Nexus Between Sectoral Shift and Stock Return:
Insights From Bangladesh

Mosharrof Hosen, Faculty of Business and Finance, Universiti Tunku Abdul Rahman, Kampar, Malaysia

https://orcid.org/0000-0002-9301-4318

Mohammed Imran, DualConcept, Jakarta, Indonesia

https://orcid.org/0000-0003-1011-4258

Mohammad Ashraful Ferdous Chowdhury, Department of Business Administration, Shahjalal University of Science and Technology, Bangladesh

https://orcid.org/0000-0001-8540-1353

ABSTRACT

The objective of this study is to examine the impact of sectoral shift on the stock return of Bangladesh. This study employs auto-regressive distributive lag (ARDL) approach using the weekly data of various sectoral indices of Bangladesh over the period from May 1999 to September 2016. The findings tend to indicate that there has possible sectoral portfolio diversification in the market and 'general product industry' is the most exogenous and profitable sector from the rest. This study is one of the first attempts of the sectoral analysis and its impact on the stock return with the reference to Bangladesh. Furthermore, this study can be a benchmark for the policymakers of emerging economies to find the impact of economic transformation in the stock returns of the equity markets.

KEYWORDS

1. INTRODUCTION

The sectorial investigation is employed by financial analysts who are to choose better stocks to put their resources into it. The financial analysts distinguish most encouraging segments and evaluate the performance of respective companies within the sector to figure out which remarkable stock would give better returns and at last, be purchased (Abuzayed, Al-Fayoumi, & Molyneux, 2018). Markowitz (1952 and 1959) explored that sectoral diversification can help investors by decreasing volatility as well as afterward, investment jeopardy which is also supported by many studies and researchers. Moreover, nowadays a sectoral diversified investment approach is commonly used by numerous universally successful stockholders (Barbieri & Consoli, 2019; Maheshwari, Gupta, & Li, 2018).

The performance of a company's stock in the capital market is generally affected by two significant aspects which are first, the individual company's performance and second aspect mainly consider the overall performance of the whole sector where the respective company belongs (Bebczuk & Galindo, 2008). As investors know that a similar function in the economy is performed by the sectors which consist of a group of companies. However, the sectoral analysis can be done by dividing the total market into the sector and after that justifying the performance of each sector which will also lead to know the comparison feedback between each sector or whole market (Chowdhury, Bhattacharya, Mallick, & Ulubaşoğlu, 2014).

According to Mohamad, Hassan, and Sori (2006), a sectoral diversified investment portfolio can be attained in different ways such as through investing in diverse intercontinental markets, numerous asset classes and/or crosswise various industries or sectors. In similar kind of study, Grubel (1968) found that the most optimum amount of benefits can earn from global diversification of investment in respect to best fit by using finance to discover the finest conceivable amalgamation of markets around the world. Economic industries and sectors, thus, also allow us to do the diversification because of the potential changes in performances within each economic cycle or market circumstances. Due to that, a specific sector or a company cannot always be the highest or worst performer all the time (Grillitsch & Asheim, 2018).

The comovement and correlation between the stocks are the crucial maiden elements for the diversification. The gain can earn from a portfolio with stocks, therefore, when there has an adverse or little correlation among themselves that leads to reducing risk. Several researchers have demonstrated that the nature of correlation may not be stable for a particular period (Preis, Kenett, Stanley, Helbing, & Ben-Jacob, 2012). The actual risk may be varied due to the time fluctuating feature of the stock market which leads to getting diverse risk at a different time in the portfolio. However, many researchers have focused on this issue, correlation, and comovement of the stock market, in a different way including crisis period facing by all over the world (Rastogi, 2014).

Some studies also have concentrated, more precisely, on a different feature of correlation such as the correlation between markets (Gupta & Donleavy, 2009; Syllignakis & Kouretas, 2011). Some investors are more concerned to get long-term gains, but some stakeholders are only interested in getting short-term profits from the investment. Moreover, short-term correlation and fluctuation were expected in the former, but though nowadays the stakeholders are more interested in the short-term fluctuation and comovements (Masood, Bellalah, Chaudhary, Mansour, & Teulon, 2010).

The connection between macroeconomic factors and stock market returns is, at this point, very much archived in the literature (Singh, Mehta, & Varsha, 2011; Flannery & Protopapadakis, 2002). Nevertheless, almost no writing identifies with looking at the cointegration between sectorial shift and stock markets' indices. Therefore, country impacts have been an overwhelming part of clarifying varieties in stock returns, even in the developed markets, and investors have segmented their allocations accordingly. This study set out to investigate whether sectoral portfolio opportunities still prevails in Bangladesh economy or not. So, the main objective of the study is to find the sector-wise portfolio opportunity in Bangladesh by using ARDL bounds testing approach. This study effort to examine the probable investment diversification strategies based on various economic segments for the case of Bangladesh. The maiden question needs to answer is whether there are any potentialities for investors in Bangladesh to classify and expand their investment across segments and markets.

Most of the previous studies were inconclusive because they examined that the intercontinental stock market comovement in respect of returns and volatility. Hence, the majority percent of those studies have been done based on grouped market indices or between diverse countries around the world (Gupta & Basu, 2011). The current authors claim that, for instance, some empirical researches have made a comparison by including their new data of stock markets comovements in the established economies in contradiction of the emerging markets, or among regions, with the Middle East, the Asia Pacific, Euro area and North Africa (MENA) (Balli & Balli, 2011; Rua & Nunes, 2009; Vo, Pham, Pham, Truong, & Nguyen, 2018). The current study analysis this issue only for a single country

like Bangladesh where the researchers' tried to highlight some Bangladeshi companies that usually export to other countries around the world. Lastly, the study will also effort to scrutinize possible diversification into diverse segments within the domestic stock market.

This study contributes to the existing literature in several ways: first, this is one of the first attempts for finding the impact of sectoral shifts on the stock return for Bangladesh. As Bangladesh is one of the fastest growing nations, the findings of this research work would be a guideline for other developing countries. Secondly, this study provides clear guidelines for the investors and policymakers on how the industry development and shifts affect the stock return of a country. The rest of the paper is organized in the following way; Section 2 outlines a short overview of Bangladesh Capital Market and after that, a brief review of some recent literature related to the topic and theoretical underpinning, although in section 3 discusses a short explanation of the data and methodology. Section 4 provides analysis and present the empirical results, and the final section provides concluding remarks, limitations and some suggestions for further improvements.

2. AN OVERVIEW OF BANGLADESH CAPITAL MARKET

The stock market activities of Bangladesh were launched on 28 April 1954 but at that time it was named as East Pakistan Stock Exchange Limited. However, before the independence of Bangladesh 1971, officially the name was changed as Dhaka Stock Exchange (DSE) on 14 May 1964. At that time there was a total paid-up capital Taka 4 billion with 196 listed securities. The stock market was very volatile from 1971 to 1976 because of the independence war of Bangladesh. Moreover, Securities and Exchange Ordinance 1969, Securities and Exchange Commission Act 1993, and Companies Act 1994 have been used by the DSE to conduct their operation smoothly thus, it has own rules and regulations (Chowdhury et al., 2001). The DSE is currently holding 195 members including foreigner but membership can be extended up to 500.

After post-war, there were only nine listed companies with a total paid-up capital BTK137.52 million approximately and total market capitalization was BTK 146.73 million but at present, the activities of DSE has been increasing very swiftly. However, in September 2017, a total of 564 listed companies are running their operation under DSE and having market capitalization is USD 730 billion which is tremendously effected on capitalization to GDP ratio.

Bangladesh has another stock exchange which is named the Chittagong Stock Exchange was incorporated on 01 May 1995 as a public limited self-regulated non-profit organization with 30 listed securities. CSE had 129 listed members where all members have to be a corporate body. Moreover, currently, end of August 2017, has 250 listed company running their operation under CSE and capitalization is USD 30 billion.

After the getting legal backing of Bangladesh capital market, in order to regulate and supervise the capital market activities, the Securities and Exchange Commission (SEC) has been established based on the Securities and Exchange Act, 1993. Both DSE and CSE use the automated online trading system and use clearing services for their members. The Clearing House works out the ultimate situation of each member in every transaction in which the member has dealt on a particular trading day.

The maiden responsibility of this body is to compare the total buy and sell of every script. Moreover, the Clearing House also determines the net balance receivable from and payable to every member for the trading day. After netting, all transactions on a given day are settled and cleared on the third and fifth working day, correspondingly succeeding the trading day. Special incentives are provided to encourage non-resident Bangladeshis to invest in the capital market and they will get the parallel advantage of foreign investors as well. Furthermore, they are allowed to purchase newly issued shares/debentures of Bangladeshi companies. They can maintain foreign currency deposits (styled as an NFCD1 account) in special accounts for up to five years . A special quota of 10% reserved for non-resident Bangladeshis in primary shares (IPO) has also been introduced. The market capitalization to GDP and the historical scenario of DSE stock index are presented in Figures 1 and 2, respectively.

Figure 1. Market capitalization to GDP ratio. Source: World Bank (alfred.stlouisfed.org).
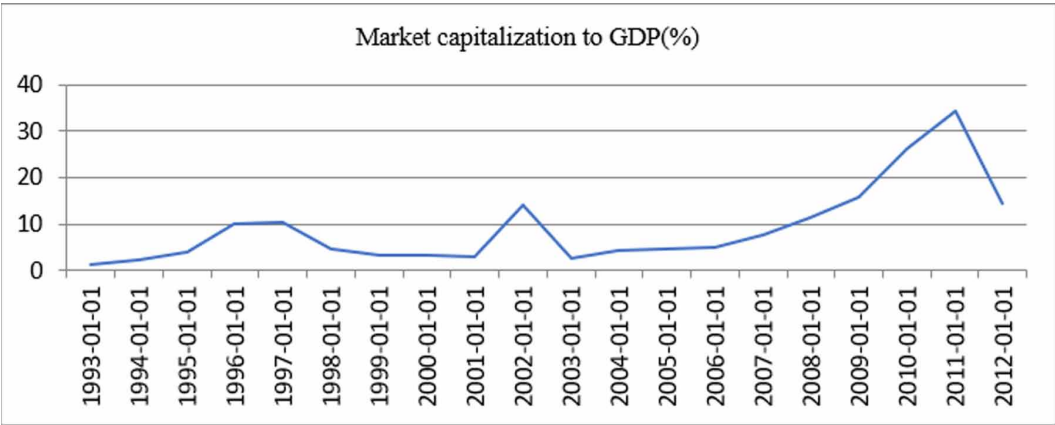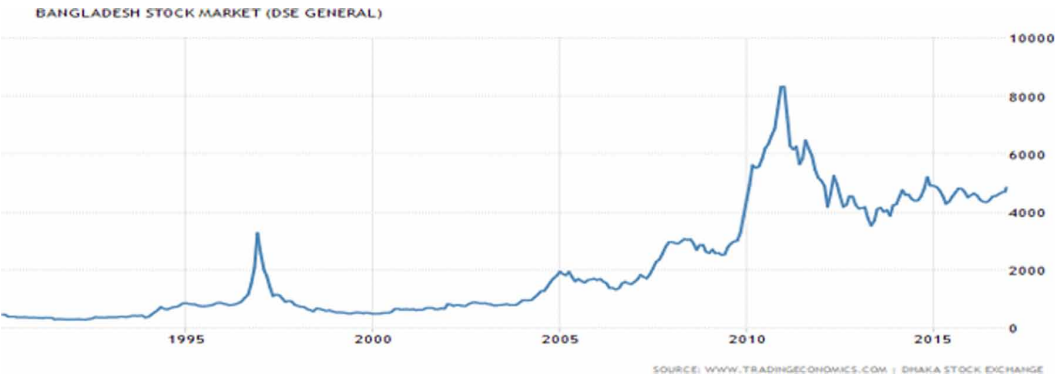

Figure 2. DSE stock index. Source: WWW.TRADINGECONOMICS.COM (DHAKA STOCK EXCHANGE).

Based on both Figures, the researchers could see that the stock market in Bangladesh sharply increased since the year 2010. The market capitalization to GDP ratio was only around 15% while it has increased to around 34% in the year 2011. In terms of stock market movement, it was slightly above 2000 basis points before the year 2010, however, it has increased to more than 8000 basis points after the year 2010 and gradually it has been declined. Therefore, it is essential to look at the stock market efficiency and portfolio diversification opportunity from the Dhaka stock exchange. In Bangladesh has three types of economic phases which are first, at the very beginning it was an agricultural-based economy but now in the industrial economy. Maybe in the future, it would be leading to diverting in the service economy (Osmani, 2008). However, this is extremely important to see which sector is a leader and which are a follower from among sectors because economical shifting might affect the investors' investment decision.

3. LITERATURE REVIEW AND THEORETICAL UNDERPINNING

The modern portfolio theory has been developed by Markowitz (1952) where the founder incorporated theoretical models of portfolio selection by providing normative rules and positive explanation for the diversification of risky assets. However, the degree of risk reduction not only depend on diversification but also need to consider the correlations among security returns (Aslanidis & Savva,

2011). Thus, diversification can only reduce the risk of investment if the returns are not correlated. Within the different types of industries, portfolio selection strategy is being used as a maiden way to reduce the risk. On the contrary, no amount of diversification can affect risk if security returns are perfectly correlated.

The sectoral analysis covers the market efficiency of different sectors of the economy. Rubinstein (2002) brings a revolutionary article as an essential reference which is published in 1952 by Markowitz. This theory is considered as a foundation of financial economics. The investors can make a decision based on a historical review of portfolio theory of Markowitz (1999) where the author argued that diversification strategy in respect of investment was previously a deep-rooted exercise. Rubinstein (2002) also analyzed that diversification cannot eliminate the risk totally but helps to decrease risk in certain level which is in line with Markowitz's portfolio selection strategy. The most crucial part of an investors' diversification strategy is not only focused on stocks own variance or risk but also its covariance with other stocks in the portfolio (Vo et al., 2018). The major benefit from the diversification in the portfolio is that it leads to minimize the risk without any kind of fluctuating the anticipated portfolio yields. However, portfolio earnings and risk management are one of the important erudition issues in finance.

Rua and Nunes (2009) explored that before taking the investment decision the investors must measure the risk and return on the investment portfolio. Therefore, the investors also required to understand the comovement of asset return which is measured by correlation coefficient as well as the volatility of every single portfolio (Tiwari, Jena, Mitra, & Yoon, 2018). Lesser profits can achieve from the portfolio diversification in terms of risk management when a sophisticated positive comovement among the stocks. Henceforth, investors mostly look for the incorporation of stocks with little or adverse correlation to arise the full gains from diversification (Saiti et al., 2014).

An investment portfolio can be differentiated in several ways. International diversification is the most renowned way from the rest where numerous stock markets are selected from the world (Balli & Balli, 2011). Grubel expanded the previous portfolio concept of Markowitz in 1968, stated that to examine the diversification into cross-border markets several types of research have been succeeded. Most of the previous research is focused on finding the long run affiliation among the international stock markets by employing different sort of methodologies like error correction approach, estimated correlation matrices, cointegration theory, principal components analysis, and Granger causality technique. The feedback of these researchers also analyzed by Madaleno and Pinho (2012) where the researchers got a mix bag result meaning the portfolio diversification approach could be influenced by the existence or non-existence of long-run cointegration between the stock markets.

An investment portfolio can also be diversified through economic sectors and industries within individual stocks markets which is also well-known to the investors as an alternative way instead of an international diversification (Mohamad et al., 2006). The maiden motives for suggesting the sectoral diversification is because not every single segment makes profit or loss at any given certain point in time or throughout the respectively economic cycle. For instance, dissimilar sectors of the economy that might have to perform differently in terms of risk and return at definite levels in the economic cycle. It is well-known that diverse sectors may perform inversely at numerous points of the market circumstances. Saiti et al. (2014) mentioned that not a single specific sector or industry inclines to be constantly the worst or highest performer. However, associated with the enormous quantity of literature existing on the international sectoral diversification of stock markets, but studies on sectoral portfolio diversification are very inadequate (Mohamad et al., 2006; Ahmed, 2011; Balli et al., 2013; Panda & Nanda, 2017).

Mohamad et al. (2006) examined the sectoral diversification in Bangladesh using Sharpe ratio, stability tests, and cross-correlation measures to calculate the risk-return performance. The research result found that there are high but unstable correlations between the indices. This result represents inadequate diversification aids except over the short term. Based on a certain country study, Ahmed (2011) analyzed the short as well as long-run features of the inter-sectoral connections in the

Egyptian stock market by using daily data between 2007 and 2010. The researcher pointed out that alone cointegrating equation and inadequate short-run underlying associations, signifying possible reimbursements from diversifying in the short run, but not in the long run investment.

Balli et al. (2013) scrutinized the spillover properties of global and local on the Gulf Cooperation Council (GCC)-inclusive sector equity yields by using data from 2005 to 2012. In respects of portfolio diversification approach, the researchers discovered that portfolios diversified across GCC-inclusive sector outperform than portfolios diversified transversely GCC coast-to-coast equity markets. Moreover, Saiti et al. (2014) found that Far East countries cannot offer better diversification opportunity than Islamic countries where includes robust policy implications for the international and local investors in respect of their portfolio diversification for prevarication of unexpected perils.

Panda and Nanda (2017) examined the short-term dynamism and long-term equilibrium relationship between the stock markets of South and Central America by employing several techniques such as multivariate cointegration test, VECM, GARCH-DCC. The study explored that, Peru, Venezuela, and Chile have long-run comovement between the equity market and they are interlinked. Therefore, the VECM result states that the stock return of four selected countries (Brazil, Argentina, Venezuela, and Chile) are influenced by each other and hence, the result of GARCH-DCC ensure that stock market is consistently cointegrated. Similarly, Ajaz et al. (2017) also applied the asymmetric autoregressive distributed lag (ARDL) model for detecting nonlinearities focusing on the long-run and short-run asymmetries among economic variables. The results found that there has an asymmetric effect of a stock price that could include emphasis to change the financial and monetary variables. Muthu (2017) also used the same method to estimate the long-run relationship between public and private investment using annual data from 1971-1972 to 2009-2010. The results tend to indicate that the return of public investment is far better than private investment.

From the above recent related literature review, the researchers pointed out that there have some inconsistency and gaps. Therefore, this study contributes to the literature by emphasizing to fill up that certain gaps and improve thoughtful on the succeeding three extents: namely, i) certain country-wise comovement between particular trading partners of Bangladesh, ii) possibility for sectoral diversification and iii) outspread the methodologies addressed by using most appropriate statistical ARDL technique.

4. DATA AND METHODOLOGY

4.1 Data

In order to scrutiny the research objective a total of 910 weekly observations were collected from Bangladesh, where the episode was 1996 to 2016. As the current study has been using long data set there some data has been deleted because of their missing values. However, data has been collected from multiple sources such as Dhaka Stock Exchange, Data Stream, and Bloomberg. The details of our variables and sources are shown in Table 1.

4.2 Methodology

The autoregressive distributed lag (ARDL), which is developed by Pesaran (1997); Pesaran and Shin (1999), has been employed in this study in order to determine the causality between the variables. Among the different alternative methods, the current authors have been selected this strategy because of some extensive benefits. Firstly, this method moves towards to fulfill the current authors' research objectives easily and smoothly by ensuring the causality affiliation between the variables.

Secondly, one more important benefit can get by using this method is, it does not provide any obligation that all data sequences which are considered must have the similar instruction of integration and thus, Pesaran and Pesaran (1997) mentioned that it could be employed whether the regressors are I (1) or I (0) demand of cointegration. Meanwhile, the current study already has a blended bag

Table 1. Measurement of variables

Name of Variables	Source	Measurement	Abbreviations
Average Stock Exchange	Dhaka Stock Exchange	Million in USD	ADS
Average Banks	Data Stream	Million in USD	ABA
Average Pharmaceuticals	Bloomberg	Million in USD	APH
Average Goods Producers	Data Stream	Million in USD	AGP
Average Financial Services	Bloomberg	Million in USD	AFS
Average General Industries	Dhaka Stock Exchange	Million in USD	AGI
Average Real Estate	Bloomberg	Million in USD	ARE
Average Construction and Materials	Data Stream	Million in USD	ACM

of I (1) and I (0) variables which would bring a great advantage because the obligatory requirement of conventional Granger causality there must have all variables in stationary form in first difference.

Thirdly, the founder of ARDL, Pesaran and Shin (1999) also clearly stated that in order to run ARDL-oriented assessment process it allows using small sample size which can ensure the valid estimation and test hypotheses on the long-run coefficients[1]. Moreover, by using the ARDL method does not cause any major problem in the endogeneity due to it helps to establish totally out of residual correlation (Jalil et al., 2013). Pesaran and Shin (1999) also recognize that the ARDL approach can assist to extricate between independent and dependent variables as well as the assessment is accessible even when the explanatory or independent variables are endogenous (Pesaran & Pesaran, 2009; Pesaran et al., 2001).

Finally, the ARDL process tries to ignore the bigger number of the specification to be made in the conventional cointegration test which contains choices concerning the quantity of exogenous and endogenous (if any) to be involved, in addition to the optimum number of lags to be quantified (Duasa, 2007). Through ARDL, the actions will choose its own respective lag. However, it is conceivable to have diverse optimum lags for dissimilar variables which are not applicable in the standard cointegration test due to the requirements of the sample has been used. The Granger causality assessment shows inappropriate for the current study's sample and thus, ARDL bound testing method has been designated to address that issue.

At the very beginning phase of estimation prior proceeding to the ARDL test is necessary to examine the stationarity of individual variable and to ensure that whether the variables are stationary at the difference form (I (1)) or level form (I (0)). Defining the stationary of the variables has been considered as a pre-requisite pace for numerous approaches in econometrics, meanwhile, it may assist in picking the most suitable technique. Though, ARDL does not necessitate any stationary test, testing the categorization of the integration may support in defining the appropriateness of the technique (Hasnul & Masih, 2016; Hakim & Masih, 2014; Rahim & Shahwahid, 2009). To ensure and examine the stationarity of individual variable, three tests namely specifically Augmented Dickey-Fuller (ADF) test, Phillip Perron (PP) test, and Kwiatkowski–Phillips–Schmidt–Shin (KPSS) test, has been completed.

One of the preliminary equations for this study can thus be presented in the following ARDL form:

$$\Delta \ln ADS_t = \propto_0 + \sum_{i=1}^{k} \propto_1 \Delta \ln ADS_{t-i}$$

$$+\sum_{i=1}^{k}\propto_{2}\Delta\ln ABA_{t-i}$$

$$+\sum_{i=1}^{k}\propto_{3}\Delta\ln AFS_{t-i}$$

$$\sum_{i=1}^{k}\propto_{4}\Delta\ln AGI_{t-i}$$

$$+\sum_{i=1}^{k}\propto_{5}\Delta\ln AGP_{t-i}$$

$$+\sum_{i=1}^{k}\propto_{6}\Delta\ln ARE_{t-i}$$

$$+\sum_{i=1}^{k}\propto_{7}\Delta\ln ACM_{t-i}$$

$$+\sum_{i=1}^{k}\propto_{8}\Delta\ln APH_{t-i}$$

$$+\gamma_{1}\ln ADS_{t-1}+\gamma_{2}\ln ABA_{t-1}+\gamma_{3}\ln AFS_{t-1}+\gamma_{4}$$

$$\ln AGI_{t-1}+\gamma_{5}\ln AGP_{t-1}+\gamma_{6}\ln ARE_{t-1}+\gamma_{7}\ln ACM_{t-1}+\gamma_{8}\ln APH_{t-1}+\boldsymbol{\mu_{t}}$$

From the above equation, k represents the maximum order of lag.

As the authors know by getting a suggestion for weekly data from Pesaran and Shin (1999), in respect of weekly observations typically need to select a maximum lag order is 4. Hence, from that statement in the ARDL model, the orders of the lags can be designated by either the Schwarz Bayesian criterion (SBC) or Akaike Information Criterion (AIC), ordinary least squares appraise earlier the nominated model. For the F-test the null hypothesis, which indicates no long-run cointegration among the variables, is

$$H_{o}:\gamma_{1}=\gamma_{2}=\gamma_{3}=\gamma_{4}=\gamma_{5}=\gamma_{6}=\gamma_{7}=\gamma_{8}=0$$

In contradiction, long-run cointegration does exist among the variables which represent by alternative hypothesis.

$$H_{1}:\gamma_{1}\neq\gamma_{2}\neq\gamma_{3}\neq\gamma_{4}\neq\gamma_{5}\neq\gamma_{6}\neq\gamma_{7}\neq\gamma_{8}\neq0$$

The ARDL error correction model can also allow the authors to estimate the short-run dynamic and the causal long-run relationship (endogeneity and exogeneity) if there is an indication of the presence of long-run cointegration among the variables. The suggested error correction model are as follows:

$$\Delta\ln ADS_{t}=\propto_{0}+\sum_{i=1}^{k}{}_{i}\Delta\ln ADS_{t-i}+\sum_{i=1}^{k}{}^{2}{}_{i}\Delta\ln ABA_{t-i}+\sum_{i=1}^{k}\text{Æ}_{i}\Delta\ln AFS_{t-i}$$

$$+\sum_{i=1}^{k}\omega_{i}\Delta\ln AGI_{t-i}+\sum_{i=1}^{k}\rho_{i}\Delta\ln AGP_{t-i}+\sum_{i=1}^{k}\delta_{i}\Delta\ln ARE_{t-i}+\sum_{i=1}^{k}\lambda_{i}\Delta\ln ACM_{t-i}$$

From the above, the authors can be pointed out that ECT characterizes the lagged error correction term of which its coefficient (Φ) signifies the swiftness of adjustment back to long-run equilibrium after having a short run shock. Therefore, according to Narayan (2004), a significant negative significant coefficient of the ECT term is essential to confirm the presence of cointegration and tuning of disequilibrium in the model. Moreover, the higher degree of the ECT term means the better the speed of adjustment (Coakley et al., 2004).

To emphasize more in the ARDL process, the authors implement a simulation procedure by applying impulse response functions (IRF) and variance decompositions (VDC) for additional inferences. IR and VDC assist as tools for appraising the dynamic interactions as well as the forte of causal relations among variables in the system (Duasa, 2007).

Out of sample causality test as well as Variance Decomposition (VDC), barriers the variance of the estimated error of a certain variable into proportions attributable to shocks or revolutions in every variable in the system together with its own (Masih & Masih, 1996, 1996a). This statement passes a clear message that VDC can deliver contingency among the variables in the system. A variable that is optimally prediction from its own lagged values will have all its estimate error variance accounted for by its own turbulences (Sims, 1982). Meanwhile, the data frequency has been used in the study is weekly data, the time horizon applied in the VDC are 13, 26, and 39 in order to regulate the degree of endogeneity/ exogeneity of the variables. Furthermore, the IRF help to hint the maneuvering answers of the variables to a one standard nonconformity shock of another variable. The IRF is standardized in such a means that zero denotes the steady-state value of the response variable (Masih & Masih, 1996, 1996a). This is trying to clear that the authors can detect the perseverance of stock return.

5. EMPIRICAL RESULTS

As described earlier, preceding to the ARDL process, the authors directed unit root assessment for every variable, in its first difference form and level form, applying three types of test, specifically ADF (Augmented Dickey-Fuller) test, PP (Phillip Perron) test, and KPSS (Kwiatkowski–Phillips–Schmidt–Shin) test. Augmented Dickey-Fuller (ADF) can help to fix the autocorrelation delinquent whereas Phillips-Perron (PP) revises both the heteroscedasticity and autocorrelation glitches by applying the Newey-West adjusted-variance technique.

The authors expect the null hypothesis for all variables would be non-stationary for both Augmented Dickey-Fuller and Phillips-Perron test. From the tested outcomes, the scholars must focus on the maximum value from SBC (and/or AIC) column and find out what is the conforming Test Statistic. After that, the researchers can equate it to the critical value revealed in CV column (or lower the table) and reject the null hypothesis if the t-statistic is larger than the critical values. Thus, the authors accept it because they cannot reject the null hypothesis. Though the ARDL process does not necessitate any unit root test, this supplementary phase could able to persuade whether ARDL practice would be appropriate to apply or not.

From the outcomes of the above table, the researchers can see that there is contradict of the consequences between the estimation. Nevertheless, irrespective of the test applied, the outcomes display a mixed bag of I (1) and I (0) regressors in the illustration. Consequently, the test of ARDL would be eligible, but standard time-series procedures can't employ because that necessitate all regressors must be I (1).

By performing the following phase, the authors would able to know VAR order or number of lags. From the result of VAR model, the researchers shall try to get the maximum value for SBC and AIC and need to find the consistent direction of lag. If the p-value is more than 5% then no need to continue anymore and have a consistent direction of lag. If the outcomes are in mix box, then researchers are also allowing to select the lower order but must need to ensure that there was no serial autocorrelation. The authors can see from the table below, and outcomes represent that AIC indorses command of three although SBC favors zero lags.

It is also apparent that there are significant differences between the commendations of SBC and AIC. This recommendation could be taken as an intrinsic landscape of time series data for examination. As the current study has weekly observation and data is 910, the authors can select supreme three VAR orders, AIC provides three lags as well while SBC gives 0 lag. In respect to go the subsequent phase, the researchers have determined to pick three lag orders as indicated in Table 3.

Table 2. Unit root test result

Name of the variable	Augmented Dickey-Fuller			Phillip Perron			Kwiatkowski–Phillips–Schmidt–Shin		
Level Form	**T-STATE**	**C.V.**	**Result**	**T-STATE**	**C.V.**	**Result**	**T-STATE**	**C.V**	**Result**
LADAS	-1.797	-3.4171	NS	-2.2171	-3.4529	NS	0.18056	0.14082	NS
LABA	-1.9476	-3.4171	NS	-2.2197	-3.4529	NS	0.16646	0.14082	NS
LAFS	-1.3844	-3.4171	NS	-1.8213	-3.4529	NS	0.19791	0.14082	NS
LAGI	-2.2536	-3.4171	NS	-2.1706	-3.4529	NS	0.16947	0.14082	NS
LAGP	-2.0163	-3.4171	NS	-1.9835	-3.4529	NS	0.24077	0.14082	NS
LACM	-1.9983	-3.4171	NS	-2.2192	-3.4529	NS	0.13737	0.14082	S
LAPH	-2.2189	-3.4171	NS	-2.2129	-3.4529	NS	0.12929	0.14082	S
LARE	-1.7674	-3.4171	NS	-1.7409	-3.4529	NS	0.17092	0.14082	NS
	ADF			**PP**			**KPSS**		
Differenced Form	**T-STATE**	**C.V.**	**Result**	**T-STATE**	**C.V.**	**Result**	**T-STATE**	**C.V**	**Result**
DADAS	-19.4707	-2.8651	S	-28.5848	-2.8551	S	0.08628	0.40126	S
DABA	-20.4606	-2.8651	S	-29.4326	-2.8551	S	0.065101	0.40126	S
DAFS	-21.8683	-2.8651	S	-30.6473	-2.8551	S	0.10605	0.40126	S
DAGI	-22.0263	-2.8651	S	-28.8953	-2.8551	S	0.07887	0.40126	S
DAGP	-20.1005	-2.8651	S	-27.9828	-2.8551	S	0.17784	0.40126	S
DACM	-20.1853	-2.8651	S	-28.4654	-2.8551	S	0.06277	0.40126	S
DAPH	-19.5726	-2.8651	S	-29.1741	-2.8551	S	0.060889	0.40126	S
DARE	-19.469	-2.8651	S	-27.401	-2.8551	S	0.13451	0.40126	S

Note: S (derives Stationary Variables); NS (derives Non-Stationary Variables)

Table 3. VAR Order Selection

		Principles of Selection	
		AIC	**SBC**
Optimum direction of VAR	3	3	0

With doing this phase, the authors would come to know whether variables have theoretical relationships or not, meaning that they are cointegrated (move together) in the long run or not. To reach the research objectives the researchers have performed F-test for every OLS model where every single variable turns as an endogenous variable and thus, will get eight F-test for every regression model because the current study has been plotted eight variables. From table 4, some results like F-statistics, upper bound critical value and lower bound critical value that is projected by (Pesaran et al., 2001). According to table 4, the authors can take a decision whether they have a long-run theoretical relationship among the variables or not.

Finally, the result shows only one F-statistics which is ARE, 3.7482 meaning that surpasses the upper critical value, so it allows rejecting the null hypothesis that stated no cointegration, as well as this, helps us to get rid of the curse of spurious affiliation. Now the authors have no obstacle to proceeding further along with ARDL technique because they already have found one cointegration.

After ensuring the cointegration among variables through the F-statistics above, this study proceeds with the long run estimation in table 5. The findings in table 5 indicate that the main two

Table 4. Cointegration test result of ARDL

Name of the Variables	F-Statistics	Critical Value: Lower Bound	Critical Value: Upper Bound	Decision
ADS	2.3965	2.272	3.447	Inconclusive
ABA	2.2209	2.272	3.447	Not-cointegrated
AFS	1.5578	2.272	3.447	Not-cointegrated
ACM	1.8079	2.272	3.447	Not-cointegrated
AGI	3.4128	2.272	3.447	Inconclusive
AGP	1.8791	2.272	3.447	Not-cointegrated
APH	2.0905	2.272	3.447	Not-cointegrated
ARE	3.7482	2.272	3.447	Cointegrated

*Critical value at 95% significance level

Table 5. Long run coefficient estimation

	Co-efficient	Standard Error	T-Ratio[Prob]
Dependent Variable: ADS			
LACM	.31459	.26223	1.1997[.231]
LABA	.73546	.31758	2.3158[.021]
LAFS	-.034169	.11141	-.30670[.759]
LAGI	-.49492	.15296	-3.2355[.001]
LAGP	-.20271	.24660	-.82203[.411]
LAPH	-.033576	.28306	-.11861[.906]
LARE	.40925	.25283	1.6187[.106]
Intercept	5.2080	.39394	13.2201[.000]
Diagnostic Test Statistics (P-values)			
Chi-square (Serial Correlation)			3.2759[.071]*
Chi-square (Functional Form)			4.5523[.033]
Chi-square(Heteroscedasticity)			.0059880[.938]*

independent variables such as LABA and LAGI are causing a significant impact on the dependent variable ADS. However, the impact of these two on the dependent variable ADS is entirely different. The results reveal that the overall growth of the banking sector proxied by the variable LABA plays a positive role on the dependent variable ADS but the Average General Industries proxied by AGI plays the negative impact on the ADS. For instance, 1 unit of LABA increases 0.735 units of ADS. On the other hand, 1 unit of LAGI reduces the dependent variable ADS by 0.49 units. The possible explanation of the result might be the stock market of Bangladesh is highly dependent on the banking sector.

The overall weight of the banking sector is very high in the market capitalization of Bangladesh and the majority of the A category shares are also from the banking sector. That's why the effect of the banking sector is comparatively higher than any other sector in the market. The other possible reason might be the average industry variable (LAGI) is composed of various categories of shares

including the Z category. As the Z category shares are not fundamentally as strong as the A category shares (banking sectors), the market may not have a positive effect on that. This study also confirms all diagnostic tests and found no problems in the model.

The researchers are free to go the subsequent stage after ensuring the theoretical long-run cointegration among the variables. In this step will help to know the exogeneity and endogeneity of every variable and short-run dynamics of the model. To ensure the exogeneity and endogeneity the authors are using the ARDL version of error correction equation, where will get eight error correction term and equation. The outcomes of error correction equations are shown in table 6.

The significance of error correction term (ECT) is that it would help in every model to ensure the causal affiliation between the variables. The exogenous variable would be confirmed by ECT when it could be insignificant meaning the dependent variable of the model is an exogenous variable and vice versa. Here the authors assume that the null hypothesis is exogenous variable and the alternative hypothesis is endogenous variable. The significance of the coefficient of the error correction ensures that the preceding outcomes of a long-term significant cointegrating affiliation among the variables.

The results show that average general product industries are exogenous variable while the other variables, namely average Dhaka stock exchange, average financial service industries, average banks, average consumption and materials industries, average goods industries, average real estate industries, average pharmaceuticals industries are endogenous variables. As the investors know endogenous variables will follow the exogenous variables because exogenous variables are leaders and endogenous variables are the followers. So, the authors can summarize that all industry follows the movement of the general industries.

Moreover, the coefficient of ECT of all the variables are close to zero and holding a negative sign, which directs a very low rapidity of adjustment to an imbalance in the model. This could be happening due to these variables might have internal relation or effect by some other variables, later there might have to consume some more time to come back in equilibrium if there have any imbalance in the model.

Moreover, ARDL feedback will not help to find out the comparative endogeneity and exogeneity for every variable in the illustration. However, the authors are being encouraged to run an extra mile by performing IRF and VDC test to ensure that the comparative endogeneity and exogeneity as well to confirm the approximate time is required to come back to balance if there have any shock in variables.

VAR order of lag is essential for variables prior accompanying the supplementary IRF and VDC estimation. As the current study need to select the maximum order of VAR, the authors decided to select number 3 as it is showing the highest number in table 7. Furthermore, the researchers also expect a conflicting outcome from SBC and AIC even though, can see a similar result between SBC and Adjusted LR test. However, as the suggestion received from the preceding research if there are

Table 6. Error Correction Term (ECT) of ARDL Process, Constructed on SBC

Variables	Coefficient	T-Statistics	P- Values	Result
ECT of ADS	-.022034	-2.6620	.008	Endogenous
ECT of ABA	-.039481	-4.1003	.000	Endogenous
ECT of AFS	-.015028	-2.3984	.017	Endogenous
ECT of ACM	-.025234	-3.7588	.000	Endogenous
ECT of AGI	-.043559	-4.5689	.000	Endogenous
ECT of AGP	-.010835	-1.8985	.058	Exogenous
ECT of APH	-.020278	-2.9142	.004	Endogenous
ECT of ARE	-.034524	-4.8845	.000	Endogenous

Table 7. VAR Lag Order

Principles of Selection	Maximal Order
Akaike Information Criterion	3
Schwarz Bayesian criterion	1
Adjusted LR Test	1

inconsistent result needs to take the inferior order of lag. Finally, to continue the impulse response (IR) and VDC estimation need to select one as the order of VAR.

By performing this phase, the authors would able to know the comparative exogeneity and endogeneity or ranking of the variables that could also make resolute through the share of variance clarified by its former. Generally, the highly focused variable is supposed to be the maximum exogeneous variable from the rest.

Orthogonalized and Generalized options are used in the VDC tests in table 8. The maiden difference between the Orthogonalized and Generalized is that, Orthogonalized, is mostly fitted for the specific order of the variable in the VAR and in respect of shock, if one variable is being shocked assume that all another variable in the system would be switched off regardless any other problem happens but on the contrary, in Generalized VDCs test does not assume that if one variable is shocked all other variables in the system would be switched off as well as it does not follow the specific ordering of the variables in the VAR. The researchers are proceeding further by applying Generalized VDCs to get our expected feedback from VDCs estimation.

The VDC results show that based on the short-, medium-, and long-term period, the maximum exogenous variables are average Dhaka Stock Exchange and average real estate whereas, the maximum endogenous variables are an average bank and average financial services. Moreover, from the VDCs outcomes of the average general product is completely reversing with the error correction equation of ARDL. The average general product is conquered as a 1st exogenous variable based on ARDL whereas, it has been occupied as a 3rd exogenous position in VDC result. The possible argument of this result could be the financial sectors are playing a supporting role for the financing of the real estate sector i.e. the demand of finance depends on the demand and supply of the real estate.

The Impulse Response Function (IRF) also scrutinize in this study to justify the effect of shocks in one variable over others and the magnitude of adjustment. The current study's maiden intention is to see the response of other variables once shocked most exogenous variables, general product, and Dhaka stock exchange. From figure 3 and 4, we can see that all variables are usually taking 7 to 9 weeks' time to get back in balance situation in the model. However, the results and interpretations of VDCs and IRF are the same except the IRF shows us graphically.

6. CONCLUDING REMARKS AND POLICY IMPLICATIONS

For any portfolio selection, the most crucial part is to do a fundamental study which determined the underlying forces that distress the benefit of the companies, industry group as well as the economy. The maiden concern of this analysis is to derive and forecast the future price movement that ultimately helps to know the expected profit. Moreover, management policy, financial data, competition, and business concept may help to do the fundamental analysis at the company level. Apart from that, demand and supply forces for the offering product might be considered at the industry level. Thus, to determine the present and future growth of the economy, the fundamental analysis might concentrate on economic data at national economic level. However, fundamental analysis aggregates company, industry, and economic analysis that would help to forecast stock's future value and able to derive a stock's current fair value.

Table 8. Generalised VDC

Horizon	ADS	ARE	APH	AGP	AGI	AFS	ABA	ACM
13	38.6%	8.1%	8.1%	6.2%	4.5%	2.4%	18.3%	13.7%
13	48.1%	14.6%	0.9%	10.2%	12.4%	7.0%	4.6%	2.3%
13	79.4%	4.0%	5.4%	0.2%	1.3%	2.8%	2.2%	4.7%
13	62.1%	0.7%	6.0%	7.4%	0.5%	8.7%	6.8%	7.7%
13	44.5%	0.5%	13.7%	3.3%	5.2%	9.6%	14.5%	8.6%
13	51.4%	7.3%	1.6%	7.7%	11.5%	0.2%	12.7%	7.5%
13	47.4%	11.8%	4.8%	1.3%	12.6%	15.4%	0.2%	6.5%
13	53.2%	6.9%	8.2%	6.9%	2.4%	11.3%	10.6%	0.4%
Exogeneity	38.6%	14.6%	5.4%	7.4%	5.2%	0.2%	0.2%	0.4%
Ranking	1	2	4	3	5	8	7	6
26	38.6%	8.1%	8.1%	6.2%	4.5%	2.4%	18.3%	13.7%
26	48.1%	14.6%	0.9%	10.2%	12.4%	7.0%	4.6%	2.3%
26	79.4%	4.0%	5.4%	0.2%	1.3%	2.8%	2.2%	4.7%
26	62.1%	0.7%	6.0%	7.4%	0.5%	8.7%	6.8%	7.7%
26	44.5%	0.5%	13.7%	3.3%	5.2%	9.6%	14.5%	8.6%
26	51.4%	7.3%	1.6%	7.7%	11.5%	0.2%	12.7%	7.5%
26	47.4%	11.8%	4.8%	1.3%	12.6%	15.4%	0.2%	6.5%
26	53.2%	6.9%	8.2%	6.9%	2.4%	11.3%	10.6%	0.4%
Exogeneity	38.6%	14.6%	5.4%	7.4%	5.2%	0.2%	0.2%	0.4%
Ranking	1	2	4	3	5	8	7	6
39	38.6%	8.1%	8.1%	6.2%	4.5%	2.4%	18.3%	13.7%
39	48.1%	14.6%	0.9%	10.2%	12.4%	7.0%	4.6%	2.3%
39	79.4%	4.0%	5.4%	0.2%	1.3%	2.8%	2.2%	4.7%
39	62.1%	0.7%	6.0%	7.4%	0.5%	8.7%	6.8%	7.7%
39	44.5%	0.5%	13.7%	3.3%	5.2%	9.6%	14.5%	8.6%
39	51.4%	7.3%	1.6%	7.7%	11.5%	0.2%	12.7%	7.5%
39	47.4%	11.8%	4.8%	1.3%	12.6%	15.4%	0.2%	6.5%
39	53.2%	6.9%	8.2%	6.9%	2.4%	11.3%	10.6%	0.4%
Exogeneity	38.6%	14.6%	5.4%	7.4%	5.2%	0.2%	0.2%	0.4%
Ranking	1	2	4	3	5	8	7	6

The main objective of this study is to explore the potentiality of sectoral diversification through investment in various sectors of the Bangladesh economy. The crucial question needs to answer is whether there exist prospects for diversifying the investment portfolio crosswise sectors or markets that can assist in diminishing perils. Examining the correlation and comovement between volatilities and returns of the dissimilar assets or markets, consequently, is significant to measure the probable outcomes from sectoral diversification.

The diversification benefits would shrink if the stocks of sectoral industries are highly correlated with each other and that could definitely heading towards earning fewer benefits from the investment.

Figure 3. Generalised Impulse Responses to one SE shock in the equation for DAGP

Generalised Impulse Responses to one SE shock in the equation for DAGP
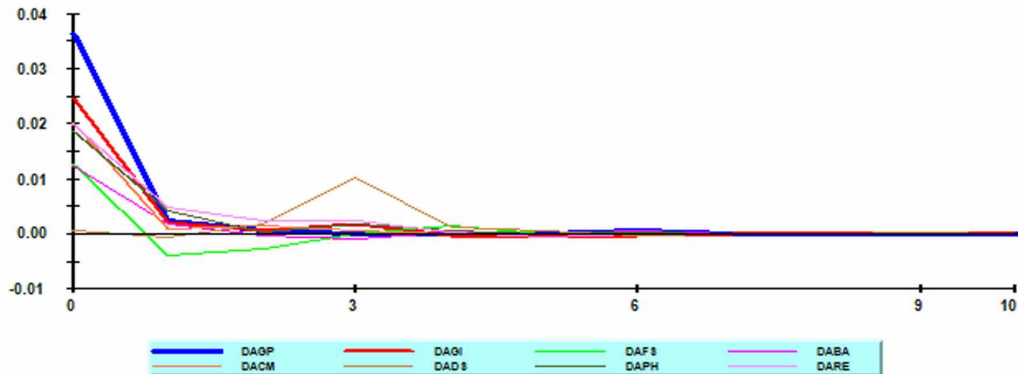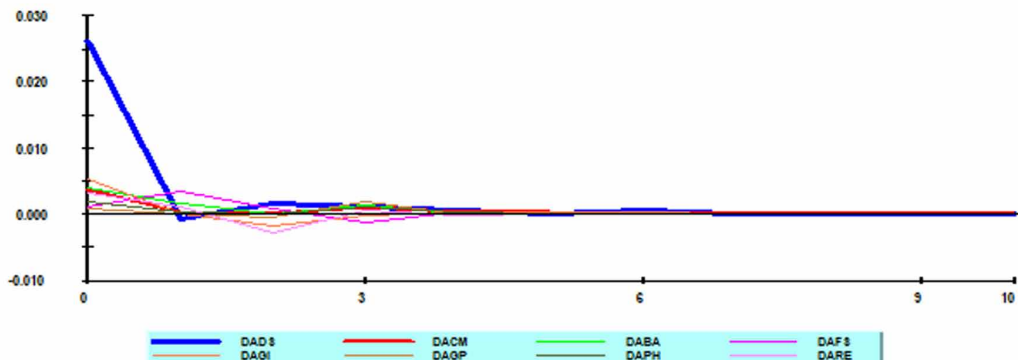
Figure 4. Generalised Impulse Responses to one SE shock in the equation for DADS

Generalised Impulse Responses to one SE shock in the equation for DADS

Moreover, the previous evidence ensured that the correlation between stocks is not constant all the time. Therefore, the best return industry would not behave the same for the entire investment horizon. However, the investors would able to earn some benefits if the investment tenure is more than one period. The longer investment period tends to indicate that there would have more chance to get profit by reducing the risk. Based on the discussion the investors can postulate that the best return could be earned from diversification across the real estate industry, the pharmaceutical industry and general product industries which also recorded good return performance in the past years. This study reveals that there is possible sectoral portfolio diversification in the Bangladeshi equity market. Furthermore, the results of long-run estimation also ensured that the banking industry positively influences on the stock exchange. At the same time, a significant negative impact has been found between the general industry and stock exchange. The investors could invest their investment in the banking sector because it has a positive and significant long-run effect of the stock exchange.

The findings of the study would add extra value to the portfolio literature and provide an in-depth understanding of the financial analysts who try to examine the stock market behaviour. The authors reported that all the sectors do not behave similarly throughout the studied year. Therefore, it is very insightful for the investors to have knowledge about the sectoral comovement that helps to understand

the availability of portfolio diversification. The investors can reduce their risk by investing in some specific sectors like general product industries, the pharmaceutical industry, etc.

In this empirical research pointed out some sort of restrictions like as very limited researches have been done to find out sectoral diversification benefits for Bangladesh, so the researchers could not find sufficient reference and data as well, specifically, the authors have done this research only for few sectors. This research could be widened by including more countries, and certain regions of the universe. Moreover, the opportunity of the research can also be prolonged to test the effects of Islamic financial sectors and can add more general sectors as well.

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ENDNOTE

[1]   Cavanaugh et al. (1995) and Pesaran (1997).

Mosharrof Hosen is currently a Doctor of Philosophy (Ph.D.) candidate at Faculty of Business and Finance, Universiti Tunku Abdul Rahman (UTAR), Malaysia. He obtained Master of Science in Islamic Finance from INCEIF, Malaysia. He is working as a research assistant under the faculty of Business and Finance, UTAR. His research interest includes knowledge management, financial econometrics, economics, organizational behaviour, Islamic finance, educational system. Mr. Hosen's published work appears at JEFAS, IJSE, QFE, IJBS, APSSR, IJFS, among others.

Mohammed Imran is a marketing specialist and an independent researcher with several years of experience in the business development field. He worked with multinational as well as some well-known national companies. Currently, he is leading marketing for an Indonesian construction chemical company. He obtained his MBA and BBA from the University of Chittagong, Bangladesh. He has a publication in Scopus indexed journal. He is a founder of DualConcept, a consulting firm that is specialized in branding, marketing, and data analysis. He is also co-founder of EasyRetail, an e-commerce website.

Mohammad Ashraful Ferdous Chowdhury is the Associate Professor of the Department of Business Administration, Shahjalal University of Science & Technology, Sylhet, Bangladesh. He holds PhD. and MSc. degree in Islamic finance from INCEIF, Malaysia. His research interest includes financial economics, Institutional economics, banking and finance, Islamic finance, etc. Dr. Chowdhury published more than 30 articles in ISI/SSCI/SCI/SCOPUS indexed journals in reputed publishers including Elsevier, Springer, Taylor & Francis, Wiley, Emerald, etc.