markets are working as the channel through which the public savings are mobilized to industries and business enterprises. Mobilization of such resources for investment is certainly a necessary condition for economic take off, but quality of their allocation to various investment projects is an important factor for economic growth. This is precisely what an efficient stock market does to the economy (Berthelemy and Varoudaks 1996).

During nineteenth and twenty century, Bagehot (1973) and Schumpeter (1912) had focused on the constructive assistance of financial sector to economic growth. In the study, the direction of causality between the higher growth in financial sector and country’s economic growth rate was not clear (Robinson, 1952 and Lucas, 1988). Also, most of the traditional growth theorists believed that there is no correlation between stock market development and economic growth because of the presence of level effect not the rate effect. Similarly Singh (1997) contended that stock markets are not necessary institutions for achieving high levels of economic development. Many viewed stock market as a agent that harm economic development due to their susceptibility to market failure, which is often manifest in the volatile nature of stock markets in many developing countries (Singh, 1997; Singh and Weis, 1999). So, the traditional assessment model of stock prices and the wealth effect provide hypothetical explanation for stock process to be proceeded as an indicator of output (Comincioli, 1996). According to wealth effect, however, changes in stock prices cause the variation in real economy (Bhide, 1993; and Obstfeld, 1994).

Contrary to traditional views; a large number of theoretical and empirical works have been done in order to understanding the strong positive linkage between stock market development and economic growth. See for example likes Shahbaz, Ahmed and Ali (2008) has found a long run relationship between stock market development and economic growth. Stock market development has the direct impact in corporate finance and economic development. Deb and Mukherjee (2008) have found a bi-directional causality between real GDP growth rate and real market capitalization ratio in the Indian Economy. Adjasi and Biekpe (2005) found a significant positive impact of stock market development on economic growth in countries classified as upper middle income economies. In the same way, Chen et al (2004) elaborated that the nexus between stock returns and output growth and the rate of stock returns is a leading indicator of output growth. Arestis et al (2001) using time series on five industrialized countries also indicate that stock markets play an important role for economic growth. Various studies such as Spears (1991); King and Levin

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(1993a, b), Levin and Zervos (1998), Atje and Jovanovic (1993), Comincioli (1996), Filer et al (1999), and Demirguc and Maksimovic (1996), have found positive association between financial development and economic growth, by real market capitalization ratio (size proxy) defined by the ratio of market capitalization to real GDP. These studies largely based on developed and developing countries. Only few studies have been conducted for less developed/underdeveloped countries. In Bangladesh the development and growth of stock markets have been widespread in recent times. The stock market development could have important implications for economic activity. Pardy (1992) has noted that even in less developed countries capital market are able to mobilize domestic savings and able to allocate funds more efficiently. Thus stock market can play an important role in inducing economic growth in Bangladesh by channeling investment where it needed from public. Mobilizing of such resources to various sectors certainly helps in economic development and growth. That is why, in this paper the principal purpose has been made to investigate the causal relationship between stock market development and economic growth in Bangladesh. In this paper another attempt has been made to investigate the non-stationarity in the series of stock market development and economic growth by using modern econometric techniques. The co-integrated tests are applied to know whether the pair of variables shares the same stochastic trend or not.

2 Data Measurement

This study focuses on the Bangladesh economy spanning over a time period of about 33 years from 1976 to 2008. This study is based on secondary data which are collected from annual reports and official reports of concerned organizations naming “Economic Trends” published by the Statistics Department of Bangladesh Bank, website of Dhaka Stock Exchange (DSE), Research Department of Dhaka Stock Exchange (DSE) and website of Securities & Exchange Commission (SEC) of Bangladesh, Statistical Yearbooks of Bangladesh. The variables we have used are as follows:

a. Economic development is measured by the growth rate of real GDP at constant market price (base year: 1995-96 = 100) and also by the real per capita GDP
b. Stock market development is measured by real market capitalization ratio (size proxy) defined by the ratio of market capitalization to real GDP and also by the market capitalization.

3 Graphical Method

In order to study the existing upward trending of these considered variables, these series are presented graphically below in logarithmic form

Figure 1: Per Capita Real GDP, Growth Rate of Real GDP, Market Capitalization and Ratio of Market Capitalization to Real GDP in Logarithmic

From the above figure, it is clear to us all of these variables contain upward trend and this trend is unmistakable. Now the most important question arise in our mind, whether this trend arises positive drift or not. From the point of economic theory, all of these figures should exit a deterministic time trend and so a natural null hypothesis is that the true process is random walk with trend. Now for empirical verification of this null hypothesis for each and every variable, next the modern econometric techniques have been applied here.
4 Econometric Analysis

The principal econometric analysis involves testing whether the stock market development causes economic growth in Bangladesh economy. Before doing this an econometric analysis has been done to test whether stock market development and economic growth contains a unit root or not and whether an underlying co-integration relation exists. If both the series does not contain a unit root then any innovation to the series are temporary and have short-run consequences. Otherwise, any shocks to it will be permanent and thus have a long-run effect. To test for the stationarity of a variable a number of econometric techniques have been developed which are called unit root tests.

4.1 Unit Root Tests

It is well known that the usual techniques of regression analysis can result in highly misleading conclusion when variables contains stochastic trend (Stock and Watson (1988), Granger and Newbold (1974)). In particular if the dependent variable and at least one independent variable contain stochastic trend, and if they are not co-integrated, the regression results are spurious, (Phillips (1986), Granger and Newbold (1974)). To identify the correct specification of the model, an investigation of the presence of stochastic trend in the variables is needed. To test for the stationarity of economic growth, and stock market development a number of econometric techniques have been employed. The Dickey-Fuller, and Augmented Dickey-Fuller tests are applied in order to investigate that each of the variables contains stochastic trend or not.

For the Dickey-Fuller test, the following three cases have been considered in this paper;

**Case One:** Constant and trend terms are included in the equation

\[ \Delta X_t = \alpha_0 + \alpha_1 t + \theta X_{t-1} + u_t \]  

(1)

**Case Two:** Only constant term is included in the equation

\[ \Delta X_t = \alpha_0 + \theta X_{t-1} + u_t \]  

(2)

**Case Three:** No constant and trend terms are included in the equation

\[ \Delta X_t = \theta X_{t-1} + u_t \]  

(3)

and for the Augmented Dickey-Fuller Test, the following equations have been considered

**Case One :** Constant and trend terms are included in the equation

\[ \Delta X_t = \alpha_0 + \alpha_1 t + \theta X_{t-1} + \sum_{i=1}^{m} \phi_i \Delta X_{t-i} + u_t \]  

(4)

**Case Two:** Only constant term is included in the equation

\[ \Delta X_t = \alpha_0 + \theta X_{t-1} + \sum_{i=1}^{m} \phi_i \Delta X_{t-i} + u_t \]  

(5)

**Case Three:** No trend and constant terms are included in the equation

\[ \Delta X_t = \phi X_{t-1} + u_t \]  

(6)

Here \( X_t \) is the series under investigation, \( \Delta \) stands for first difference and the lagged difference terms on the right hand side of the equations are designed to correct for serial correlations of the disturbance terms. The lagged differences are selected by using the AIC and SBIC criteria. If \( \theta = 0 \), the series \( X_t \) contains a unit root and therefore an I(1) process governed by a stochastic trend. Since the estimated \( \theta \) does not have the usual asymptotic distribution, the values tabulated by MacKinnon (1991) are used; these values are more accurate than the ones original tabulated by Fuller (1976) and Dickey-Fuller (1987). We can also use the Phillips-Perron test. Phillips and Perron (1988) generalized the following results, to the case when the random error term \( u_t \) is serially correlated and possibly heteroscedastic as well. The Phillips-Perron test for the null hypothesis \( H_0 : \rho = 1 \), i.e. \( H_0 : \rho - 1 = \theta = 0 \), is given by;

\[ Z_{\rho} = T \left[ \hat{\rho} - 1 \right] - \frac{1}{2} \left[ T^2 \frac{\hat{\sigma}}{\hat{\sigma}^2} \right] \left[ \hat{\lambda}^2 - \gamma_0 \right] \]  

(7)

where the estimated autocovariances of the OLS residuals \( \hat{u}_t \)'s are given as;

\[ \hat{\gamma}_0 = \frac{T}{T-2} \sum_{t=1}^{T} \hat{u}_t^2; \hat{\gamma}_j = \frac{T}{T-j+1} \sum_{t=1}^{T} \hat{u}_t \hat{u}_{t-j}; \hat{\lambda}^2 = \hat{\gamma}_0 + 2 \sum_{j=1}^{q} \left[ 1 - j \right] \hat{\gamma}_j \]

To examine the order of integration for the variables by the unit root tests, the Dickey Fuller, the Augmented Dickey Fuller and the Phillips-Perron tests results are reported below;

**Table 1: The Dickey-Fuller (DF), Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) Tests Results**

<table>
<thead>
<tr>
<th></th>
<th>DF Test</th>
<th>ADF Test</th>
<th>PP Test</th>
</tr>
</thead>
</table>

*All the variables are in logarithmic form*

At 5% level of significance the critical values of DF and ADF tests for case one is -3.584, for case two is -2.980 and for case three is -1.95. For Phillips-Perron test the critical value at 5% level of significance for case one is -18.204, for case two is -12.51 and for case three is -7.305
If each variable individually is stationary in first differences (integrated of order 1), but linear combination estimation in the model, Case to GDP are non-random.

To consider the second order unit root in each series. The test results for the second order unit root are reported below:

**Table 2: The Dickey-Fuller (DF), Augmented Dickey-Fuller (ADF) and Philips-Perron (PP) Tests Results for 2nd Order Unit Root**

<table>
<thead>
<tr>
<th></th>
<th>DF Test</th>
<th>ADF Test</th>
<th>PP Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Case1</td>
<td>Case2</td>
<td>Case3</td>
</tr>
<tr>
<td>GRATE</td>
<td>-7.3047*</td>
<td>-7.3385*</td>
<td>-5.9808*</td>
</tr>
<tr>
<td>MCAP</td>
<td>3.7878**</td>
<td>3.8557*</td>
<td>2.89357*</td>
</tr>
</tbody>
</table>

**Results Discussions:** From the tests results it has been found that all the series do not contain second unit root. So, from the results it can be concluded that all the series are integrated of order one that is I(1). Next, the co-integrating relationship between different pairs of variables has been discussed for Granger causality investigation.

### 4.2 Co-integration Tests

The preceding analysis helps to make the point that the series, per capita real GDP, growth rate of real GDP, market capitalization and ratio of market capitalization to GDP are non-stationary which means that each series individually contains unit root. But, the questions is, either these series share a common trend, so that the gap will not grow without bound. Therefore, I have further conducted an alternative analysis by using the co-integration techniques. The notion of co-integration among variables has introduced a new flexibility into the modelling of economic time series. As defined by Engle and Granger (1987), two variables are co-integrated of order (1, 1), if each variable individually is stationary in first differences (integrated of order 1), but linear combination of the variables is stationary in level (integrated of order 0). More generally, a set of variables is co-integrated of order (d, b) if each variable individually is integrated of order d, but at least one linear combination exists which is of order (d-b). Most of the researchers focuses on the case d = 1 and b = 1 and I have done the same here. Here I have also conducted the DF, ADF and PP tests for the second unit root, the results are reported in Table 2, all the tests results indicate the rejection of second unit root in each series. Thus it is very much clear that all the series are I(1) processes and thus it is appropriate to carry out the co-integration analysis. To test for co-integration, the Engle-Granger (1987) and Phillips and Ouliaris test (1990) methods are applied. The co-integrated tests results for different pairs of variables are given with the following table:

**Table 3: Residual-Based Tests Results for Co-integration between Different Pairs of Variables**

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Engle-Granger Test</th>
<th>Phillips-Ouliaris Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per Capita Real GDP (PCGDP)</td>
<td>Independent Variable Market Capitalization (MCAP)</td>
<td>Dependent Variable Growth Rate of GDP (GRATE)</td>
</tr>
<tr>
<td>Case One</td>
<td>Case Two</td>
<td>Case Three</td>
</tr>
<tr>
<td>-1.44623</td>
<td>-1.05985</td>
<td>-1.42942</td>
</tr>
<tr>
<td>-1.5346</td>
<td>-0.9649</td>
<td>2.0266</td>
</tr>
</tbody>
</table>

5 * indicates significant at 1% level, ** indicates significant at 5% level
6 The critical values for Augmented Engle-Granger test at 5% level of significance is -3.588 for case one, -2.9828 for case two, and -1.95 for case three, and for Phillips-Ouliaris test the critical values at 5% level of significance is -27.1 for case one, -21.5 for case two, and -15.6 for case three. Case one: indicates constant and trend terms are included in the equation, Case two: indicates only constant term is included in the model, Case three: no constant and trend terms are included in the model.
4.3 The Granger Causality Test

In order to investigate the causal directions associated with the change of stock market development and economic growth, the Granger causality test and the Lagrange Multiplier Test are applied. Prior to the causality test, examined the order of integration for all variables by the unit root tests. In section (1) the DF, ADF and PP tests results have been presented, which indicate the possible I(1) property for all the variables. After that the co-integration relationship between different pairs of series has been examined, which are used for the causality test. It has been found that the all pairs of variables are co-integrated to each other. Therefore, the following equation for the Granger Causality test is used;

\[ X_t = \alpha_0 + \sum_{i=1}^{n} \alpha_i X_{t-i} + \sum_{j=1}^{m} \beta_j Y_{t-j} + u_t \]  (8)

Here, moreover, 2 different lags has been considered in equation (8) i.e. n=m= 1, 2. Our decision for taking 2 continuous lags is somewhat conventional. We have also investigated the casual direction for higher lag values but, there is no causal relationship between the variables for higher lag values that is why the test results are not reported for higher lag values. The estimated values are reported with the following table;

Table 4: Granger Causality Test Results

<table>
<thead>
<tr>
<th>Granger F-Test</th>
<th>Lagrange Multiplier Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent Variable Market Capitalization (MCAP), Independent Variable Growth Rate of GDP (GRATE)</td>
<td></td>
</tr>
<tr>
<td>Test Value</td>
<td>p-Value</td>
</tr>
<tr>
<td>1</td>
<td>10.20961*</td>
</tr>
<tr>
<td>2</td>
<td>2.24082</td>
</tr>
<tr>
<td>Dependent Variable Market Capitalization Ratio to GDP (MCR), Independent Variable Per Capita GDP (PCGDP)</td>
<td></td>
</tr>
<tr>
<td>Test Value</td>
<td>p-Value</td>
</tr>
<tr>
<td>1</td>
<td>9.24913*</td>
</tr>
<tr>
<td>2</td>
<td>1.97559</td>
</tr>
<tr>
<td>Growth Rate of Real GDP (GRATE) versus Market Capitalization Ratio to GDP (MCR)</td>
<td></td>
</tr>
<tr>
<td>Test Value</td>
<td>p-Value</td>
</tr>
<tr>
<td>1</td>
<td>5.04725**</td>
</tr>
<tr>
<td>2</td>
<td>1.30607</td>
</tr>
<tr>
<td>Growth Rate of Real GDP (GRATE) versus Market Capitalization (MCAP)</td>
<td></td>
</tr>
<tr>
<td>Test Value</td>
<td>p-Value</td>
</tr>
<tr>
<td>1</td>
<td>12.14203*</td>
</tr>
<tr>
<td>2</td>
<td>1.30607</td>
</tr>
</tbody>
</table>

7 All the variables are in logarithmic form

AIC : Akaike Information Criterion, SBIC : Schwarz Bayesian Information Criterion, \( R^2 \) : indicates goodness of fit, p-value : indicates the lowest significance level at which a null hypothesis can be rejected, \( \Delta \) : means first difference, ** : indicates the statistical significant at 5\% level of significance, * : indicates the statistical significant at 1\% level of significance.
The Granger Causality Test Results: The both tests results support that the stock market development causes the economic growth significantly but the economic growth does not cause the stock market development in Bangladesh economy. The results suggest the unidirectional causality from stock market development to economic in Bangladesh economy. This association is statistically significant at any level of significance.

5 Discussion and Conclusion

This paper has addressed the issue of long-run consequences between stock market development and economic growth in Bangladesh economy, Here the real per capita income and growth rate of real GDP are as the indicators of economic growth and the variables market capitalization and ratio of market capitalization to real GDP are used as the proxies of stock market development. Here to know, whether the trend arises either from the positive drift term or not of a random walk an empirical investigation has been done on the basis of the modern econometric techniques. First, using the DF, ADF and PP tests, it has been found that the hypothesis of stationarity has not been rejected for all the series. Thus, it can be concluded that any innovation of these series will be permanent and have a long-run effect for Bangladesh economy. The test results support that these series do not contain second order unit root. Hence these series are integrated of order 1. In order to find the co-integrated relationship between different pairs of variables, the Engle-Granger and Phillips and Ouliaris tests have been applied. From the both tests results it has been found that all the pairs of variables are co-integrated with each other. Thus it can be said that variables stock market development and economic growth share the same stochastic trend in Bangladesh economy. Therefore it can be concluded that there is a long-run equilibrium relationship between stock market development and economic growth in Bangladesh economy. Thus it can be concluded that the pair of variables bears the mutual dependence for economic development in Bangladesh. In this paper the Granger causality test and the Lagrange Multiplier tests are applied to find the causal direction between stock market development and economic growth.

The both tests results support the unidirectional causality from stock market development to economic growth significantly. But the relationship from economic growth to stock market development is insignificant. Thus finally it can be concluded that stock market development significantly influences the economic growth in Bangladesh economy.

6 References


