

Impact of Macro Fundamental Factors on Financial Volatility: Evidence from Financial Sectors of Bangladesh

Impact of Macro Fundamental Factors on Financial Volatility: Evidence from Financial Sectors of Bangladesh

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Letter of Transmittal

January 13, 2020

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Subject: Submission of Project paper on 'Impact of Macro Fundamental Factors on Financial Volatility: Evidence from Financial Institutions of Bangladesh

Dear Sir,

It is indeed a great experience for me to prepare the project paper on 'Impact of Macro Fundamental Factors on Financial Volatility: Evidence from Financial Institutions of Bangladesh' under your excellent supervision. By using the empirical data, I have tried to find out which factor is the most influential one on stock price volatility by using the OLS based ARDL model. This study will help the investors to take a correct decision to some extent while investing in the vulnerable stock market of Bangladesh.

I hope that you will find this project worth reading. Please feel free for any query or clarification that you would like me to explain. I hope that the project paper would meet your expectations and standards. I hope you will appreciate my hard work and excuse minor errors. Thanking you for your cooperation throughout the whole period.

Sincerely yours,

Ananda Bardhan
ID: 111 161 201

Certification of Similarity Index

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Declaration of the Student

I hereby declare that this project paper entitled “Impact of Macro Fundamental Factors on Financial Volatility: Evidence from Financial Institutions of Bangladesh” submitted to the United International University, is a record of a genuine work conducted between October’19-December’19 and done by me under the supervision of Dr. Md. Qamruzzaman, Associate Professor of School of Business and Economics.

The information submitted is true and original to the best of my knowledge. Again, where references of other works have been cited, full acknowledgment has been given. This project work has never been submitted in whole or in part in any other institution for any purpose.

Ananda Bardhan

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Acknowledgment

First of all, I want to thank our Almighty from my heart. Without His blessings, nothing would be possible for me.

Second, I want to show my gratitude to my parents. Parents always help me both directly and indirectly. Actually, the parents are one of the main reasons that I am now in UIU and able to do this kind of project work. They also help me in many ways for completing the project mentally.

Third, before thanking this person, I want to say something about him. In my UIU life, I have dealt with many faculties with their different attitudes and behavior. I can say one thing, I am very fortunate to have this faculty member as my project supervisor who is very committed to his duties, caring and helpful to me throughout the project period. He taught me many new things related to the project with the practical demonstrations. Actually, this project paper is mainly based on 'Impact of Macro Fundamental Factors on Financial Volatility: Evidence from Financial Institutions of Bangladesh' and it becomes very easy for me to reach my target because of this person. The person I am talking about is none other than, my honorable supervisor, Dr. Md. Qamruzzaman. I will be grateful to him forever.

Abstract

Introduction: Continuous fluctuation or volatility of stock prices cannot ensure a stable stock market which ultimately leads the economy in a vulnerable condition. However, return from the stock market largely depends on taking the right decision at the right time about the investment in the stock market. The main obstacle for investing in the Bangladesh stock market is the continuous volatile condition of the market. Different economic and non-economic factors are the reason behind this volatility. Different business institutions cannot raise capital smoothly from a volatile stock market and so, business growth is hampered which ultimately affects the overall economic growth of Bangladesh.

Purpose: There are many macro fundamental factors related to stock price volatility. Some factors may directly affect the volatility with different levels of intensity ([Njoroge 2015](#), [Oluseyi 2015](#), [Barakat, Elgazzar et al. 2016](#), [Ndunda 2016](#), [Nikmanesh and Nor 2016](#), [Cai, Chen et al. 2017](#), [Feng, Lin et al. 2017](#)). Some other factors may indirectly affect or others may not affect the volatility at all in a particular economy ([Haider, Hashmi et al. 2017](#), [Okoro 2017](#), [Romero 2017](#)). The main purpose of this study is to find out which macro fundamental factor (BM, DBD, DCP, NPL, RE, TO) plays the most vital role in stock price volatility concerning to all the financial institutions of Bangladesh by finding the relationship between financial volatility and that particular factor.

Methodology: This study has been forwarded based on the 46 years of empirical data starting from 1976 which ends with 2017 related to all financial institutions in Bangladesh. By using the OLS based ARDL model, this study has tried to reach the main objective. Before using the ARDL model, a unit root test has been conducted to find out whether there is stationarity or not in the time series. The combined result of three types of unit root tests such as ADF, PP, and KPSS gives strong evidence to make a decision about the presence of stationarity. After that, Linear ARDL Bound Testing has been used to find whether there is any long-run relationship among all the variables or not. Then, the main ARDL model has been used to find the

particular relationship between financial volatility and one independent variable for both the long run and short run. At the very end, the residual test has been conducted to support the result found from ARDL test.

Findings: After conducting the ARDL test, this study has developed a relationship of six macro fundamental factors with volatility separately which is either positive or negative. It has been found that financial volatility has a positive relationship with broad money and domestic credit by financial sectors, but between these two; volatility has the strongest positive relationship with broad money. On the other hand, domestic credit to private sectors; non-performing loans; remittance inflow; and trade openness have a negative relationship with volatility. Among these relationships, financial volatility is maintaining the strongest negative relationship with domestic credit to private sectors and remittance inflow. These findings have been found for both the long run and the short run.

Implications: Though this study has focused on six macro fundamental factors, there are also other economic and firm-specific factors that also affect the financial volatility of the stock market of Bangladesh. However, these six can be considered the most vital macro factors in the context of Bangladesh. Now, if the investors no matter the investor is individual or any business institution know the actual relationship of these six factors with financial volatility, then they will be able to take the right decision about when to invest in the stock market and to which extent. Along with this knowledge of this study, if they have knowledge regarding firm-specific and other remaining factors, then there is a high chance that they will not face loss from the stock market and slowly, the market will be efficient and structured after getting the stability. Thus, the business institution will be able to raise capital from this market smoothly.

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List of Abbreviation

FDV	Financial Volatility
BM	Broad Money
DBD	Domestic Credit by Financial Sectors
DCP	Domestic Credit to Private Sectors
NPL	Non-performing Loan
RE	Remittance Inflow
TO	Trade Openness
GDP	Gross Domestic Product
RMG	Ready-Made Garments
DSE	Dhaka Stock Exchange
BDT	Bangladeshi Taka
ADF	Augmented Dickey-Fuller
PP	Phillip Perron
KPSS	Kwiatkowski-Phillips-Shin
LM Statistics	Lagrange Multiplier Statistics
ARDL	Autoregressive Distributed Lag
OLS	Ordinary Least Square
ECT	Error Correction Term
RESET	Regression Specification Error Test
SIC	Schwarz Information Criterion
SCB	State-Owned Commercial Banks
DFI	Development Financial Institutions
PCB	Private Owned Commercial Banks
FCB	Foreign Commercial Banks
ROA	Return on Assets
ROE	Return on Equity
CPD	Center for Policy Dialogue
NBFI	Non-Banking Financial Institutions

IPDC	Industrial Promotion & Development Company of Bangladesh
IDLC	Industrial Leasing Company of Bangladesh
PLFS	People's Leasing and Financial Services
MFI	Micro Finance Institutions
NGO	Non-Government Organizations
GB	Grameen Bank
CPI	Consumer Price Index
LC	Letter of Credit
ATM	Automated Teller machine
BB	Bangladesh bank
VAR	Vector Autoregressive
GMM	Generalized Methods of Moments
GARCH	Generalized autoregressive Conditional Heteroskedasticity
LP	Local Projection Test
IMF	International Monetary Fund
WB	World Bank
BBS	Bangladesh Bureau of Statistics
ECM	Error Correction Model
VECT	Vector Error Correction Test
SME	Small Sized Enterprises

CHAPTER I: INTRODUCTION

1.1 Background of the Study

In the last decade, Bangladesh has successfully retained economic growth although the global economy faced fluctuations. The increased GDP is evidence of this successful economic growth in Bangladesh. No matter whether a country is developed or developing one, the financial industry is considered as the backbone of the overall economy of a country. Though Bangladesh is facing an upward economic growth, the financial industry of Bangladesh is considered the weakest part of this economy. A huge amount of remittance inflow, strong RMG sector, highly efficient agricultural sector are the main reasons for this continuous economic growth. On the other hand, even if after passing the 48 years of independence, Bangladesh is still searching for an efficient; reliable; trustworthy; strong and structured capital market.

After independence, the Dhaka Stock Exchange started its functions properly from 1976. Till 1996 when the Bangladesh stock market faced one of the biggest crashes, there were controllable and moderate fluctuations in the market. By 2006, the market started going upward again, when some profitable government companies and multinational companies became enlisted in the stock market. However, the highest level of fluctuations or vulnerability in the stock market started from the very beginning of the last decade.

During the period of 2009-10, the stock market maintained a strong bullish trend with average turnover was almost 2818 million BDT daily. Even the highest daily turnover was almost 32500 million BDT which was beyond imaginations. At the end of 2010, this bullish trend turned into an erratic bubble. The broad index touched its historic high with 8919 and market capitalization became 35% as a percentage of GDP. Obviously, if there exists an inevitable upward turn, the market would soon face an inevitable downturn and in reality, downturn started from 2011 and by April 2013, the index came down to 3610 ([Arif 2018](#)). A huge number of investors both individuals and companies lose a huge amount of investment. Different reasons were behind that, such as different scams from big companies, political bad influence, lack of investment

knowledge and so on. From that period, investors totally lose confidence in the stock market. This is the reason why there was a start of high stock price volatility in Bangladesh for the last few years. Even it is seen that one day there is an upward trend and the very next day, there is a downward trend. After taking different steps by the government, the stock market started facing little stability from 2016. But the market never gets stability in such a way so that it doesn't affect the performance of the market. That's why, in 2019, the Dhaka Stock Exchange faced a tremendous negative growth of almost -17.3% which indicates a very poor condition of the stock market.

An economy with this poor stock market and no separate bond market can never be a vital source of capital not only for financial institutions but also for all types of industry. If the industries cannot raise capital from the stock market, then they can never get success in the long run which ultimately affects the overall economy of the country. So a structured and stable stock market is very important in order to achieve the vision of becoming a developed country within 2041.

Apart from the lack of confidence in investors, there are many reasons behind these fluctuations. There may be many economic, firm-specific, investors related, political, and social factors behind the volatility. For establishing an efficient, reliable and structured stock market, a detailed analysis of these factors is very important. If investors have the knowledge about which factors are related to this volatility to which extent, then they will be able to take the right decision with the changing situation. Then high amount of share purchasing and selling for a time being will go down. Thus, a stable stock market can come into the light.

This study is designed to find the relationship of six macro fundamental factors with financial volatility. The factors are broad money, domestic credit to private sectors, domestic credit by financial institutions, non-performing loans, remittance inflow, and trade openness. Among different macro variables, these six are chosen based on context of Bangladesh. Data about these six variables from 1976 to 2017 have been used to find these relationships. Chapter 1 of this study is dealing with the introductory part of this study. Chapter 2 presents the literature survey about the previous studies regarding the concept of the relationship among different variables and financial

volatility in the different economy which ends with three separate paragraphs highlighting the relationship of three control variables with volatility. Again in this chapter, a detail industry analysis has been presented based on both banking and non-banking financial institutions. Chapter 3 exposes the detailed study of all the methodologies such as unit root test, ARDL, and Residual test that have been used in this research to find out the relationship between volatility and other six macro fundamental variables separately. Chapter 4 reveals the findings and related interpretation in order to clarify how each of the independent variables is related to stock volatility in Bangladesh. The study ends with chapter 5 that is consisted of a conclusion about the whole study with the implications and some future research suggestions

1.2 Statement of the Problem

The development of financial sectors is affected by the financial volatility which is ultimately affected by different macro fundamental factors in Bangladesh. This study is focused on determining the impact of those factors on financial volatility in the context of financial sectors of Bangladesh by using the Autoregressive Distributed Lag (ARDL) method.

1.3 Objectives of the Study

The main objective of this study is to determine which factor is more responsible for financial volatility in the context of macro fundamental factors evidence from financial institutions of Bangladesh.

1.4 Theoretical Framework and Research Hypotheses

The financial volatility of financial sectors is affected by both macro fundamental and firm-specific factors. This study is not focused on a comprehensive study of the firm-specific factors' effect on financial volatility, rather it is focused to determine which macro fundamental factors play as key determinants of financial volatility of financial sectors of Bangladesh. In this context, six factors or variables have been selected through empirical studies. Now by considering FDV as dependent variables and BM, DCP, DBD, NPL, RE and TO as six independent variables, the following six hypotheses

have been tested by using the ARDL method with the support of Ordinary Least square Regression Test.

- ❖ $H_{1A,B}$: There exists a positive relationship between financial volatility (FDV) and Broad Money (BM) and vice versa.
- ❖ $H_{2A,B}$: There exists a positive relationship between financial volatility (FDV) and Domestic Credit to Private Sector (DCP) and vice versa.
- ❖ $H_{3A,B}$: There exists a positive relationship between financial volatility and Domestic Credit by Financial Sector (DBD) and vice versa.
- ❖ $H_{4A,B}$: There exists a positive relationship between financial volatility (FDV) and Non-Performing Loan (NPL) and vice versa.
- ❖ $H_{5A,B}$: There exists a positive relationship between financial volatility (FDV) and Remittance (RE) and vice versa.
- ❖ $H_{6A,B}$: There exists a positive relationship between financial volatility (FDV) and Trade Openness (TO) and vice versa.

1.5 Definition of Key Terms

- ❖ **Financial Volatility (FDV)**: It refers to the fluctuation of stock prices over a time period.
- ❖ **Broad Money (BM)**: It simply refers to the money supply in an economy.
- ❖ **Domestic Credit by Financial Sectors (DBD)**: It refers to both gross basis credit to different sectors as well as net basis credit to the government.
- ❖ **Domestic Credit to Private Sectors (DCP)**: It refers to the financial resources supplied by financial institutions to private sectors.
- ❖ **Non-Performing Loan (NPL)**: It refers to the default of timely loan repayment by debtors.
- ❖ **Remittance (RE)**: It simply refers to transferring the earned money by foreign workers to their home country.
- ❖ **Trade Openness (TO)**: It refers to the overall trade amount included as a percentage of GDP.

- ❖ **Gross Domestic Product (GDP):** It refers to the monetary value of products (both goods and services) within a national geographical border of a nation within a specific time period.
- ❖ **Unit Root Test:** It refers to the test of evaluating the presence of non-stationarity in a time series.
- ❖ **Augmented Dickey-Fuller (ADF):** It refers to a test that examines the presence of unit root especially in a complex model with a longer time series.
- ❖ **Phillip Perron (PP):** It refers to a non-parametric test that is used to identify the presence of unit root in a time series.
- ❖ **Kwiatkowski-Phillips-Shin (KPSS):** It refers to one type of unit root test that examines the stationarity in a time series in the presence of a deterministic trend.
- ❖ **Autoregressive Distributed Lag (ARDL) Test:** ARDL test is used to determine the co-integrating long-run relationship among the variables with the help of statistical results.
- ❖ **Linear ARDL Bound Testing:** It refers to the test of examining the presence of a long-run relationship among the tested variables.
- ❖ **Ordinary Least Square (OLS):** It refers to one kind of linear least square method that estimates the relationship between the dependent and independent variable in a statistical method.
- ❖ **Coefficient of Determination (R^2):** It refers to the proportion of variance existed in the dependent variable that can be predicted by a particular independent variable.
- ❖ **Adjusted Coefficient of Determination (Adjusted R^2):** It refers to the proportion of variance existed in the dependent variable that can be predicted by multiple independent variables.
- ❖ **Standard Error of Regression:** It refers to how much deviation is presented between the observed values and predicted value considering the regression analysis.
- ❖ **F Squared Statistics (F^2 statistics):** It examines which model gives better fit to data- linear regression model with independent variable or model without an independent variable.

- ❖ **Autocorrelation:** It refers that when a variable is correlated with itself over many time intervals.
- ❖ **Heteroskedasticity:** It refers to the non-constant standard error of a variable and the presence of it can invalidate the significance of statistical tests.
- ❖ **Normality Test:** It refers to a test that is used to examine whether the sample data has been taken from a normally distributed population or not.
- ❖ **Regression Specification Error Test (RESET):** It refers to the test that examines the presence of non-linear relationships while analyzing a linear regression model.
- ❖ **Error Correction Term (ECT):** It refers to the speed of adjustment of the dependent variable to the equilibrium level after a short term shock of all the variables.
- ❖ **Schwarz Information Criterion (SIC):** It refers to an index that is used to choose a model from different models or lag selection.

CHAPTER II: REVIEW OF THE LITERATURE

2.1 Introduction

After 53 years of independence, Bangladesh might get the official status of being a Developing Country by 2024 from the United Nation if they can maintain all the requirements that had been fulfilled in 2018 by that period. Without a great contribution from financial institutions, it is not possible. The origin of financial institutions in Bangladesh dates back to 1971 after the liberation war. Dhaka branch of State Bank of Pakistan had been converted into Bangladesh Bank and it is still running as the central bank of Bangladesh. Bangladesh Bank is responsible for regulating all the financial institutions, formulating monetary and fiscal policies, issuing currencies and so on.

All the financial institutions need to report to Bangladesh Bank about their functions and performance. This monitoring and regulations given by the central bank are very vital to control the unusual activities of financial institutions, so that general people don't get hurt by them. Even after taking many regulations, different Govt. owned bank has been engaged in different fraudulent activities by giving a huge amount of illegal loans to different persons and companies which ultimately increases the non-performing loans of Bangladesh. In the last decade, the trend of NPL is upward. Different reasons are behind this trend. Again, three times big crashes in the stock market make the market unreliable and inefficient to the investors. Many investors consider the stock market as the last investing option. Now if the people of a country don't have trust in the stock market, then that economy will never get a strong capital market. Thus, overall economic growth is never possible. Even, after passing so many years of independence, no Govt. was successful to establish a separate and strong bond market from where businesses can deal their debt financing smoothly.

In spite of having many weaknesses in the financial institutions, the emergence of the micro-finance industry is one revolutionary step of Bangladesh that engaged the rural people under the benefits of financial institutions which directly affect both the social life of those people and the overall economy of Bangladesh. The entry of private commercial banks under both domestic and foreign ownership, leasing companies,

development institutions, insurance companies have given an almost complete look of the financial industry of Bangladesh. Financial sector of Bangladesh can be comprised of,

1. Bangladesh Bank
2. Commercial Banks
3. Govt. owned Development Financing Institutions
4. Govt. owned Investment Company
5. Finance & Leasing Company
6. Insurance Company
7. Two Stock Exchanges
8. Bangladesh Samabaya Bank
9. Bangladesh Post Office Savings Bank
10. Micro-Finance Institutions

Financial Sector in Bangladesh

2.2 Industry Analysis

Within the 48 years of independence, Bangladesh has developed a lot in terms of financial institutions. The emergence of micro-finance institutions is a revolutionary invention of Bangladesh which not only changed the social-economical state of rural people of Bangladesh, but the implementation of this micro-credit concept also helped different developing and non-developing countries. However, still, Bangladesh is failed to develop a strong capital market from where the different financial institutions can easily collect their capitals and it is one of the main reasons why the growth of financial institutions cannot be considered as a significant one. Again, an increasing amount of non-performing loans and continuous volatile stock markets become the headache of Bangladesh's economy. Without taking any strong step regarding this issue may hamper the dream of Bangladesh to become a developed country within 2041. This study will develop the financial industry analysis basis on dividing the whole financial institutions into two broad categories- Banking Industry and Non-banking Financial

Industry. This analysis will also present some of the main reasons which are suffering the overall growth of different industries under the financial industry.

2.2.1 Specification of Industry

Banking Industry

The banking industry is playing a vital role in the economic development of Bangladesh compared to all other financial institutions. Starting with only 6 State-Owned Commercial Banks (SCB), Bangladesh saw a dramatic change in terms of a variety of banking sectors, the involvement of both domestic and foreign-owned private commercial banks, the growth of assets and finally, Bangladesh is comprised of 59 scheduled banks. The volume of deposit was only 9.132 billion in June 1974, whereas it was almost 9874.89 billion in June 2018.

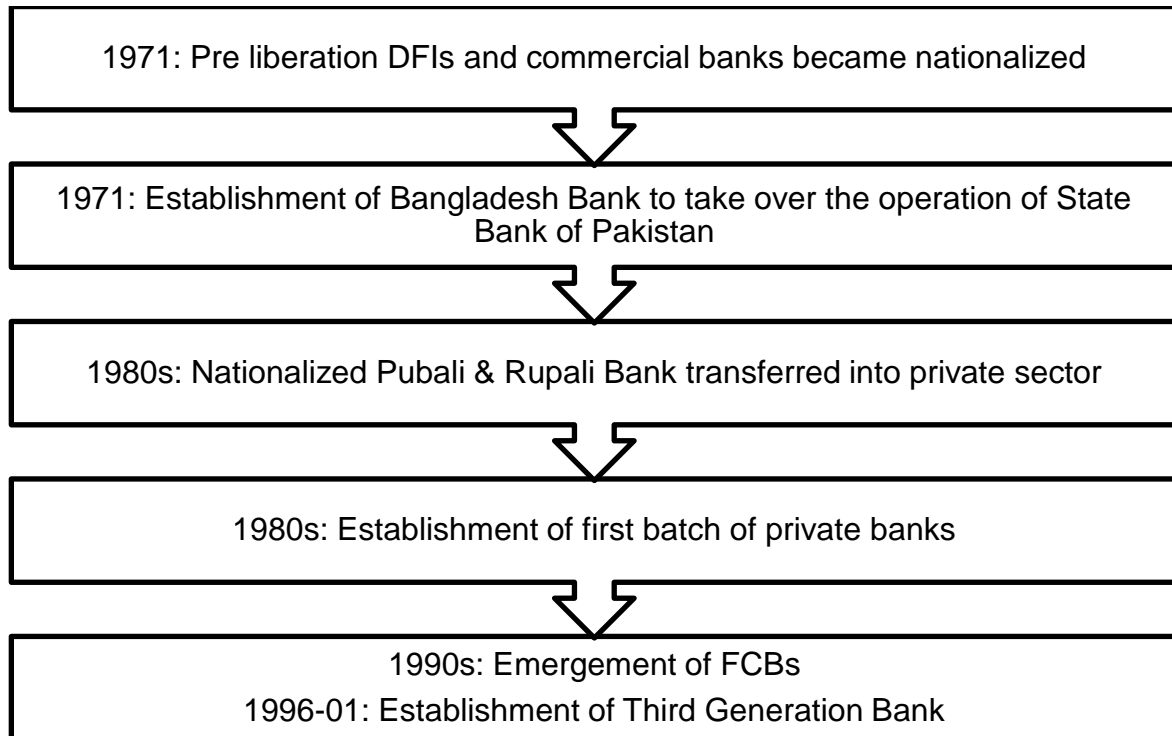
The process of growth and diversity came into light when Private Owned Commercial Banks (PCB) came into the scene in the early 1980s. With the hope of capturing the emerging market of Bangladesh, many Foreign-Owned Private Companies (FCB) commenced their business in Bangladesh in the 1990s which ultimately changed the overall banking industry scenario of Bangladesh. Once SCBs enjoyed almost 95% of the total bank deposit, but in 2018; it fell down into only 27.35%. On the other hand, PCB is now holding almost 66% bank deposit share. As banks under SCBs could not upgrade themselves with the upgraded technologies and ongoing aggressive market strategy, SCB is gradually going out of the competition.

Since the banking industry is considered as the main element of the overall financial system of Bangladesh, so having a sound banking system is important for the continuous development of the economy. The main source of funds for the banks is the deposits taken from households and other private sectors. In 2017, of the total fund, 75.3% came from deposits. The other two sources of funds are capital & reserve (7% of overall deposits) and other liabilities (17.7% of total funds). On the other hand, it is obvious that loans and advances are considered as the main asset which was almost 61.6% of the total assets for the banks. Govt. bills; bonds, deposit with Bangladesh bank, Cash in hand and other assets cover the remaining 38.4% of the total assets. The

performance of both domestic and foreign-owned commercial banks is the main reason why the banking industry is still contributing to GDP.

The overall growth of the banking industry is given below,

Figure 1: Growth of Banking Industry



A recent situation has been evaluated based on the following tables and figures consisting of data between 2012 to 2017 with a comparison between SCBs; DFIs and PCBs; FCBs.

Table 1: Overall Performance of the Banking Industry

Bank Types	2017						2016					
	Bank Number	Branches	TA	% of IA	DEP	% of DEP	Bank Number	Branches	TA	% of IA	DEP	% of DEP
SCB	6	3721	3380	25.88	2701	27.35	6	3710	3210	27.6	2535	28.38
DFI	2	1407	318	2.43	273	2.77	2	1407	300	2.6	249	2.79
PCB	40	4758	8758	67.07	6508	65.91	40	4467	7560	65	5788	65
FCB	9	69	604	4.62	393	3.98	9	70	558	4.8	361	4.04
Total	57	9955	13059	100	9875	100	57	9654	11627	100	8934	100
	2015						2014					
SCB	6	3690	2840	27.5	2255	28.44	5	3553	2517	27.5	1952	28
DFI	2	1406	291	2.8	227	2.86	3	1500	334	3.7	238	3.4
PCB	39	4226	6653	64.5	5110	64.46	39	3917	5787	63.3	4449	63.9
FCB	9	75	531	5.2	337	4.25	9	70	505	5.5	326	4.7
Total	56	9397	10315	100	7929	100	56	9040	9143	100	6965	100
	2013						2012					
SCB	4	3520	2109	26.4	1631	26	4	3478	1832	26.1	1378	25.5
DFI	4	1494	455	5.7	343	5.5	4	1440	386	5.5	260	4.8
PCB	39	3602	4948	61.8	3939	62.8	30	3339	4372	62.2	3431	63.6
FCB	9	69	489	6.1	360	5.7	9	65	442	6.3	327	6.1
Total	56	8685	8000	100	6273	100	56	8322	7031	100	5396	100

Note 1: SCB for State-Owned Commercial Banks, DFI for Development Financial Institutions, PCB for Private Commercial Banks, FCB for Foreign Commercial Banks, TA for Total assets, % of IA for percentage of Industrial Assets, DEP for Deposits, % of DEP for percentage of Deposits; **Note 2:** All the data have been taken from Bangladesh Bank website.

Table 2: Banks Facing Capital Deficit

Banks Facing Capital Deficit (Up to June 2018)			
Name of Bank	Amount of Deficit (Billion)	Name of Bank	Amount of Deficit (Billion)
Sonali Bank	66.013	Bangladesh Agricultural Bank	80.096
Basic Bank	31.062	Rajshahi Krishi Unnayan Bank	6.459
Janata Bank	21.953	ICB Islami Bank	15.250
Agrani Bank	14.193	Bangladesh Commerce Bank	3.019
Rupali bank	12.932	Social Islami Bank Limited	0.455
Source: Mawla (2018)			

Note 1: Capital deficit amount is based on at the end of fiscal year on June 30; **Note 2:** All the monetary value are in BDT

Figure 2: ROA by Types of Banks

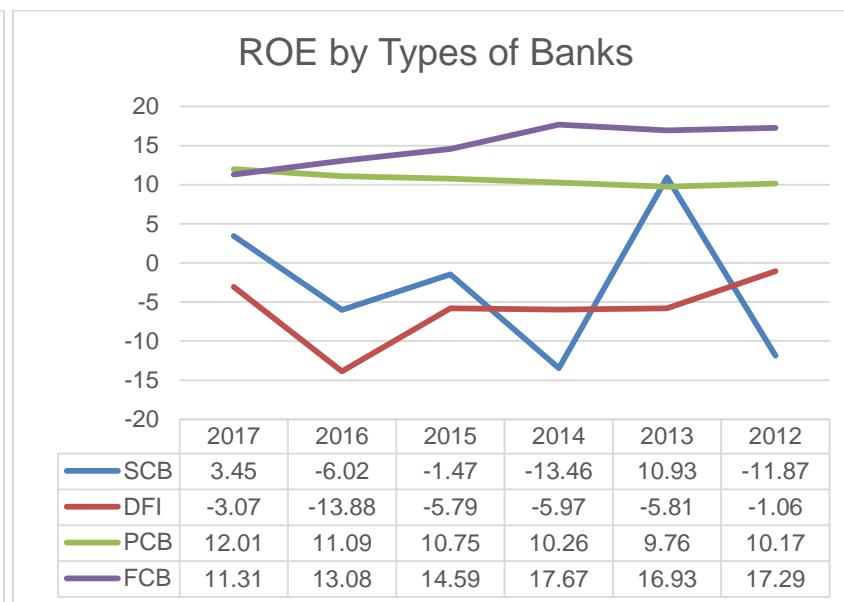
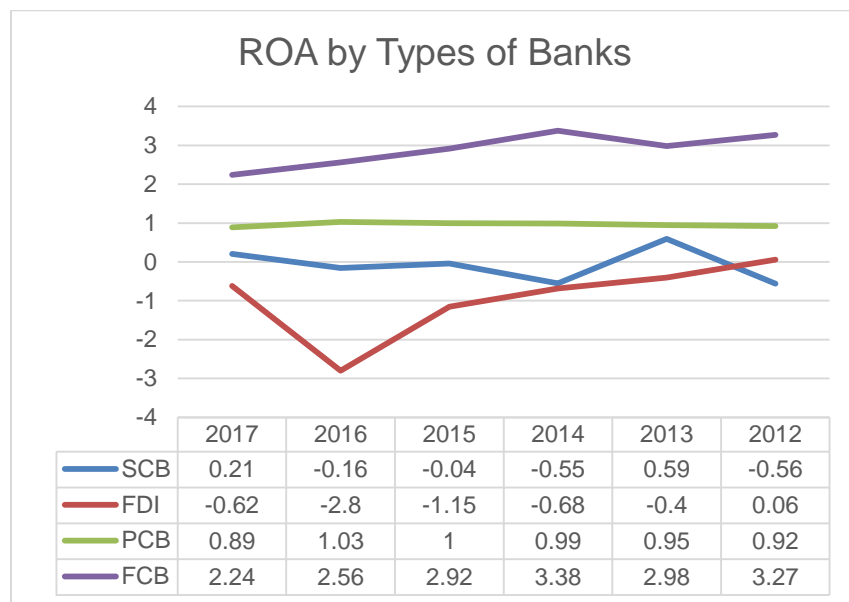


Figure 3: ROE by Types of Banks

Note 1: Capital deficit amount is based on at the end of fiscal year on June 30; **Note 2:** All the monetary value are in BDT

From the above-given tables 1 & 2 and figures 2 & 3, it can be stated that the present situation of the banking industry of Bangladesh is vulnerable. Especially, the condition of state-owned commercial banks is very poor. They are facing a negative return from their assets and equity in the last few years. Even the seven SCBs are facing capital deficit by a huge amount by June 2018. According to the June 2018 report of Central Bank, they used their core capital because

of the high amount of non-performing loans. In a sense, it is clear that the banking industry is still running in Bangladesh because of the performance of PCBs and FCBs.

In the last decade, non-performing loans become the main obstacle in the growth of the banking industry, especially for SCBs and DSFIs. Involvement of political force, nepotism of top executives, taking bribe for issuing loans, poor central bank monitoring and regulations are some of the reasons why the amount of NPL has been decreasing. In 2017, ration of net NPL to total loans is 11.2% and 9.7% for SCBs and DFIs respectively which are very significant. On the other hand, net NPL to total loan ratios is controllable for PCBs and FCBs with 0.2% and 0.7% respectively. A huge difference simply indicates the very poor performance of SCBs; DFIs compared to private commercial banks.

While further analyzing the reasons behind the poor performance of SCBs, Firstly; regulatory authorities are weak in controlling those banks and sometimes their decisions are also questionable. In the last few years, Govt. is providing capital to these institutions from the national budget and still, these institutions are not able to solve their problems. Based on the report of the Center for Policy Dialogue (CPD), almost 11.705 billion BDT had been provided to these institutions during the period from the fiscal year 2009-10 to 2016-17 ([CPD 2018](#)). Second, political influence is one of the main reasons behind it. Many big elephants are doing many fraudulent activities with the help of top executives that directly affects the performance of SCBs. Third, these SCBs are not enough concerned about upgrading themselves with modern technologies and marketing strategies like PCBs and FCBs. Four, inefficient and unstructured capital markets resist them to collect sufficient capital for better performance. Even after the 48 years of independence, no separate bond market has been established. These four reasons can be considered as vital reasons.

In the last two years, the central bank has taken many steps in order to make the SCBs more profitable and bring the commercial banks under different regulations. Adopting the aggregate micro-prudential soundness indicators consisting with earnings, liquidity, capital adequacy, asset management, and sensitivity to market risk is one of the vital steps under which all the banks need to maintain these ratios within a given

fixed range for each accounting period and which will be directly supervised by the central bank authority. Other than this, individual bank assessment; monitoring and regulating the large borrowers whether they are maintaining the timely repayment or not; advising in order to strengthen the internal management control; monitoring stock investment; establishing risk management committee with new risk management guidelines and so on. For reducing the non-performing loans, Bangladesh Bank has adopted different measures such as loan classifications, write-off, loan rescheduling, and provisioning and also ordered to implement a new loan recovery mechanism for each of the banks.

Non-Banking Financial Industry

Non-Banking Financial Institutions (NBFIs) have already exposed themselves as emerging players in terms of the economic development of Bangladesh. They are concentrated on leasing, other leverage financings such as loans for agriculture; housing; commerce, and different investment-related activities with speedy disbursement and a high rate of recovery compared to the banking industry. Currently, 34 NBFIs are operating in Bangladesh. Of them, 3 are Govt. owned, 12 are running as a joint venture with foreign companies, and the remaining 19 are domestic privately owned. The volume of investment was only 9.197 billion in June 1998, whereas it was almost 85.04 billion in June 2018.

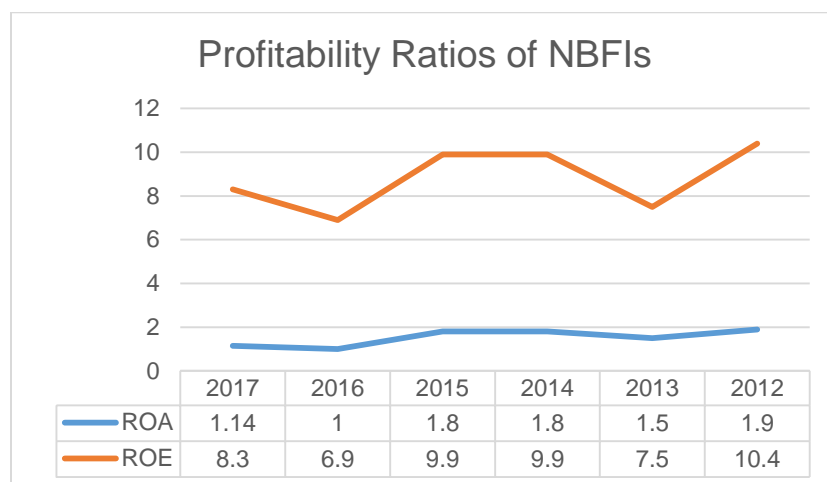
NBFI started contributing to the economy largely in the early eighties when IPDC and IDLC were established as a joint venture company. Gradually, different types of NBFI such as Leasing Company, Insurance Company, merchant Bank, Investment Bank, and Micro-Finance Institutions came into light in Bangladesh and together, they changed the overall economy of Bangladesh. A recent situation of the non-banking industry is given below in different table and figures from the year 2012 to 2017,

Table 3: Overall Performance of NBFIs

Particulars	Years					
	2017	2016	2015	2014	2013	2012
No. of NBFIs	34	33	32	31	31	31
TA	841	713	611	520	436	334
TL	725	606	509	424	350	274
L-A Ratio	86.36	84.95	83.3	81.5	80.3	82.2
TD	468	382	318	239	198	145
D as % of TL	64.41	63.1	62.5	56.2	56.6	53.0

Note 1: NBFIs for Non-Banking Financial Institutions, TA for Total assets, TL for Total Liabilities, L-A Ratio for Liability to Asset Ratio, TD for Total Deposits. D as % of TL for Deposits as percentage of Total Liabilities; **Note 2:** All monetary values are in BDT

Figure 4: Profitability Ratios of NBFIs



Note 1: ROA for Return on Assets, ROE for Return on Equity

From the above-given table 3 and figure 4, it can be stated that the present situation of non-banking financial industry of Bangladesh is above average. In the last few years, consistent positive performance is being given by them compared to the banking industry. In the later part, the industry-wise discussion has been given which will clearly highlight the separate industry based contribution in NBFIs.

To achieve the official status of being a “Developing Country” in 2023, more success of NBFIs along with the banking industry is highly demanded. However, there are several constraints on that road such as, First; most of the leasing companies are focusing on some particular business areas which ultimately negatively affecting the companies in terms of lack of growth opportunity. Second, intensive and strict Bangladesh Bank rules are also working against them. They are not even permitted to open a letter of credit in terms of imports financed by them. Third, different commercial banks are also engaging themselves in leasing business with the help of their diversified sources of funds which is directly affecting the growth of leasing companies. Forth, the inefficient and unstructured capital market makes it difficult to raise capital. Without sufficient capital. It is not possible for the non-banking financial industry to give loans in different sectors of Bangladesh. These four reasons can be considered as vital reasons.

Insurance Industry

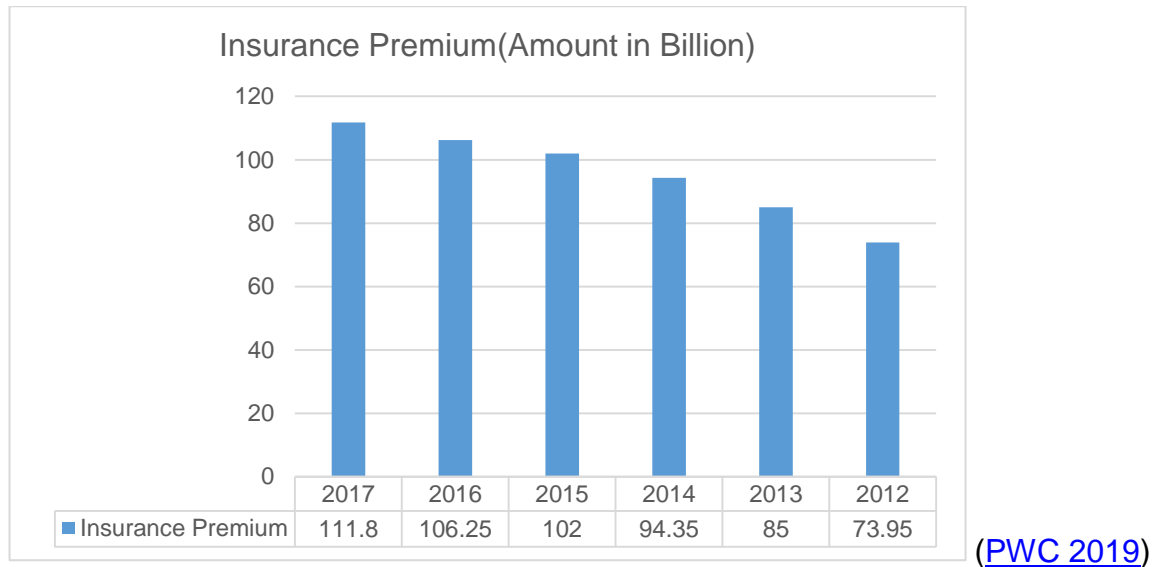
For economic development, higher return from all types of financial institutions is highly desirable. However, if there is a chance of a return, there must have the presence of risk and if the risk cannot be controlled at a minimum level, it can hamper the overall growth and insurance is such a tool that helps the institutions or households to control these risks. On a bigger scale, it can also reduce the financial burden of Govt. in many ways. In simple terms, insurance covers some level of losses arriving from different types of investments and financing. Currently, 62 companies are functioning in Bangladesh. Of them, 18 belong to Life Insurance Company and the rest of 44 belong to General Insurance Company. Out of the 100% share position of the overall insurance market, life insurance companies are holding almost 73.5% share and the rest of the 26.5% shares are held by general insurance companies. In 2017, total gross premium earning was 82.031 billion for life insurance companies whereas the amount of premium was 29.796 billion for general insurance companies.

After the independence of Bangladesh, all the pre-liberation insurance companies were merged into 5 nationalized insurance companies in 1972 and among them, Jatiya Bima Corporation was the controller of others. In 1973, these 5 corporations were abolished and instead of that, 2 corporations came in light such as Sadharan Bima Corporation and Jiban Bima Corporation. However, after 1984, private insurance companies got the license to do business and at that time, 60 privately owned insurance companies started functioning in Bangladesh ([Chaudhuri 2013](#)). Till now, Sadharon Bima Corporation is the sole insurance company which is owned by Govt. of Bangladesh. Other than this, no other private insurance companies are allowed to insure any public property. Insurance Development and Regulatory authority of Bangladesh is the controller of all the insurance companies.

Although insurance companies were started with the hope of capturing the insurance coverage opportunities in many sectors of Bangladesh, still the insurance market is fragmented. For different reasons, the concept of insurance doesn't get popularity especially in the context of the individual. Insurance companies are run by giving services to different businesses, especially which are engaged in export-import.

In spite of having several problems, total insurance premiums have been increasing for the last few years which is shown in the following table.

Figure 5: Insurance Premium Amount



Based on the insurance premium earnings, it can be stated that insurance companies are showing growth in the last few years. However, this is not the actual scenario of the insurance company, because the penetration rate or contribution in GDP is only 0.55% from the insurance industry in 2017 which indicates a very poor situation of this industry. In 2009, penetration was 1.20% which indicates that insurance overall performance of insurance companies is not up to the mark. Compared to other South Asian countries, Bangladesh is holding the lowest penetration rate.

While analyzing, several problems have been identified behind this. First, the people of Bangladesh have a very low level of trust in insurance companies because of the gap between promise and delivery given by the insurance companies. Second, technological incapacities are also keeping them behind. Similar to other global insurance companies, digitalization is totally absent from insurance companies in Bangladesh. Customers of the banking industry can take many advantages from ATM services like withdrawing money and also depositing money. However, policyholders have no such opportunity to use ATM to pay premiums without any hassles. Third,

insurance agents are not enough trained and efficient to attract more customers. Sometimes, they are also engaged in fraudulent activities. Without giving money receipts, they take the insurance premium from policyholders, especially those who have less knowledge about it. This kind of activity directly violating the trust between policyholders and insurers. Forth, people are not much aware of the benefits of insurance for the lack of marketing strategies taken by insurance companies. Fifth, a claim settlement system is very long and time consuming for the policyholders. Even after verification and investigations, some policyholders don't get their rights. By removing these problems, insurance companies can be another strong pillar of Bangladesh's economy as they will be able to give more loans to different institutions from their increased amount of premiums.

From the outer part, it seems that the contribution of insurance companies may not be too much just like other financial industries of Bangladesh. This argument can be eliminated by taking the example of the agricultural industry. Every year, Bangladesh faces different natural calamities and agricultural sectors are affected the highest. If the agricultural sectors can be brought under the umbrella of insurance coverage on a larger scale, then the contribution from the agricultural sector will be higher in the overall GDP of Bangladesh. Even, it will reduce the expense of Govt. In 2007, because of the damages caused by Cyclone Sidr, Bangladesh Govt. had to spend a lot for recovering the damages of agricultural sectors. Thus, taking the right steps by both Govt. and insurance regulatory authority can make the insurance sector stronger.

Leasing Company

With the growth of the industrial sector in Bangladesh, the importance of a leasing company comes in the light. Previously different commercial banks and development institutions had been considered as only the lending institutions. However, the leasing company gains popularity because of certain advantages that other lending institutions cannot provide. Under leasing, leasing companies provide the property to the lender in order to use it in exchange for payment, not transfer the ownership. This is the basic concept of leasing, but there are many exemptions in different types of

leasing. Especially, leasing companies bring the benefits for Small Sized Enterprises (SMEs) as they open up additional access for them. Currently, 24 leasing companies are running their functions in Bangladesh.

Compared to other financial institutions, the concept of a leasing company is a newer one. In Bangladesh, the IPDC is the first leasing company which was established in 1981 with the equity participation by government, Commonwealth Development Fund, IFC and Aga Khan Fund. Different advantages make the concept of leasing interesting especially to the business people such as lease doesn't require a heavy down payment; makes it enable to use any asset for a long time without purchasing; provides tax exemptions; is not counted as borrowing and so, borrowing capacity remains same for the businesses.

In spite of lots of advantages, the leasing industry never gets huge success and in the last few years, growth is going down. While analyzing, different reasons come into the front. First, more than 60% funding of lease companies come from commercial banks and the recent vulnerable conditions of banks make it difficult for the leasing companies to collect fund. The rest of the funds come from fixed deposits. The increase of non-performing loans also makes it difficult for the banks to issue funds to the leasing companies. Even some of the leasing companies are fully dependent on banks. Second, depositing systems such as leasing companies cannot take deposits for less than three months; transactions only through banks, no issuing of checkbooks make it difficult for them to fight against the liquidity crisis. Because these systems are the main reasons why general people are not interested to keep deposits in leasing companies. Third, inefficient and unstructured capital markets don't allow to raise capital easily.

The situation is so bad that one of the oldest leasing companies named People's Leasing and Financial Services (PLFS) has gone under liquidation very recently. Even the people are interested to withdraw their deposits from leasing companies, but they are not able to give the depositors' money back because of a liquidity crisis. Without proper steps taken by Bangladesh Bank and government, an emerging industry can face overall liquidation.

Micro-Finance Industry

Before the establishment of MFIs, no other financial institutions were not so much willing to provide their functions for the rural people in an extended way. As rural people cannot give any security against any loan or they don't have any fixed secured income, so traditional institutions were unwilling to lend money to them. So a huge amount of people were not able to bring economic success in their lives and ultimately success in the overall economy of Bangladesh. However, the situation started to change when different Non-Government Organizations (NGOs) came into light and following to them when different MFIs were established. Currently, 705 MFIs are operating in Bangladesh and among them, Grameen Bank; BRAC; ASA & Proshika are the largest ones.

The origin of micro-credit financing dates back in 1974 when few concerned individuals set up different NGOs for the purpose of rehabilitation of a war-ravaged and flood-affected country. The primary purpose was to help those affected people. However, Bangladesh saw a dramatic turn in microcredit idea when Nobel winner Dr. Muhammad Yunus established Grameen Bank in 1983. GB introduced a banking practice where people would get loans without any collateral and so, rural people get the opportunity to take part in the banking system. Even GB's main focus was on how to empower women. Because Bangladeshi women have different capabilities especially in handicrafts activities. If they get some financial supports, they can become businesswomen and turn their luck and that was the target of GB and they successfully did that in the last few years. Their banking system was established based on mutual trust; accountability and creativity. By June 2018, GB had almost 8.31 million loan takers. This business idea made Bangladesh as a role model in terms of microcredit financing. Many rural people especially women changed their lives with the microcredit given by GB.

Gradually along with GB, different MFIs came out with different types of projects like giving a loan to beggars, funds given to meritorious and needy students, food against education and so many. One of the biggest contributions of these MFIs is in climate change. Different MFIs came out with different innovative ideas in order to cope

with the climate change like saline tolerant crop farming, awareness building programs and trainings etc. In just simple words, MFIs reduces poverty from Bangladesh, engaged unemployed rural people into employment, and engaged them in contributing to the overall economy of Bangladesh. In spite of huge success, MFIs are facing a few challenges. Different fraud institutions are taking the popularity of MFIs as the weapon in order to do different fraudulent activities with the poor illiterate rural people. In the name of loans, they are taking their livestock and other assets. If the local authority can handle these situations, then people can be protected from fraudulent activities and people will trust more on MFIs.

However, with the different innovative projects, most of the MFIs get the success and following tables and charts will highlight the growth of MFIs in Bangladesh,

Table 4: Overall Performance of MFIs

Particulars	Year (Ends on June 30)					
	2017	2016	2015	2014	2013	2012
No. of MFI	699	680	697	697	649	590
Members (Million)	29.90	27.58	26	25.11	24.60	24.64
Loan Takers (Million)	25.98	23.11	20.35	19.42	19.27	19.31
Member Saving (Billion BDT)	216.71	170.67	135.41	106.99	93.99	75.25
Source: (MRA 2012-2018)						

Note 1: MFI for Micro Finance Institutions; **Note 2:** All the data have been taken on the last of fiscal year which is June 30; **Note 3:** All monetary values are in BDT

Figure 6: Outstanding Loan of MFIs

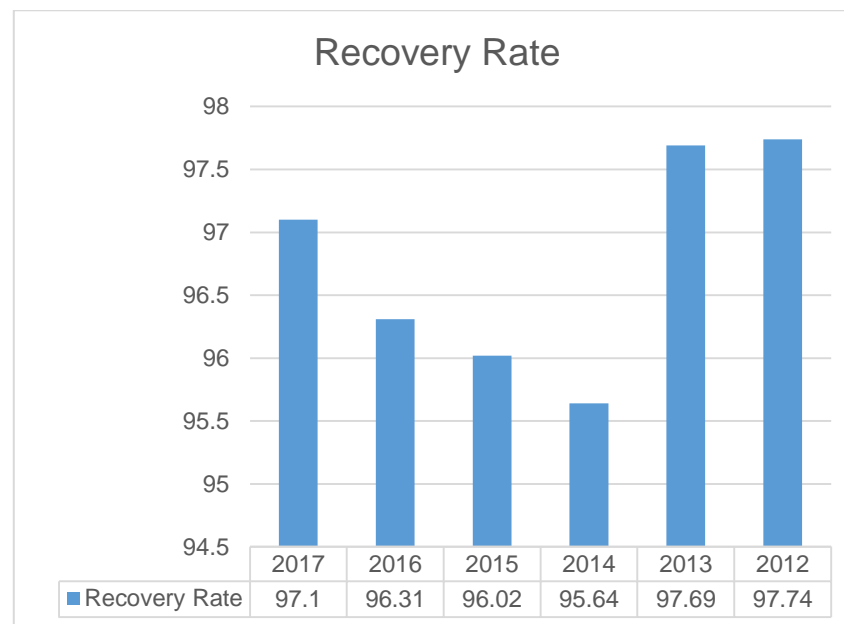
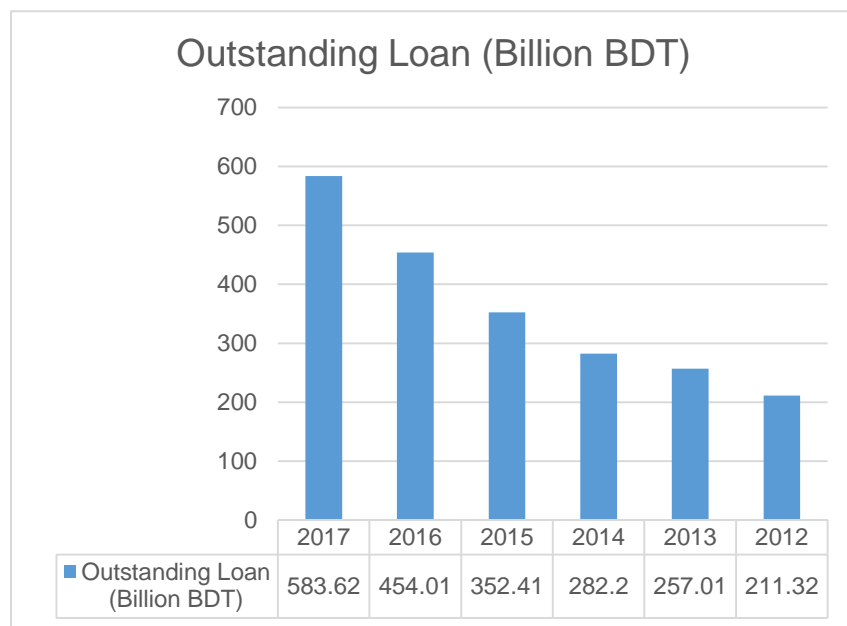


Figure 7: Loan Recovery Rate of MFIs

From the above table 4 and charts 6 & 7, it can be clearly stated that the growth of the micro-finance industry is upwards. The total amount of loan outstanding was only 114.75 billion BDT in 2005, whereas it was almost 583.62 billion BDT in 2017. It clearly indicates more people are taking microcredit from these institutions. The high rate of recovery indicates that business can also run based on mutual trust and is also giving the evidence of successful operations of MFIs. These MFIs are playing a vital role in the overall economy of Bangladesh and helping in the continuous of growth of GDP.

Need For Establishing Derivative Market

One of the missing parts of the Bangladesh capital market is derivative securities. The existence of the derivative security market in any economy can strengthen the capital market which can ultimately help to bring stability in the stock market, because some investors may become willing to invest in derivative securities which can reduce the excessive purchasing or selling pressure of stocks.

Though derivative is a new concept for us, the invention of derivatives markets occurred officially before the 1900s'. Even India, our neighboring country started the trade of derivatives before 20 years from now in 2000. However, still, the derivative contracts and its functions are confined to the study materials of Bangladesh. Derivatives impose a strong and significant impact on modern finance because of providing crucial advantages- firstly, by deriving the value of an underlying asset, derivatives contract reduces risk. Besides, both of the parties in the contract shouldn't have to bear any loss. Secondly, asset price estimations can be made easily through the derivatives. For instance, the approximate commodity price can be forecasted through the spot prices of the futures. Thirdly, the efficiency of financial markets strengthened by derivative contracts. Often underlying asset prices and derivatives remain in the equilibrium, which reduces the arbitrage opportunities. Finally, by conducting interest rate swaps, a business group may gain favorable interest rates compared to the rates in the market which is available for all.

Among all the financial institutions, the banking industry is moving forward and the development in the banking sector strengthens the financial performance of the financial industry and the economy as well. NPL hurts the banks' performance. So the economy also suffers, which shouldn't be continued. The capital market of Bangladesh should be developed to become an alternative sector of banks. Stock price fluctuations often hurt investors, which should be modified. Hopefully, a strong and efficient economy can be built with the establishment of the derivative market.

2.2.2 External Factors

The performance or profitability of the financial industry is dependent on various external factors (factors that cannot be controlled) that can be both economic and non-economic factors. Some of the significant factors are given below for the banking industry,

Economic Factors

- ❖ **Consumer Price Index:** Consumer price index or inflation can be considered as one of the vital factors that affect the performance of the banking industry. If the price of goods goes up, people will have to spend more money to buy the same products, so they will have fewer savings in the hands and so, they will be able to save less in different banks and ultimately, banks will not be able to provide sufficient loans to different institutions. If providing loan which is considered as the main function of banks is affected because of increased CPI, then it will negatively affect the profitability of the banking industry.
- ❖ **Money Supply:** If there is an increase in the money supply in the economy of Bangladesh, people will have more money in the hand and they will be able to save more in the banks after their expenditures and so, banks will have more money supply. Having more money supply in banks will force the banks to lower the interest rates to attract more lenders. So different institutions can lend more money from banks at a lower rate. Again, a decrease in the money supply will give less money in the hand of people and so, they will be able to save less in the banks. Because of less supply of funds, different institutions will have to lend less amount at a higher interest rate. In both the situation, there is a chance of both increase and decrease in profit. It will depend on the management of the bank how they will handle the situation in a profitable way.
- ❖ **Remittance Inflow:** In an economy like Bangladesh, a huge amount of remittance comes into this country every year which ultimately increases the money supply in the overall economy. People will save an excessive amount of money in the bank by which banks can extend their business in a profitable way.

- ❖ **Interest Rate:** Decisions regarding the interest rate taken by Bangladesh bank and government directly affects the functions of the banking industry. Recently Govt. has announced that by April 2020, the interest rate for all the commercial banks will come down at single-digit which will directly affect the profitability of banks. A few times ago, Govt. also tie the banks at a fixed range of interest charges for the credit cards which also affected the banks. So if the Govt. allows a higher interest rate for the banks for giving loans, it becomes profitable to them. Because banks are a major source of a fund providing to different companies and companies will be bound to take a loan with higher interest rates and which will ultimately increase the profits of banks.
- ❖ **Gross Domestic Product:** In the last few years, Bangladesh's economy is facing a higher GDP although the global economy is facing vulnerable conditions. If an economy has a continuous high GDP, it will positively affect the performance of the banking industry. Different investors become motivated in more investment in such an excellent economy and for that, they take larger loans from the banks which ultimately positively affects the profitability. A high level of GDP attracts many companies to start a new business to grab the opportunity from a high GDP based economy. For starting the business, they need financing and the banking industry can supply that fund which can increase their performance.
- ❖ **Trade Openness:** Increased amount of export and import always increase the profitability of the banking industry. In Bangladesh, most of the trade is still done based on the letter of credit (LC) and from that, banks earn a significant amount for opening the LC and also for making the connection between the traders. Again, for matching with an increased amount of trade with foreign companies, companies need to take large loans from banks which can increase profitability.
- ❖ **Exchange Rate:** As Bangladesh is engaged with a huge level of export-import business, so the fluctuation of the exchange rate plays a vital role. Against different strong currencies, most often BDT depreciates which indicates that depreciation leads to paying more BDT for buying the same foreign goods. So it may affect the money supply, personal saving negatively and so, the banking

industry gets fewer savings amounts from the investors and so, they can provide fewer loans to the businesses. It ultimately affects the profitability of banks.

Non-Economic

- ❖ **Competition:** The above-given industry analysis has highlighted that SCBs are lagging much behind the commercial private banks because they are not able to compete with the intensive competition. Private Banks are introducing new marketing strategies that cannot be adopted by SCBs. They are still maintaining their business with traditional ways. Again, PCBs are facing challenges to fight with FCBs because of a larger amount of capital investment by FCBs. However, this intense competition ultimately helps the banking industry to grow. Banks are forced to take new steps to compete with the growing banks.
- ❖ **Political Issues:** This has become one of the major concerns for the banks. In the last decades, many big elephants took a huge amount of loans especially from SCBs, but they didn't repay the money with the help of political power which ultimately increases the non-performing loan. This is one of the major reasons why today SCBs are facing loss. Because of this NPL, they can neither get back their money nor can give new loans in order to earn more. Day by day, the total amount of NPL is increasing in the banking industry which negatively affects the profitability of banks. Again, the different political crisis also affects performance. Crashes among the different political parties affect the daily functions of banks.
- ❖ **Technological Development:** In this modern era, without upgrading the banking sector according to new technology, it is never possible to develop and this is one of the reasons why SCBs are not able to fight with private banks. New technologies enable the banks to start mobile banking, online transaction, ATM machine facilities, etc. and these directly affect the profitability of Banks. The concept of the debit card, credit card, and prepaid card came into the market because of the upgraded technologies. Even with the help of

technologies, many rural people have been undertaken into banking services in Bangladesh. With the help of mobile banking, they can receive or send money even from the villages. These modern services have increased the overall growth of banks which ultimately positively affects profitability.

- ❖ **Consumer Perception:** It is another vital reason why SCBs are lagging behind. Because of the continuous poor services from SCBs, people have lost their trust in them, rather they face reliability with the private banks. On the other hand, if the banks can gain the trust of consumers that bank is the best investment sector for their excess money compared to all other investment sectors, then banks will be able to engage more people as their consumers and which will ultimately increase the profitability of banks.
- ❖ **Inefficient and Unstructured Capital Market:** If the banks cannot raise capital smoothly, they can never hold the growth in the long run and a structured capital market is considered as the vital source of capital. However, the irony is, the stock market of Bangladesh is still facing continuous fluctuations. Three major crash lose the confidence of investors from stock markets. Even it happens that, the new company needed to sell the Initial Public Offerings (IPO) at less than their face value. Again, there is no separate bond market from where they can deal with debt financing. The establishment of the derivative market is far beyond the imagination. This partially established capital market is one of the obstacles in the road to the success of the banking industry. It is obvious that without sufficient fundraising, the banking industry cannot grow in the long run.
- ❖ **Tax Policy:** Tax-related policies taken by Govt. directly affects the profitability of the banking industry. The increase of corporate tax decreases the profits and a decrease in corporate tax rate increases the profits of banks. Before announcing the financial budget of 2019-2020, the tax rate was 40% for the listed banks and 42.5% for the non-listed banks. In this fiscal year, Govt. has reduced 2.5% corporate tax for all types of banks which will certainly increase the profits as banks will have to spend less tax expense.

2.2.3 Barriers to Entry

As people have trust in the banking sector and for maintaining this trust, Bangladesh Bank has imposed some requirement for the organizations which are interested to come in the light as a new bank. If there would no requirements for entry, any incapable organization will formulate a bank and so, they will not be able to keep their promises made to their customers. So customers will lose trust from the banking industry and they will save less amount. As a consequence, businesses will get less money from banks and so, the overall economy will be hampered. In 2019, 80 applications were filed in Bangladesh bank in order to get the permission of opening a new bank. Different people or organizations nowadays want to open money to maintain a smooth circulation of funds for their other businesses from that bank. Among all 80 applications, only 3 organizations got permission to open new banks. In order to save the banking industry, different requirements are set that need to be fulfilled before entering into the banking industry.

- ❖ The first vital condition is to have a minimum of 4 billion BDT as paid-up capital provided by the sponsors of the bank. Even in 2019, the three banks which got permission for opening bank were asked to have a minimum 5 billion BDT as paid-up capital based on the present size of the economy and interests of the depositors. Again, the maximum shareholding stake of each sponsor cannot be more than 10% of the bank's total share capital.
- ❖ From the very beginning, it must be established as a public limited company. The bank has to issue the IPO within three years of commencement.
- ❖ Any director or any person who is appointed as advisor of another bank cannot be the director of the proposed bank. The member of the Board of Directors should not be more than 13.
- ❖ Different proper documents need to be submitted like a bank draft of BDT 1 million, feasibility report, biographical reports, written agreement with shareholders, business plan, risk management techniques report, memorandum of association (MOA), articles of association (AOA), certificate of incorporation, registration certificate under Joint Stock companies, etc.

- ❖ The branching ratio for an urban and rural place should be 1:1 or any other special instructions are given by Bangladesh Bank.
- ❖ Within six months of commencing the business, banks need to arrange the statutory meeting and also provide the statutory report to the Bangladesh Bank. Otherwise, that bank will be forced to liquidation.
- ❖ Without taking permission by showing the proper documents, no bank can open a new branch in any place of Bangladesh.
- ❖ After the immediate commencement of the business, banks must maintain a minimum of 5.5% as cash reserve ratio. It may seem quite difficult for newer banks to enter into the industry after fulfillment of all the required conditions of Central bank ([BB 2019](#)).

2.3 Literature Survey

Table 5: Literature Survey

Authors	Country	Variables	Methodology	Findings
Cai, Chen et al. (2017)	China	<ul style="list-style-type: none"> *Dividend Price Ratio *Dividend Payout Ratio *Dividend Yield *Earning price ratio *Book-to-market ratio *Inflation *Turnover *Changes in the money supply *Industrial product growth *Long term treasury yield *Long-term treasury yield 	*Standard Predictive Regression Framework	*The ultimate result of this study focuses on the positive and significant relationship between dividend price ratio; dividend payout ratio; dividend yield; inflation; stock turnover; changes in money supply and Chinese stock market volatility. Again, the combined use of these variables gives the strong forecasting power for Chinese market volatility.
Oluseyi (2015)	Nigeria	<ul style="list-style-type: none"> *Industrial production index *Consumer price index *Money supply *Exchange rate 	*General Autoregressive Conditional Heteroscedasticity (GARCH) model	*The final outcome of this study varies with the different models used here. GARCH model shows the positive relationship between inflation; money supply; GDP and

		<ul style="list-style-type: none"> *Base lending rate *Inflation 	<ul style="list-style-type: none"> *Bi-variate and multivariate Vector Autoregression (VAR) Granger causality tests *Regression Analysis 	<p>stock market price volatility whereas Granger test & regression analysis finds that interest rate and exchange rate affect the price volatility. The existence of huge non-institutional investors and asymmetry of information of a developing country like Nigeria are two main reasons for this variation.</p>
<p>Papadamou, Sidiropoulos et al. (2017)</p>	<p>Argentina, Australia, China, Canada, Chile, Denmark, Croatia, Hungary, Iceland, Russia, Indonesia, Israel, Japan, Korea, Malta,</p>	<ul style="list-style-type: none"> *Real GDP *Interest rate *Trade Openness *Business Size *EER volatility *Inflation 	<ul style="list-style-type: none"> *Sargan Test *General Autoregressive Conditional Heteroscedasticity (GARCH) model 	<p>*This study gives the positive relationship between the independence of central bank that controls monetary policy and stock market volatility. There is a significant effect of exchange rate and turnover ratio on volatility.</p>

	Mexico, New Zealand, Norway, India, Philippines, Romania, Saudi Arabia, South Africa, Singapore, Sweden, Thailand, Turkey, UK, and USA			
Ndunda (2016)	Kenya	*Inflation *Exchange Rate *Money Supply *Gross Domestic Product	*Regression Analysis	*This study has presented positive and significant relationships between inflation; GDP; money supply and stock market performance. On the other hand, the exchange rate effect has a negative impact on stock market performance.
Vo (2015)	Vietnam	*Foreign Ownership	*Volatility measure	*The result suggests that if there is

			model	any increase In foreign ownership, then stock market return volatility will be reduced. So it presents a negative relationship between these two.
Afroze (2013)	Bangladesh	*Money stock *Reserve Requirement	*Correlation analysis and t test	*By using only these two monetary policy variables, this study presents a positive significant effect of these two variables on the performance of the Dhaka Stock Exchange.
Kitatia, Zablonb et al. (2015)	Kenya	*Exchange Rate *Inflation *Interest Rate	*Simple and multivariate regression analysis	*The regression analysis that gives a negative correlation coefficient made the negative relationships among inflation; exchange rate; interest rate and stock market indices for companies.
RT Ferreira (2016)	USA	*Gross Domestic Product *Investment *Credit to Non-financial firms	*DSGE Model *Vector Autoregression (VAR) Model	*The study explores the effect of three macro fundamental factors on firms of the USA. Ultimately, VAR finds the positive effect of these three factors on financial volatility.
Nikmanesh	Malaysia and	*Consumer Price Index	*General	*This study provides a significant

and Nor (2016)	Indonesia	<ul style="list-style-type: none"> *Interest Rate *Trade Openness *Money Supply *Industrial Production Index 	Autoregressive Conditional Heteroscedasticity (GARCH) model *Seemingly Unrelated Regression (SUR), model	relationship between stock market volatility and macro variables. In both, the countries, trade openness creates a huge effect on stock market volatility. Except for CPI, other factors create a positive impact on both countries. In the case of CPI, it creates a positive impact on Malaysia, but a negative impact on Indonesia.
Banerjee, Pradhan et al. (2019)	India	<ul style="list-style-type: none"> *Money supply *Consumer Price Index *Fiscal Deficit *Bank Credit *Govt. Borrowings *Repurchase agreement *Order book 	*Exponential generalized autoregressive heteroscedastic (EGARCH) model	*According to this study, there is an impact of macro fundamental factors related information on stock price or volatility.
Asgarian, Christiansen et al. (2015)	Sweden & Denmark	<ul style="list-style-type: none"> *Inflation *Interest Rate *Illiquidity *State of the economy 	*Dynamic conditional correlation mixed data sampling model	*Based on this study, the separate result has been presented for both stock and bond. It shows the countercyclical behavior of stock

		*Market uncertainty		market volatility and its negative relationship with economic factors. Again, inflation; interest; market uncertainty create an impact on long term bond volatility.
Okech and Mugambi (2016)	Kenya	*Inflation *Gross Domestic Product *Exchange Rate *Interest Rate	*Unit Root Test *Linear Regression Model	* The finding of this study comes in two shapes- one is a positive and significant relationship between inflation and bank stock returns and another is a negative relationship among GDP, exchange rate, interest rate, and bank stock returns.
Kumari and Mahakud (2015)	India	*Foreign Institutional Investment *Exchange rate *Money supply *Interest Rate *Stock market indices	*Univariate autoregressive conditional heteroscedasticity model (ARCH) *Vector Autoregression (VAR) model	*This study presents a significant relationship between equity market volatility and the macro fundamentals factors especially the money supply and inflation.
Ahmad and Ramzan (2016)	Pakistan	*Inflation *Real interest rate	*General Autoregressive	*This study result draws a conclusion that except the real

		<ul style="list-style-type: none"> *Gross Domestic Product *Money Supply *Industrial Production Growth rate 	<ul style="list-style-type: none"> Conditional Heteroscedasticity (GARCH) model *Vector Auto Regression (VAR) model 	<p>interest rate, all other variables have a significant positive relationship with stock market volatility. With the real interest rate, there is no relationship.</p>
Mittnik, Robinzonov et al. (2015)	Germany	<ul style="list-style-type: none"> *Dividend Per Share *Earning Per Share *Interest rate *Exchange rate *Liquidity *Inflation *Return CRB spot *Orders *Housing starts *Industrial production 	<ul style="list-style-type: none"> *General Autoregressive Conditional Heteroscedasticity (GARCH) Model *Exponential General Autoregressive Conditional Heteroscedasticity (EGARCH) Model 	<p>*This study reveals that macroeconomic factors related information have the effect to predict the future stock market volatility in the Germany stock market.</p>
Haider, Hashmi et al. (2017)	Pakistan	<ul style="list-style-type: none"> *Industrial production *Real interest rate *Inflation *Money supply *Exchange rate 	<ul style="list-style-type: none"> *AR-GARCH Model *Vector Auto Regression (VAR) Model 	<p>*The final picture of this study reflects no relationship among real interest rate; money supply with the stock return or stock volatility. On the other hand, other variables have</p>

				a significant relationship with stock volatility.
Shah, Baharumshah et al. (2017)	Bangladesh	*Inflation *Growth rate	*Exponential General Autoregressive Conditional Heteroscedasticity (EGARCH) Model	*The study reflects the very strong and significant relationship between inflation and stock volatility.
Abubaker (2015)	Argentina Mexico Australia Netherlands Austria Norway Belgium New Zealand Brazil Peru Canada Philippines China South Africa	*Trade Openness *Real Gross Domestic Product *Real interest rate *Financial openness *Country size	*Regression Analysis	*Based on the regression analysis, it is found that trade openness has a positive impact on volatility. Because of adding control and country characteristics, this result can be considered as more robust.

	Chile Saudi Arabia Finland Singapore France Spain Germany Sweden India Switzerland Indonesia Thailand Italy Turkey Japan United Kingdom Korea USA Malaysia			
Pinjaman and Aralas (2015)	Malaysia	*Gross Domestic Product *Inflation rate	*Exponential General	*According to this study, all the variables that have been used

		<ul style="list-style-type: none"> *Interest rate *Exchange rate *Money supply *Economic crisis 	<p>Autoregressive Conditional Heteroscedasticity (EGARCH) model</p>	<p>create a significant impact on stock return volatility, but inflation; exchange rate and economic growth are the major ones.</p>
<p>Nikmanesh (2016)</p>	<p>ASEAN 5 countries (Indonesia, Thailand, Malaysia, Singapore, Philippine)</p>	<ul style="list-style-type: none"> *Trade Openness 	<p>*General Autoregressive Conditional Heteroscedasticity (GARCH) model *Seemingly Unrelated Regression (SUR), model</p>	<p>*This study gives a different result for different countries in terms of trade openness. For Indonesia and Malaysia, trade openness has a positive impact on stock market volatility, but negative in Thailand. On the other hand, in Philippine and Singapore, there was no sign of trade openness on volatility.</p>
<p>Siddikee and Begum (2016)</p>	<p>Bangladesh</p>	<ul style="list-style-type: none"> *Interest rate *Unanticipated inflationary movement *Productivity level *Political reason *Labor productivity *Availability of raw materials 	<p>*General Autoregressive Conditional Heteroscedasticity (GARCH) model *Autoregressive Conditional Heteroscedasticity (ARCH) model</p>	<p>* The result of the study is oriented on the changes in stock market volatility than previous periods. It is found that these macro variables affect the volatility but ultimately changes in volatility are within a tolerable range.</p>

Arouri, Estay et al. (2016)	USA	<ul style="list-style-type: none"> *Growth *Inflation *Employment 	<ul style="list-style-type: none"> *General Autoregressive Conditional Heteroscedasticity (GARCH) model *Vector Auto Regression (VAR) model 	*The outcome of this study presents that growth, inflation, and employment affects the total economic policy positively and which ultimately affects the stock return in the US market.
Khan, Tantisantiwong et al. (2015)	South Asian Countries (Bangladesh, India, Sri Lanka, Pakistan)	<ul style="list-style-type: none"> *Real interest rate *Real inflation *Trade Balance *Regional Economic activity 	<ul style="list-style-type: none"> *Multiple Regression *Vector Auto Regression (VAR) model 	*This study finds that interest rate and inflation rate have a significant effect on Pakistan. For Bangladesh, regional economic activities can explain the stock return.
Galí and Gambetti (2015)	USA	<ul style="list-style-type: none"> *Monetary Policy (Inflation, interest rate) 	<ul style="list-style-type: none"> *Vector Auto Regression (VAR) 	* Based on this study, it is found that if the interest rate increases, then there will be shrinking in an asset price bubble.
Khan, Teng et al. (2017)	China	<ul style="list-style-type: none"> *Inflation rate *Exchange rate 	<ul style="list-style-type: none"> *ARDL approach 	*This study is mainly focused on both short and long term relationship between these two factors and stock returns. By considering these two,

				there is a positive effect on stock price in China whereas there is the negative significance of interest rate on stock return.
Kanas and Karkalakos (2017)	USA Uk	*Exchange rate *Equity return	*Trivariate vector autoregressive system	* The finding of this study exposes volatility spillovers across equity return, exchange rate, and equity flows.
Phiri (2016)	South Africa	*Inflation rate	*Momentum threshold autoregressive (MTAR) model	*This study reveals that there is a negative relationship between inflation and stock market return which means investors of South Africa stock market are unable to protect them from rising inflation that affects the stock price.
Laichena and Obwogi (2015)	Kenya, Uganda Tanzania	*Gross Domestic product *Inflation rate *Interest rate	*Descriptive analysis *Panel data regression analysis	*According to this study, there is a positive influence of the inflation rate on stock return whereas there is negative impact of interest rate on stock price volatility. On the other hand, there is inverse significant relationship between exchange rate

				and stock return. Finally, this study suggests that policymakers of East Africa should focus on improving the macroeconomic conditions of this region in order to improve the stock return.
Zubaidi Baharumshah (2014)	Malaysia	*Inflation *Output growth *Consumer Price Index	*General Autoregressive Conditional Heteroscedasticity (GARCH) model	*The main finding of this study suggests that though there is a long history of low inflation of Malaysia, inflation of the last few years adversely affect growth which ends into another finding that suggests the negative relationship between output growth and volatility.
Barakat, Elgazzar et al. (2016)	Egypt Tunisia	*Consumer Price Index *Interest Rate *Money Supply *Exchange Rate	*Unit Root Test *Vector Auto Regression (VAR) model *Augmented Dicky Fuller (ADF) test	*According to this study, the consumer price index; money supply and exchange rate have a strong and long-run effect on Egypt stock return whereas only changes in interest rate have an influence on the Tunisia stock market. The result has been designed in a way so that

				investors can make the right decision about the management of their portfolios.
Feng, Lin et al. (2017)	China	*Foreign Direct Investment *Foreign Reserves *Hot Money Net Flow *Trade Balance *Short Term Capital Flows	*Impulse Response Function *Local Projections (LP) method *Vector Auto Regression (VAR) model	*This study reveals that though only foreign direct investment has little significance on stock price volatility, both FDI and short term capital flows have a positive impact on both stock price volatility and house price in China.
Ilahi, Ali et al. (2015)	Pakistan	*Inflation Rate *Exchange Rate *Interest Rate	*Multiple Regression Analysis	*This study reflects the fact that inflation, interest rate, and exchange rate have an insignificant relationship with stock market return volatility. As exchange rate has no impact on it, so foreign investors are free from investing in the Karachi stock market.
Kumari and Mahakud (2015)	India	*Foreign Institutional Investment *Exchange Rate	*Univariate Auto Regressive Conditional	*This study reveals that long term interest rates, broad money supply, and inflation have a strong

		<ul style="list-style-type: none"> *Short term and long term interest rate *Broad Money Supply *Inflation 	<ul style="list-style-type: none"> Heteroscedasticity model *Multivariate Vector Auto Regressive (VAR) model *Impulse Response Function 	<p>significant relationship with the stock market return. This relationship can help investors to predict the Indian stock market.</p>
Mumo (2017)	Nairobi, Kenya	<ul style="list-style-type: none"> *Inflation *Money Supply *Exchange Rate *Interest Rate 	<ul style="list-style-type: none"> *Unit Root Test *Vector Error Correction Model (VECM) model 	<p>*According to this study, there is a long-run equilibrium relationship between stock market volatility and all these four factors. Especially, in Nairobi Stock Market, there is a very strong influence of inflation on stock prices.</p>
Nisha (2015)	Bombay, India	<ul style="list-style-type: none"> *Interest Rate *Gold Price *Money Supply *Exchange Rate 	<ul style="list-style-type: none"> *Vector Auto Regression (VAR) model 	<p>*This study reveals that all these four variables have a significant impact on the stock return of the Bombay Stock Exchange. Their observation also focuses on the world stock index which indicates the implications of BSE towards global financial markets.</p>

Okoro (2017)	Nigeria	<ul style="list-style-type: none"> *Gross Domestic Product *Inflation Rate *Money Supply *Exchange Rate *Interest Rate 	<ul style="list-style-type: none"> *Least Square Regression Analysis 	*This study indicates that stock prices of Nigeria stock market cannot be explained by these factors, rather companies should focus on increasing their profitability to attract the investors.
OlugBenga and Grace (2015)	*Nigeria	<ul style="list-style-type: none"> *Foreign Direct Investment 	<ul style="list-style-type: none"> *Johansen Co-Integration test *Unit Root Test 	*Based on this study, it is clear that foreign direct investment and capital market development have a positive relationship. However, this study suggests that for the growth of the capital market, relying on FDI is not a significant decision especially for a developing country like Nigeria.
Raza, Jawaid et al. (2015)	Pakistan	<ul style="list-style-type: none"> *Foreign Capital Inflows *Workers Remittance *Economic Growth 	<ul style="list-style-type: none"> *Auto Regressive Distributed Leg (ARDL) model *Error Correction Model *Rolling Window Estimation Procedures 	*This study exposes that all these three variables have a positive impact on stock market capitalization. However, together FDI and economic growth can very strongly affect the stock market of Pakistan.

Sakti and Harun (2015)	Jakarta, Indonesia	<ul style="list-style-type: none"> *Inflation Rate *Exchange Rate *Money Supply *Industrial Production 	<ul style="list-style-type: none"> *Time Series Techniques of Co-Integration *Vector Auto Regression (VAR) model 	*This study focuses that domestic factors such as inflation, money supply, and industrial production can bring stability in the Islamic stock price in the Jakarta stock market whereas the exchange rate has no such impact on stock volatility.
Yadav, Goyari et al. (2019)	China India Malaysia South Korea Indonesia Bangladesh Pakistan Singapore Sri Lanka Philippines	<ul style="list-style-type: none"> *Consumption *Output *Income *Ratio of Consumption *Trade Openness *Inflation *Financial Openness *Broad money 	*Generalized Method of Moments (GMM) approach	*This study presents their outcome by dividing these selected Asian countries into developed and developing economies. Volatilities of per capita outflow and consumption have a direct impact on financial integration for developed economies compared to developing economies. On the other hand, trade openness and broad money have a positive and significant impact on financial volatility whereas inflation has a negative effect on it.
Zhou, Zhao et al. (2015)	Cameron	<ul style="list-style-type: none"> *Real Interest Rate *Inflation 	*Calderon Rossell Model	*According to this study, among the eight variables; only stock market

		<ul style="list-style-type: none"> *Private Capital Flows *Stock Market Liquidity *Savings and Investment *Income Level *Banking Sector Development *Foreign Direct Investment 	<p>Generalized Method of Moments (GMM) approach</p> <p>*Least Square Analysis and t test</p>	<p>liquidity; private capital flows and foreign direct investment have a positive and significant relationship on Cameron stock market development.</p>
Njoroge (2015)	Nairobi, Kenya	<ul style="list-style-type: none"> *Remittance *Inflation *Lending Interest Rate *Exchange Rate 	<p>*Regression Analysis</p>	<p>*This study exposes that there is a strong and positive relationship between the remittance and stock market performance of Nairobi. Increases of remittance will dramatically improve the performance.</p>
Al Oshaibat (2016)	*Amman, Jordan	<ul style="list-style-type: none"> *Inflation *Remittance *Share Liquidity *Interest Rate 	<p>*Vector Autoregressive (VAR) model</p> <p>*Granger Causality</p>	<p>*This study indicates that there is a moderate positive relationship between inflation rate and stock returns. However, remittance has an effect, but a long term basis. On the other hand, the interest rate has a negative influence on stock returns.</p>

Issahaku, Abor et al. (2017)	<p>*Study is conducted on 61 developing countries</p>	<p>*Remittance Inflow</p>	<p>*Ordinary Least Square (OLS) regression analysis</p>	<p>*This study finds a bi-causal negative relation between remittance and stock market especially in the countries that have advanced banking systems. Another interesting finding is, in less remittance dependent countries; remittance positively influences banking sector development.</p>
Romero (2017)	<p>*Philippine</p>	<p>*Remittance Inflow *Export-import amount *International Reserves</p>	<p>*LaGrange-Multiplier Test of ARCH *Exponential Generalized Autoregressive Conditional Heteroskedasticity (EGARCH) *Augmented Dickey-Fuller (ADF)</p>	<p>*This study reveals that the volatility of the Philippine stock market is not influenced by these three macro-variables both in the long and short term.</p>

In previous many studies, broad money had been exposed as one of the vital factors which is closely related to the stock price fluctuation. In most of the studies, researchers reveal that broad money has strong and positive relationship with the stock market volatility in different countries ([Kumari and Mahakud 2015](#), [Pinjaman and Aralas 2015](#), [Ahmad and Ramzan 2016](#), [Barakat, Elgazzar et al. 2016](#), [Ndunda 2016](#), [Nikmanesh 2016](#), [Cai, Chen et al. 2017](#), [Mumo 2017](#)). Broad money has both positive impacts on volatility both in long term and short term which indicates that an increase in broad money in the economy increases the stock market volatility and vice versa. On the other hand, different studies like ([Haider, Hashmi et al. 2017](#), [Okoro 2017](#)) exposes that stock market volatility cannot be explained by broad money or broad money has no influence on the stock market in some countries.

The increased amount of domestic credit to private sectors directly influences the stock market volatility. In different prior studies, this variable came out as one of the significant factors that can explain the volatility of a stock market. The study from ([Feng, Lin et al. 2017](#)) exposes that domestic credit can influence the stock market but in the short run. In the long run, domestic credit is not considered as an explanatory factor. Few researchers use one particular section of domestic credit basis on financial institutions. Two researchers ([Banerjee, Pradhan et al. 2019](#)) worked only on banking institutions that provide domestic credit. In their study, they find that domestic credit supplied by banking institutions has a positive and strong effect on stock market volatility both in the long and short run. However, most of the researchers focus on domestic credit supplied by all types of financial institutions ([Zhou, Zhao et al. 2015](#), [RT Ferreira 2016](#)). Their findings indicate the strong and positive relationship between domestic credit to private sectors and stock market volatility.

Remittance inflow is one of the significant macroeconomic factors that play a vital role in the economy especially for developing countries and it is directly related to stock market volatility. In different prior studies, many researchers find that remittance inflow has a positive and strong influence on stock market volatility such as ([Njoroge 2015](#), [Raza, Jawaid et al. 2015](#), [Al Oshaibat 2016](#)). On the other hand, the study of ([Issahaku, Abor et al. \(2017\)](#)) finds the totally opposite outcome. They reveal that financial volatility

and remittance have a negative relationship which means an increase in remittance inflow in an economy decreases stock market volatility. Again study like ([Romero 2017](#)) exposes that remittance inflow cannot explain the stock market volatility which means there is no relationship between these two. He further reveals that countries that have a strong banking industry have no impact of remittance on volatility. So it can be stated that remittance inflow can affect stock market volatility differently in a different economy.

CHAPTER III: RESEARCH METHOD

3.1 Variable Definition and Sources

This research uses annual time series data of 42 years from 1976 to 2017 of Bangladesh. Data were collected and transformed from various sources such as World Development Indicators that were published by the ([WorldBank 2019](#)), ([IMF 2017](#)), a statistical handbook published by ([BBS 2017](#)). Financial Volatility has been used as the dependent variable in this study whereas broad money; domestic credit by financial sectors; domestic credit to private sectors; non-performing loans; remittance and trade openness have been used as independent variables. The following section is covering definitions of these variables and all possible general impact of these variables on financial volatility separately and in a brief.

Financial Volatility: Financial volatility can be defined as the pace at which stock prices move faster or slower and how widely they swing for a particular time period. For a successful investment in the stock market, it is very vital for the investors to have the knowledge of volatility because it indicates the movement of the next price in which direction and for how long the movement can exist. Without having this knowledge, the investment may give huge loss and this is the actual scenario of Bangladeshi investors. There is always a dramatic movement presents in the stock market. The six independent variables that have been studied in this research have a significant impact on volatility or stock price fluctuations. Different researchers have gone through a similar study by using different macro fundamental variables such as ([Kumari and Mahakud 2015](#), [Oluseyi 2015](#), [Vo 2015](#), [Nikmanesh 2016](#), [RT Ferreira 2016](#), [Cai, Chen et al. 2017](#), [Papadamou, Sidiropoulos et al. 2017](#), [Banerjee, Pradhan et al. 2019](#)).

Broad Money: Broad money can be defined as the money supply that is circulated in an economy. Actually, it is the combination of highly liquid assets known as narrow money such as cash; checkable deposits and less liquid assets known as near money such as treasury bills, foreign currencies, marketable securities, certificates of deposits and anything that is easily convertible into cash. Different researchers use

broad money as one of the fundamental factors for influencing financial volatility such as ([Kumari and Mahakud 2015](#), [Oluseyi 2015](#), [Pinjaman and Aralas 2015](#), [Ahmad and Ramzan 2016](#), [Nikmanesh and Nor 2016](#), [Cai, Chen et al. 2017](#), [Banerjee, Pradhan et al. 2019](#)). When money supply increases in an economy, investors tend to be more risk-takers because of having more money in hands and so, they start investing more in stock rather than other securities with the hope of earning more return. Because of this reason, there shows an increase in stock purchase in general and which ultimately increases the stock prices. This price increase also brings higher volatility in the market. If the other variables remain constant, then increased money supply increases stock price and it continues until the stock index starts to come close to the equilibrium position. On the other hand, if money supply decreases in an economy because of government monetary policies, lower remittance; trade and foreign reserves, then investors will not have sufficient money to invest in the stock. Rather they may start selling their existing shares for the scarcity of money. Excess selling may start decreasing share price in an extensive way which can increase the stock volatility as well. Actually, the increase in the money supply can either increase or decrease the volatility and also, the decrease in the money supply can either increase or decrease the money supply. It actually varies from country to country and different factors related to that particular economy. This study will try to find out the actual impact of broad money on price volatility in the Bangladesh market.

Domestic Credit to Private Sectors: Domestic credit to private sector refers simply to the financial resources that are supplied by different financial institutions to private sectors in the form of loans, trade credits, purchase of non-equity securities and other accounts receivables. It can also be referred to as a percentage of GDP. The increase of domestic credit means that the investors can get loans easily from financial institutions and also FIs purchase the accounts receivables and trade credit from businesses, then the business will have more liquid assets on hand. As a consequence, these different investors may start purchasing more shares from the market which can lead both stock price and volatility increase for a time being. This is consistent with the finding of many research such as ([Zhou, Zhao et al. 2015](#), [Feng, Lin et al. 2017](#), [Banerjee, Pradhan et al. 2019](#)). However, even the increase in domestic credit can

decrease price volatility. If an economy has an inefficient and vulnerable stock market for a long period of time, then investors may not be interested to invest their domestic credit in such type of risky market. So less purchase of new shares can lead to either decrease volatility or no impact on existing volatility at all for a time being. This is another important sector on which this research is working in order to find the actual impact of domestic credit to private sectors of volatility in Bangladesh.

Domestic Credit by Financial Sectors: Domestic credit by financial sectors refers to the credit given to all the sectors by different financial institutions on a gross basis except the government which is given as a net basis. The main difference between DCP and DBD is the inclusion of credit which is also given to the government. Now, a similar explanation can be given for DBD like DCP. That means an increase of DBD can either increase the volatility or decrease the volatility as well. The study of ([Banerjee, Pradhan et al. 2019](#)) is consistent with the positive relationship between DBD and volatility. This study will also try to find the actual relationship between these two variables.

Non-Performing Loan: Non-performing loan is defined as the default of scheduled repayment of loan amount by the debtors either willingly or non-willingly. When different financial institutions don't get back their money on time or never, then ultimately it affects the amount of DCP and DBD. Lack of domestic credit will give less opportunity for investors to buy more new shares. So the increased amount of NPL may decrease the stock price considering that all other factors are constant, but obviously, the speed of decreasing will not be high. So less share purchasing may reduce the existing volatility or have no impact at all. On the other hand, if an economy shows a decreased amount of NPL which means the proper schedule repayment by the debtors to the different financial institutions. So the amount of DCP and DBD will increase. Then similar impact may happen on the volatility which is described under the point of DCP and DBD. As Bangladesh economy is facing real trouble because of the continuous increase of NPL, so it is very vital to find out the impact of NPL on volatility.

Remittance Inflow: Remittance refers to when people of one country are engaged in different foreign countries for earning purposes and send back those

earnings in their home country, then that amount is called remittance inflow. Remittance plays a significant role in the stock market especially by the individual small investors. The increase of remittance inflow can either increase or decrease the stock volatility. In a general sense, when people get more remittance in their hands from their relatives, they have an excess amount in their hands. Now with the hope of earning more return, they may be willing to invest in the stock market if the market is strong enough. Then the excess purchase of share will increase the share price for a time being considering all other factors are constant which ultimately leads to higher volatility. However, the opposite scenario can be possible too. If an economy holds a vulnerable and weak stock market for a long period of time, then those people may not be interested to invest in such type of risky market with their extra income getting from the remittance. Rather they will be interested to invest in another sector. So less share purchasing can lead to a decrease of share price slowly which leads to decrease volatility compared to the existing volatility. Different researchers have tried to show the relationship between stock price volatility and remittance such as ([Njoroge 2015](#), [Raza, Jawaid et al. 2015](#), [Al Oshaibat 2016](#), [Issahaku, Abor et al. 2017](#), [Romero 2017](#)). This study will also develop a relationship between remittance and volatility and find out the actual reason of such an impact.

Trade Openness: Trade openness actually indicates the amount of export and import of an economy in a particular period. It simply refers to trade to GDP ratio that can be established by dividing the aggregate value of the amount export-import by GDP for a period. Trade openness has a significant impact on the growth of a developing country which ultimately affects the stock market also. Increase the value of trade openness lets the businesses more money in their hands which may lead them to invest more in the stock market which can increase the stock price in a general sense by considering all other factors are constant. For a time being, an increase in share price will increase the volatility and such kind of volatility will exist in the market until the index moves back in the opposite direction. However, the weak and vulnerable stock market can lead to a decrease in stock volatility because of less willingness for investing in the stock market with an increased amount of trade income. Different studies conducted by ([Abubaker 2015](#), [Nikmanesh 2016](#), [Papadamou, Sidiropoulos et al. 2017](#), [Yadav,](#)

[Goyari et al. 2019](#)) discussed about the relationship between volatility and trade openness. This study will try to find out the actual scenario of the Bangladesh stock market regarding the relationship between trade openness and volatility.

Table 6: Variable Definitions

Variable Definition	
Dependent variable	
FDV	
The pace at which stock prices move faster or slower and how widely they swing for a particular time period.	
Independent Variable	Expected Sign
BM	
Money supply that is circulated in an economy consisting of highly liquid assets known as narrow money and less liquid assets known as near money.	+
DBD	
Credit is given to all the sectors by different financial institutions on a gross basis except the government which is given as net basis (% of GDP)	+/-
DCP	
Financial resources that are supplied by different financial institutions to private sectors (% of GDP)	+/-
NPL	
The default of scheduled repayment of loan amount by the debtors willingly or non-willingly.	-
RE	
The amount which is sent back by the people of one country who are engaged in different foreign countries for earning purposes.	+
TO	
The amount of export and import of an economy in a particular period (Trade to GDP ratio).	+/-

Note 1: All monetary measures are in real USD; **Note 2:** All the above variables are defined in the World Development Indicators and published by the World Bank; **Note 3:** Natural log of these variables have been used in the estimations; **Note 4:** FDV for financial volatility, BM for broad money, DBD for domestic credit by financial sectors, DCP for domestic credit to private sectors, NPL for non-performing loan, RE for remittance inflow, TO for trade openness

3.2 Methodologies

3.2.1 Unit Root Test

It is referred to as the test of stationarity. For the purpose of researching with time-series data, it is better to go with a unit root test that determines the presence of unit root or non-stationarity in time-series data of the variables. For a smooth and better result, it is always better to have stationarity in time series.

This study contains a residual test which requires stationary data. Because if the time series is stationary, then mean; variance; covariance, etc. will be constant over time period. However, the absence of stationarity will increase the sample mean and variance with the size of the sample and they will always overlook the mean and variance in the future period and thus, forecasting becomes difficult. As a consequence, it may happen that the residual test will give high R^2 even though there is no meaningful relationship between the particular two variables.

Although this study is mainly based on the ARDL test, testing of stationarity in time series is not required in ARDL to apply. Because it is very rare to need of the order of integration $I(2)$ to get stationarity in time series. Maximum analysis up to $I(1)$ is enough to get stationarity. Still, it is better to go with a unit root test before applying ARDL, because this test will not be suitable if there is a necessity of using $I(2)$ to get stationarity.

The test of unit root for this study is conducted by the three most commonly used tests such as Augmented Dickey-Fuller (ADF), Phillip Perron (PP) and Kwiatkowski-Phillips-Shin (KPSS).

Augmented Dickey-Fuller (ADF) Test

Before approaching the ADF into the light, the Dickey-Fuller test was used to identify the presence of stationarity in a time series which was developed by two American statisticians named David Dickey and Wayne Fuller in 1979. However, later this test became almost useless as most of the time series have more dynamic and complicated structures. In 1984, the same statisticians brought this ADF which is

referred to as an augmented version of the Dickey-Fuller test. The primary difference between these two tests is ADF can be used with a complex model with a longer time series. As it is used after selecting the level of serial correlation, so it is considered as a powerful test. Though ADF is the updated version of DF, it has relatively high type 1 error and sensitivity to structural breaks and so, it should be used more cautiously. Examining the stationary properties in the long-run relationship of time series variables can be determined by the following equation,

Equation 1: ADF Test

$$\Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \sum_{j=1}^k d_j \Delta Y_{t-j} + \varepsilon_t$$

Here, Y_t is a time series, Δ is the first difference operator, α_0 is the constant, k is the optimum number of lags of the dependent variable and, ε_t is the pure white-noise error term.

This test is based on the null hypothesis (H_0) that refers to the presence of unit root in time series. Alternative hypothesis (H_1) is the absence of unit root or stationarity.

Phillip Perron (PP) Test

Even though both ADF and PP have little difference, conducting PP with the ADF gives more strong evidence about the presence of stationarity in time series. Statisticians Pierre Perron and C.B. Phillips developed this test by 1988. Both the study has some difference in managing the serial correlation and it is the basic difference of them. PP is a non-parametric test that doesn't require to select the level of serial correlation. PP is more effective in longer time series even better than ADF. This test contains significant benefits if there is the presence of moving average components in the time series. ([Phillips and Perron 1988](#)). Apart from these, PP also holds the type 1 error and sensitivity to structural breaks drawbacks. PP unit root test is used by the following equation,

Equation 2: PP Test

$$\Delta Y_t = \alpha + \rho * Y_{t-1} + \varepsilon_t$$

Here, ρ^* is the estimated coefficient.

This test is also based on the null hypothesis (H_0) that refers to the presence of unit root in time series. Alternative hypothesis (H_1) is the absence of unit root or stationarity.

Kwiatkowski-Phillips-Shin (KPSS) Test

It is another unit root test method that examines the presence of stationarity in a time series around a deterministic trend. It is conducted based on Ordinary Least Square linear regression. This model was first developed by Denis Kwiatkowski, Peter C.B. Phillips, Peter Schmidt and Yongcheol Shin in 1992. The equation that it follows can be derived by three parts,

Equation 3: KPSS Test

$$\Delta Y_t = r_t + \beta_t + \varepsilon_t$$

Here, r_t is the random walk, β_t is the deterministic trend and ε_t is a stationary error.

Compared to the null hypothesis of the other two tests, KPSS holds the opposite null hypothesis. Presence of stationarity is considered as null hypothesis (H_0) whereas the absence of stationarity is considered as an alternative hypothesis (H_1). It is a very important difference because it may happen that time series has no unit root, still be trend stationarity. As it has also a high chance of type 1 error, so it is always wise to use multiple tests to examine out the presence of unit root in time series which will lead to a more acceptable result.

3.2.2 ARDL and Linear ARDL Bound Test

ARDL test is used to determine the co-integrating long-run relationship among the variables. It is developed by [Peseran and Peseran \(1997\)](#) and [Pesaran, Shin et al. \(2001\)](#) which is used with the unrestricted vector error correction model. This study has used this test in order to find the relationship among financial volatility with other six macroeconomic factors such as BM, DCP, DBD, NPL, RE, and TO. For finding the co-

integrating long-run relationship, different methods are available such as residual bases [Engle and Granger \(1987\)](#) test, maximum likelihood-based [Johansen and Juselius \(1990\)](#) and [Johansen \(1991\)](#) tests and some researchers also used Vector Autoregression (VAR) method. However, some drawbacks of all these methods have brought the Ordinary least Square (OLS) based ARDL into the light.

After comparing the ARDL with all other methods, several advantages can be listed such as- First, it doesn't consider whether the stationarity of the variables has been found either in I(0) or I(1) or combination of both. Second, it is also handy to use with a small sample size consisting of 30 to 80 observations. Third, it can provide simultaneously both long-run and short-run relationships among the variables. Forth, Error Correction Model (ECM) can be derived which refers to the high speed of adjustment of the dependent variable after a short term shock. Fifth, a structural break issue is also not considered by ARDL.

At the very beginning of the whole ARDL test, it is necessary to find whether there is any long-run relationship among the variables or not. If there is any long-run relationship, then long-run estimates are estimated separately for each of the independent variables. So Linear ARDL Bound testing has been used to get the evidence of having long run co-integration or relationship among the variables. Considering each of the variables as dependent variable each time, this study has tried to find the best-fitted model for future analysis by formulating the unrestricted error correction model (UECM) which is shown in the matrix form below,

Equation 4: Linear ARDL Bound Test

$$\begin{bmatrix} \Delta \ln(FDV)_t \\ \Delta \ln(BM)_t \\ \Delta \ln(DCP)_t \\ \Delta \ln(DBD)_t \\ \Delta \ln(NPL)_t \\ \Delta \ln(RE)_t \\ \Delta \ln(TO)_t \end{bmatrix} = \begin{bmatrix} \delta_1 \\ \delta_2 \\ \delta_3 \\ \delta_4 \\ \delta_5 \\ \delta_6 \\ \delta_7 \end{bmatrix} + \begin{bmatrix} \Delta \ln(FDV)_{t-1} \\ \Delta \ln(BM)_{t-1} \\ \Delta \ln(DCP)_{t-1} \\ \Delta \ln(DBD)_{t-1} \\ \Delta \ln(NPL)_{t-1} \\ \Delta \ln(RE)_{t-1} \\ \Delta \ln(TO)_{t-1} \end{bmatrix} \begin{bmatrix} \theta_{11} & \theta_{12} & \theta_{13} & \theta_{14} & \theta_{15} & \theta_{16} & \theta_{17} \\ \theta_{21} & \theta_{22} & \theta_{23} & \theta_{24} & \theta_{25} & \theta_{26} & \theta_{27} \\ \theta_{31} & \theta_{32} & \theta_{33} & \theta_{34} & \theta_{35} & \theta_{36} & \theta_{37} \\ \theta_{41} & \theta_{42} & \theta_{43} & \theta_{44} & \theta_{45} & \theta_{46} & \theta_{47} \\ \theta_{51} & \theta_{52} & \theta_{53} & \theta_{54} & \theta_{55} & \theta_{56} & \theta_{57} \\ \theta_{61} & \theta_{62} & \theta_{63} & \theta_{64} & \theta_{65} & \theta_{66} & \theta_{67} \\ \theta_{71} & \theta_{72} & \theta_{73} & \theta_{74} & \theta_{75} & \theta_{76} & \theta_{77} \end{bmatrix} + \sum_{s=1}^q \begin{bmatrix} \mu_{11s} & \mu_{12s} & \mu_{13s} & \mu_{14s} & \mu_{15s} & \mu_{16s} & \mu_{17s} \\ \mu_{21s} & \mu_{22s} & \mu_{23s} & \mu_{24s} & \mu_{25s} & \mu_{26s} & \mu_{27s} \\ \mu_{31s} & \mu_{32s} & \mu_{33s} & \mu_{34s} & \mu_{35s} & \mu_{36s} & \mu_{37s} \\ \mu_{41s} & \mu_{42s} & \mu_{43s} & \mu_{44s} & \mu_{45s} & \mu_{46s} & \mu_{47s} \\ \mu_{51s} & \mu_{52s} & \mu_{53s} & \mu_{54s} & \mu_{55s} & \mu_{56s} & \mu_{57s} \\ \mu_{61s} & \mu_{62s} & \mu_{63s} & \mu_{64s} & \mu_{65s} & \mu_{66s} & \mu_{67s} \\ \mu_{71s} & \mu_{72s} & \mu_{73s} & \mu_{74s} & \mu_{75s} & \mu_{76s} & \mu_{77s} \end{bmatrix} \begin{bmatrix} \Delta \ln(FDV)_{t-1} \\ \Delta \ln(BM)_{t-1} \\ \Delta \ln(DCP)_{t-1} \\ \Delta \ln(DBD)_{t-1} \\ \Delta \ln(NPL)_{t-1} \\ \Delta \ln(RE)_{t-1} \\ \Delta \ln(TO)_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \\ \varepsilon_{5t} \\ \varepsilon_{6t} \\ \varepsilon_{7t} \end{bmatrix}$$

Where Δ refers as the first difference operator, δ_1 to δ_7 refers to constant terms, θ_{11} to θ_{77} refers as long-run coefficients, μ_{11} to μ_{77} refers to short-run coefficients. F test needs to be conducted for fulfilling the bound test. Critical values regarding the F test can be obtained from [Pesaran, Shin et al. \(2001\)](#). By comparing the upper and lower bound critical values with the value of f-statistics, the final decision can be taken. For doing that, the following hypothesis has been considered,

$$H_0(\text{Null Hypothesis}) = \left\{ \begin{array}{l} \theta_{11} = \theta_{12} = \theta_{13} = \theta_{14} = \theta_{15} = \theta_{16} = \theta_{17} \\ \theta_{21} = \theta_{22} = \theta_{23} = \theta_{24} = \theta_{25} = \theta_{26} = \theta_{27} \\ \theta_{31} = \theta_{32} = \theta_{33} = \theta_{34} = \theta_{35} = \theta_{36} = \theta_{37} \\ \theta_{41} = \theta_{42} = \theta_{43} = \theta_{44} = \theta_{45} = \theta_{46} = \theta_{47} \\ \theta_{51} = \theta_{52} = \theta_{53} = \theta_{54} = \theta_{55} = \theta_{56} = \theta_{57} \\ \theta_{61} = \theta_{62} = \theta_{63} = \theta_{64} = \theta_{65} = \theta_{66} = \theta_{67} \\ \theta_{71} = \theta_{72} = \theta_{73} = \theta_{74} = \theta_{75} = \theta_{76} = \theta_{77} \end{array} \right\} = 0$$

$$H_1(\text{Alternative Hypothesis}) = \left\{ \begin{array}{l} \theta_{11} \neq \theta_{12} \neq \theta_{13} \neq \theta_{14} \neq \theta_{15} \neq \theta_{16} \neq \theta_{17} \\ \theta_{21} \neq \theta_{22} \neq \theta_{23} \neq \theta_{24} \neq \theta_{25} \neq \theta_{26} \neq \theta_{27} \\ \theta_{31} \neq \theta_{32} \neq \theta_{33} \neq \theta_{34} \neq \theta_{35} \neq \theta_{36} \neq \theta_{37} \\ \theta_{41} \neq \theta_{42} \neq \theta_{43} \neq \theta_{44} \neq \theta_{45} \neq \theta_{46} \neq \theta_{47} \\ \theta_{51} \neq \theta_{52} \neq \theta_{53} \neq \theta_{54} \neq \theta_{55} \neq \theta_{56} \neq \theta_{57} \\ \theta_{61} \neq \theta_{62} \neq \theta_{63} \neq \theta_{64} \neq \theta_{65} \neq \theta_{66} \neq \theta_{67} \\ \theta_{71} \neq \theta_{72} \neq \theta_{73} \neq \theta_{74} \neq \theta_{75} \neq \theta_{76} \neq \theta_{77} \end{array} \right\} = 0$$

In words,

H_0 = There is no long-run relationship among the variables

H_1 = There is a long-run relationship among the variables

For decision making, whether the null hypothesis will be accepted or not, the following criteria have been proposed by [Pesaran, Shin et al. \(2001\)](#).

Table 7: Decision Making Criteria for Bound Test

Condition	Decision
$F_s >$ Upper bound of critical value	Rejecting H_0 (Confirms Co-integration)
$F_s <$ Lower bound of critical value	Accepting H_0 (Confirms No Co-integration)
$F_s \leq$ Upper bound and \geq lower bound of critical value	No Conclusive Decision

Now, the main ARDL test is developed in order to estimate the long-run coefficients separately for each of the independent variables to find the relationship with financial volatility. For doing that, at first; the lag length order of all the variables needs to be estimated based on the result of the Schwarz Information Criterion (SIC). In simple terms, lag length refers to the time between the two time series that are correlated. It is very important to find out which appropriate lag should be included as regressor because considering too many lags as regressor increases the standard error of coefficient estimates which ultimately leads to forecasting error. While using time

series data for the research, [Pesaran, Shin et al. \(2001\)](#) suggested that the maximum lag length is 2. The following model has been used to estimate the long-run coefficients,

Equation 5: Long Run Coefficient Test

$$\begin{aligned}
 FDV_t = & \theta_0 + \theta_1 \sum_{i=1}^p FDV_{t-1} \\
 & + \theta_2 \sum_{i=1}^p BM_{t-1} \\
 & + \theta_3 \sum_{i=1}^p DCP_{t-1} \\
 & + \theta_4 \sum_{i=1}^p DBD_{t-1} + \theta_5 \sum_{i=1}^p NPL_{t-1} + \theta_6 \sum_{i=1}^p RE_{t-1} + \theta_7 \sum_{i=1}^p TO_{t-1} + \phi_1
 \end{aligned}$$

After finding the evidence of the long-run relationship among financial volatility and the other six variables, now short-run coefficient estimation is possible by formulating the error correction model. In the Error Correction Model, the Error Correction Term refers to the speed of adjustment of the dependent variable to equilibrium after a short term shock of all the variables. Following model has been used to find the short-run coefficients,

Equation 6: Short Run Coefficient Test

$$\begin{aligned}
 \Delta FDV_t = & \mu_0 + \mu_1 \sum_{i=1}^p \Delta FDV_{t-1} \\
 & + \mu_2 \sum_{i=1}^p \Delta BM_{t-1} \\
 & + \mu_3 \sum_{i=1}^p \Delta DCP_{t-1} \\
 & + \mu_4 \sum_{i=1}^p \Delta DBD_{t-1} + \mu_5 \sum_{i=1}^p \Delta NPL_{t-1} + \mu_6 \sum_{i=1}^p \Delta RE_{t-1} + \mu_7 \sum_{i=1}^p \Delta TO_{t-1} \\
 & + nECT_{t-1} + \phi_1
 \end{aligned}$$

3.2.3 OLS Regression Test

In this study, OLS has been used to find the robustness of the relationship between financial volatility and other independent variables that have found from the test of ARDL. The result of OLS will make the findings of ARDL stronger. Simply, OLS means a regression analysis that estimates the relationship between the dependent variable and one or more independent variables. Our ultimate findings are not based on the result of OLS, rather it will support the findings of the ARDL test. For that, value of coefficient of determination, adjusted coefficient of determination, standard error of regression, autocorrelation, heteroscedasticity, normality and RESET tests have been conducted.

CHAPTER IV: RESEARCH FINDINGS

4.1 Unit Root Test Result

The test of unit root for this study is conducted by the three most commonly used tests such as Augmented Dickey-Fuller (ADF), Phillip Perron (PP) and Kwiatkowski-Phillips-Shin (KPSS). As all the three tests have few drawbacks, so the combined result will give more verification of the presence of stationarity or non-stationarity.

ADF which is the updated version of the Dickey-Fuller test is based on the null hypothesis (H_0) that refers to the presence of unit root in time series. Alternative hypothesis (H_1) is the absence of unit root or stationarity. By comparing with the significance level 0.05 with the p-value for all the variables at the level and at first difference, we can come to the decision. Table 9 refers that at first level the null hypothesis cannot be rejected because p values of all the variables are higher than the 0.05 which also indicates the presence of non-stationarity. However, at first difference, the desired result has been found which indicates the presence of stationarity in all the seven variables because of the lower p values than 0.05 significance level.

The unit root test has also been conducted by the PP test considering the same null and alternative hypothesis. Table 9 also provides the same result that has been found in the ADF test. All the seven variables exhibit non-stationarity at level, but stationarity at first difference.

The next test is KPSS which refers to the presence of stationarity as the null hypothesis whereas the absence of stationarity is considered as an alternative hypothesis. By comparing critical value at 5% significance level which is 0.463000 with the LM statistics value of all the variables, a decision can be taken. Usually, if LM statistics value is lower than the critical value, then the null hypothesis is accepted which indicates stationarity in time series. Now table 9 indicates LM statistics value is lower than 0.463000 for variable TO only at the level which indicates stationarity into variable. However, all the variables except BM and FDV have lower LM statistics value than the critical value at first difference which indicates acceptance of the null hypothesis. Thus, it refers that even in the order of integration I(1), the KPSS test failed

to prove the stationarity in BM and FDV. Similar to ADF and PP, the KPSS test has the chance of providing type 1 error.

Finally, it can be concluded in a way where ADF and PP tests indicate the stationarity in all the seven variables, but KPSS indicates stationarity only in five variables. Now by considering the fact of the probability of type 1 error in all the three tests, we can conclude the presence of stationarity in the time series of all the seven variables based on the overall results found from these three tests. Lastly, it can be said that variables under consideration are a mix of an order of integration $I(0)$ and $I(1)$.

Table 8: Unit Root Test Result

Variables	Test Name				
	ADF		PP		KPSS
	t-statistics	P Value	t-statistics	P Value	LM-S
BM	1.841	0.999	1.841	0.999	0.753
ΔBM	-4.763	0.000	-4.773	0.000	0.526
dbd	0.831	0.993	0.831	0.993	0.760
Δdbd	-4.543	0.001	-4.524	0.001	0.280
dcp	2.130	0.999	1.893	0.999	0.785
Δdcp	-4.821	0.000	-4.808	0.000	0.445
fdv	-0.920	0.771	-1.663	0.442	0.658
Δfdv	-12.627	0.000	-12.642	0.000	0.500
npl	-1.091	0.708	-0.751	0.820	0.544
Δnpl	-3.880	0.006	-3.578	0.012	0.136
re	-2.071	0.257	-1.573	0.487	0.658
Δre	-4.377	0.001	-4.505	0.001	0.171
to	-1.409	0.569	-1.801	0.375	0.155
Δto	-6.045	0.000	-6.136	0.000	0.121

Note 1: Δ represents the first difference; **Note 2:** FDV for financial volatility, BM for broad money, DBD for domestic credit by financial sectors, DCP for domestic credit to private sectors, NPL for non-performing loan, RE for remittance inflow, TO for trade openness, ADF for Augmented Dickey-Fuller, PP for Phillip-Perron, KPSS for Kwiatkowski-Phillips-Shin; **Note 3:** Null hypothesis refers presence of unit root for ADF and PP tests and absence of unit root for KPSS test.

4.2 Linear ARDL Bound Test Result

ARDL test has been used to determine the co-integrating long-run relationship among the financial volatility with the other six macroeconomic factors such as BM, DCP, DBD, NPL, RE, and TO. At the very beginning of the test, it is necessary to find whether there is any long-run relationship among the variables or not by using the Linear ARDL Bound test. If there is any long-run relationship, then long-run estimates are estimated separately for each of the independent variables. By comparing the upper and lower bound critical values with the value of f-statistics, the final decision has been taken.

The results in table 10 refer that, by considering FDV as the dependent variable; there is co-integration among all seven variables because F-statistics value is more than the upper critical bound value at the 5% level of significance which indicates the rejection of the null hypothesis. Similarly, when DCP and NPL have been considered as a dependent variable, there has been co-integration among the variables on the basis of the same ground. However, while considering BM, DBD, RE and TO as dependent variables, no evidence has suggested the long-run relationship among these variables.

However, as our main focus of this study is to find the relationship among financial volatility and other six macroeconomic factors, so the result of the linear bound test considering FDV as the dependent variable is our main concern and also it gives almost best-fitted model. So Linear Bound Test gives us the evidence of having long-run relationship among the variables.

Table 9: Linear ARDL Bound Testing Result

Panel –A: Long-Run Co-integration Estimation	F-statistics	Co-integration
$F(\ln fdv) = (\ln fdv / \ln dcp, \ln dbd, \ln npl, \ln re, \ln to, \ln BM)$	8.197	YES
$F(\ln BM) = (\ln BM / \ln dcp, \ln dbd, \ln npl, \ln re, \ln to, \ln fdv)$	2.334	NO
$F(\ln dcp) = (\ln dcp / \ln BM, \ln dbd, \ln npl, \ln re, \ln to, \ln fdv)$	9.401	YES
$F(\ln dbd) = (\ln dbd / \ln BM, \ln dcp, \ln npl, \ln re, \ln to, \ln fdv)$	1.470	NO
$F(\ln npl) = (\ln npl / \ln BM, \ln dbd, \ln dcp, \ln re, \ln to, \ln fdv)$	3.911	YES
$F(\ln re) = (\ln re / \ln dcp, \ln dbd, \ln npl, \ln BM, \ln to, \ln fdv)$	2.862	NO
$F(\ln to) = (\ln to / \ln dcp, \ln dbd, \ln npl, \ln re, \ln BM, \ln fdv)$	1.617	NO
At 5% significance level, Upper Value= 3.28 & Lower Value=2.27		

Note 1: Right hand side of all the equations represents as (ln dependent variable/ln of all other independent variables separately); **Note 2:** FDV for financial volatility, BM for broad money, DBD for domestic credit by financial sectors, DCP for domestic credit to private sectors, NPL for non-performing loan, RE for remittance inflow, TO for trade openness; **Note 3:** 3 digits have been considered after decimal

Now, after getting the evidence of having a long-run relationship among the variables, the main ARDL test is developed in order to estimate the long-run coefficients separately for each of the independent variables to find the relationship with financial volatility. For doing that, at first lag length order of all the variables has been estimated based on the result of the Schwarz Information Criterion (SIC). Table 11 provides the lag length selection result based on SIC and selection has been done based on the highest value of SIC among the four lags for each of the variables. Results of SIC refers that FDV and RE should be included in this model at first lag. On the other hand, BM; DCP; DBD and NPL should be included in this model at zero lag and the remaining TO should be included in first lag. This lag length selection will guide which coefficient result will be considered.

Table 10: Lag Length Selection by Schwarz Information Criterion (SIC) Result

Lag	0	1	2	3	Selected Lag
FDV	1.663	1.609	1.928	1.827	2
BM	2.837	2.390	2.397	2.251	0
DCP	2.537	1.961	1.825	1.037	0
DBD	3.408	2.974	2.963	2.682	0
NPL	5.536	5.404	5.420	5.390	0
RE	2.646	2.545	2.662	1.937	2
TO	6.480	6.518	5.711	5.351	1

Note 1: 3 digits have been considered after decimal; **Note 2:** FDV for financial volatility, BM for broad money, DBD for domestic credit by financial sectors, DCP for domestic credit to private sectors, NPL for non-performing loan, RE for remittance inflow, TO for trade openness

4.3 Long Run ARDL Test

After lag selection, estimations for long-run relationship have been conducted and table 12 (Panel A) shows the results under the ARDL model.

FDV vs. BM: It has been found that broad money has a positive and significant impact on financial volatility in the stock market of Bangladesh. Among all the variables, it has the highest positive contribution in volatility. It also indicates that in the long run, 100% increase in BM will be the cause of the increase in financial volatility by 13.22% and vice versa. So it can be stated that when amount of broad money increases in Bangladesh economy, investors become interested to invest their money by purchasing more stocks which increases immediate price increase of stock for a time being and thus, volatility increases as well. On the other hand, when money supply decreases in Bangladesh economy, then people tend to buy less new shares. For not purchasing high amount of new shares within a shorter period decreases the existing volatility. So it can be said that broad money is a better indicator of volatility in the stock market. This outcome is consistent with the result of ([Oluseyi 2015](#)), [Ndunda \(2016\)](#), [Nikmanesh and](#)

[Nor \(2016\)](#), [Kumari and Mahakud \(2015\)](#), [Ahmad and Ramzan \(2016\)](#), [Pinjaman and Aralas \(2015\)](#), [Barakat, Elgazzar et al. \(2016\)](#), [Kumari and Mahakud \(2015\)](#), [Nisha \(2015\)](#), [Yadav, Goyari et al. \(2019\)](#). On the other hand, this result is inconsistent with [Okoro \(2017\)](#).

FDV vs. DCP: In the long run except for the BM and DBD, the other four independent variables have a negative relationship with financial volatility. Among them, domestic credit to private (percentage of gross domestic product) sector is one of them which has the highest negative contribution to financial volatility. At first lag, the coefficient value is negative 0.139 which indicates a negative and significant relationship with financial volatility. 100% increase or decrease of domestic credit to the private sector cause 13.9% decrease or increase of financial volatility respectively. It indicates even if the private sectors like households and businesses get domestic credit easily from financial institutions, they are not willing to invest most of the credit in the stock market, rather they may be interested to invest in other sectors. A slow and less share purchasing tends to decrease existing volatility. Because domestic credit refers mostly to taking a loan from financial sectors. So private sectors don't want to invest this money in a risky stock market like Dhaka and Chittagong stock market. Different market crashes and long-time vulnerability of these two markets lose the confidence of investors. This outcome is consistent with [Okech and Mugambi \(2016\)](#), [Okoro \(2017\)](#). On the other hand, this finding is inconsistent with the findings of [RT Ferreira \(2016\)](#), [Shah, Baharumshah et al. \(2017\)](#).

On the other hand, this result indicates that the decrease in domestic credit increases the stock price volatility. Because, when private sectors don't get a loan, cannot sell the accounts receivables and trade credits, then they face lacking of money and for which, they may start to sell their existing shares which may lead to decline the stock price immediately and so, stock volatility increases in Bangladesh market.

FDV vs. DBD: This study finds a positive relationship between DBD and financial volatility, but the impact is not significant as the coefficient value is close to 0.007 only, which also indicates that 100% increase or decrease in DBD will increase or decrease the financial volatility by 0.7% successively. Similar positive relationship has been found

to the study of [Banerjee, Pradhan et al. \(2019\)](#). However, this finding is not consistent with the finding of DCP or it can be stated that it provides a contradictory result comparing with DCP. Because the inclusion of Govt. borrowings from private sectors is the addition in DBD comparing with DCP. So, the relationship between DCP and DBD with financial volatility should be consistent. But, here the results indicate a positive or no relationship at all between DBD and volatility. If we look at the probability value at lag 0 for DBD, it is 0.895 which indicates that it is even not significant at level of 10%. It also indicates less than 90% confidence level for this relationship and any result below 80% confidence level is not statistically acceptable. So a conclusive statement about the relationship between FDV and DBD cannot be given from this study, rather a further detailed analysis is required to provide a more in-depth result.

FDV vs. NPL: Non-performing loans (NPL) has also a negative and relatively moderate significant relationship with financial volatility. The coefficient of NPL reveals that 100% increase or decrease of the non-performing loans in the economy will cause almost 3% decrease or increase of volatility respectively. This result reveals a clear idea from the perspective of Bangladesh about this relationship. In the last decade, NPL becomes a headache for the Bangladesh economy. It is increasing year by year. Now based on this result, when NPL increases in Bangladesh, it is very obvious that financial institutions will have not sufficient amount to give loans or purchase the trade credit; accounts receivables. That means amount of DCP and DBD go down. Now if the investors don't get sufficient DCP and DBD from FIs, they will not be able to buy new shares. So a slow and less share purchasing decreases the stock volatility considering all other factors are constant. On the other hand, if in the future, NPL amount starts decreasing in the economy, then people will have more DCP and DBD in their hands. So it may happen that they may start purchasing more shares which will lead to increased volatility for a time being.

FDV vs. RE: The next variable is RE which has also a negative relationship with financial volatility with a significant one proved by the value of the coefficient of RE. This coefficient value suggests that if there is 100% increase or decrease happens in RE, then there will be a 9% decrease or increase in financial volatility respectively. This

result is consistent with ([Issahaku, Abor et al. 2017](#)). On the other hand, this result is inconsistent with the study of ([Njoroge 2015](#), [Raza, Jawaid et al. 2015](#), [Al Oshaibat 2016](#)). In the last decade, remittance inflow was increasing year by year. This negative relationship indicates that the people of Bangladesh are not willing to invest this remittance amount in stock purchase although the opposite scenario was expected. It is known that the Bangladesh stock market has been showing vulnerability for the last decade along with a big crash which let the investor lose confidence in the stock market. So they are not willing to take risks with the remittance amount. So a less purchase of stock reduces the volatility when remittance increases. One further clarification can be drawn based on the result of coefficient and probability. For the coefficient value of -0.09, the probability value is 0.139 which indicates slightly less than 90% confidence level about this result, but within 80% confidence level. Though below 90% confidence level is not considered as a standard one, but can be accepted.

FDV vs. TO: Last one is TO which also provides a negative impact on financial stability or volatility, but not a significant one. Actually, the coefficient value of 0.002 indicates there is almost no relationship between volatility and TO. But the result indicates that if there is 100% increase or decrease happens in TO, then financial volatility will be decreased or increased by only 0.2% which is very insignificant. This result is consistent with the study of ([Abubaker 2015](#), [Nikmanesh 2016](#), [Papadamou, Sidiropoulos et al. 2017](#), [Yadav, Goyari et al. 2019](#)). In the last 6 years, total trade to GDP ratio has been increasing in Bangladesh which indicates positive growth in trade. This result indicates that businesses are not willing to invest their excess earning from trade in purchasing the stock, rather they may invest in other sectors or reinvest. So change in volatility due to increase in trade openness is very insignificant.

So from the long run estimation of the coefficient of the variables, it has been found that BM is a better leading positive indicator for financial volatility whereas DCP and RE are two better leading negative indicators of financial volatility.

4.4 Short Run ARDL Test

After finding the evidence of the long-run relationship among financial volatility and the other six variables, now short-run coefficient estimation is possible. Table 12 (Panel B) gives the result of those findings.

FDV vs. BM: The results indicate that broad money has a positive and strong influence on financial volatility in the short run. Compared to the long-run result, there is a stronger relationship between these two because of the higher coefficient value. The coefficient value of BM is 0.185 which indicates that if there is increased or decreased happens in broad money supply in the economy by 100%, there will be an increase or decrease in financial volatility by 18.5% respectively. This result is consistent with ([Kumari and Mahakud 2015](#), [Pinjaman and Aralas 2015](#), [Ahmad and Ramzan 2016](#)). It is very obvious that the reaction of investors will be very quick in case of increased broad money and so, in the short term; this result suggests a stronger relationship than the long term.

FDV vs. DCP: Similar to the long-run relationships, except BM and DBD, the other four variables have a negative impact on financial volatility in the short run too. Among them, DCP is the highest negative contributor on FDV because its coefficient value is 0.1943 which indicates that 100% increase or decrease in domestic credit in the private sector can cause the decrease or increase of FDV by almost 19.43% respectively. This variable gives a stronger relationship in the short-run compared to the long run. This finding is consistent with ([Okech and Mugambi 2016](#), [Okoro 2017](#)). However, the opposite result has been found from different studies like ([Zhou, Zhao et al. 2015](#), [RT Ferreira 2016](#), [Feng, Lin et al. 2017](#), [Banerjee, Pradhan et al. 2019](#)).

FDV vs. DBD: Again, DBD has a positive impact on financial volatility, but not a significant one similar to long-run relationships. If there is a 100% increase or decrease happens in DBD, then financial volatility will be increased or decreased by only 0.95% respectively. Again, the relationship between DBD and FDB is inconsistent with the relationship between DCP and FDV in the short run. The same explanation can be drawn here too.

FDV vs. NPL: The next variable is non-performing loans (NPL) which has a negative impact on FDV with relatively moderate significance. Increasing or decreasing by 100% of NPL causes 4.18% decrease or increase in FDV respectively. In spite of having low significance, it provides better significance in the short-run compared to the long run.

FDV vs. RE: Similar to the long-run relationship, there is a negative and strong relationship between RE and FDV. Actually, there is a stronger relationship that exists in the short-run compared to the long run. The coefficient value of RE by 0.146 indicates that if there is 100% increase or decrease happens in re, then there will be 14.6% decrease and increase in FDV respectively which is not consistent with ([Al Oshaibat 2016](#), [Romero 2017](#)).

FDV vs. TO: At last, variable TO has also a negative impact on FDV, but with a low significance relationship. Because 100% increase or decrease in TO will cause only 0.23% decrease or increase in FDV respectively. It indicates a poor impact on stock price volatility.

So from the short run estimation of the coefficient of the variables, it has been found that BM is a better leading positive indicator for financial volatility whereas DCP and RE are two better leading negative indicators of financial volatility. Compared to long-run co-integration, these variables provide a stronger impact on FDV in the short run. This study provides results of both short and long run in a similar direction and a similar explanation can be presented for the short run just like the long run. Just because of quick reaction after a change in any of these variables, this study provides a stronger relationship in the short run compared to the long run.

After conducting this co-integration test by using the ARDL model, a Vector Error Correction test has been conducted in order to find the short-run dynamics of the long-run equilibrium relationship. In other words, it estimates both short term and long term effects of two time series on another. Considering lag 1 as the standard one, the value of error Correction Term (ECT) is a negative and significant one as it is more than negative 1 (-1.38). This refers that financial volatility has a co-integrating relationship

with all independent variables. It also refers that there is a high speed of adjustment of the dependent variable to equilibrium after a short term shock of all the variables.

4.5 Residual Test

For the OLS test, lag 1 has been considered as a standard one and this lag 1 will be considered as the foundation of all the results of these OLS test except for one test.

At first, R^2 refers to the coefficient of correlation that measures the strength of the linear relationship between two variables. On the other hand, adjusted R^2 is suitable in the case of multiple independent variables. As this study includes six independent variables, so this study is focused on adjusted R^2 . Table 12 (Panel C) provides that value of adjusted R^2 equal to 0.854 which refers that financial volatility can be explained 0.854 or 85.4% by all six independent variables. In other words, these six independent variables are 85.4% responsible for the changes in financial volatility. Firm-specific factors or other reasons are 14.6% responsible for the change of FDV.

The standard error of regression refers to the average error of the regression model or how inaccurate the estimates might be. The smaller value of standard error indicates that data are close to the regression line and regression analysis can be used to predict the dependent variable with very little error. In this study, a very small standard error of regression has been found equal to 0.405 which indicates that OLS can be used to predict the dependent variable considering all the independent variables.

F squared statistics measures the effect size that refers to the strength between two variables especially for using the multiple regression analysis methods. This study has evaluated the Cohen's F^2 statistics which refers to that if the value of F^2 is more than 0.35, then there is a large effect size between two variables. In this study, the value of F^2 statistics is almost 23.047 which is undoubtedly larger than 0.35. So it suggests that there is a strong relationship between the dependent and all independent variables separately.

Autocorrelation or serial correlation refers to the correlation of a variable with itself with subsequent observations. The presence of serial correlation in multiple regression is a serious issue for perfect estimation. Because the error of one observation of a given time period is shifted to the next observation considering the future time period. So determining whether the time series has serial correlation or not, is a vital issue for multiple regression analysis. In this study, the value of the serial correlation of this time series is 0.233 which refers that there is a weak positive serial correlation among the different observations of variables. So observations can be considered as independent.

One important assumption of OLS regression analysis is that variance of the residual term is constant or almost constant that refers to homoscedastic and having non-constant variance of residual terms refers to heteroskedastic which creates obstacles for regression analysis to give a good explanation of the performance of the dependent variable. According to the NCV test p-value is the less than the significance level of 0.05 which indicates the absence of heteroscedasticity in this regression model.

The presence of normally distributed data is an important aspect of regression analysis. If the residuals are not distributed normally, the result of regression analysis cannot be accurate. Though based on lag 1, the p-value is less than the significance level of 0.05 which indicates the absence of non-normal data; this study can further analysis the normality test based on lag 2 and lag 3 which provide higher p-value than the significance level. So overall, it can be said that the data of this time series is normally distributed.

RESET test is conducted for determining the different types of specification errors such as the absence of any relevant independent variable and incorrect functional form. In this study, it has been tried to find out whether any relevant variable has been omitted or not and for that, the null hypothesis has been made indicating no omitting of any relevant variable. Here, the value of F statistics (0.622) is more than the significance level of 0.05 which indicates the acceptance of the null hypothesis. So it refers to that no relevant variable has been omitted for conducting this study.

So the above analysis based on the seven findings of the OLS study confirms the robustness of the relationship between financial volatility and other independent variables that has been found from the test of ARDL.

Table 11: Autoregressive Distributed Lag (ARDL) Test Result

Panel A: Long-run				
Variables	Regressors (Lag)			
	0	1	2	3
BM	0.132 * [2.005]	0.140 ** [2.215]	-0.107 [-1.003]	-0.347 ** [-2.603]
DBD	0.007 [0.133]	-0.013 [-0.253]	0.141 * [1.873]	0.232 ** [2.325]
DCP	-0.139 *** [-3.156]	-0.131 *** [-3.108]	0.020 [0.295]	0.177 * [2.214]
NPL	-0.030 ** [-2.280]	-0.026** [-2.070]	-0.071 *** [-3.462]	-0.194 *** [-5.259]
RE	-0.021 [-0.452]	0.010 [0.217]	-0.090 [-1.550]	-0.329 *** [-3.690]
TO	-0.002 [-0.351]	-0.002 [-0.278]	-0.002 [-0.478]	-0.026 ** [-2.929]
Panel B: Short-run				
Variables	Regressors (Lag)			
	0	1	2	3
ECT_{t-1}	-1.398 *** [-8.688]	-1.381 *** [-9.123]	-1.622 *** [-10.440]	-2.017 *** [-11.608]
$\Delta FD_V(-1)$	-1.398 *** [-7.587]	-1.381 *** [-7.944]	-1.622 *** [-8.745]	-2.017 *** [-8.199]

ΔBM	0.184 * [1.936]	0.193 ** [2.140]	-0.174 [-1.003]	-0.670 ** [-2.426]
ΔDBD	0.009 [0.133]	-0.017 [-0.253]	0.229 * [1.850]	0.469 * [2.229]
ΔDCP	-0.194 *** [-2.885]	-0.181 *** [-2.841]	0.033 [0.295]	0.357 * [2.076]
ΔNPL	-0.041 ** [-2.274]	-0.036 * [-2.052]	-0.116 *** [-3.287]	-0.392 *** [-4.120]
ΔRE	-0.029 [-0.453]	0.014 [0.217]	-0.146 [-1.541]	-0.661 *** [-3.262]
ΔTO	-0.003 [-0.352]	-0.002 [-0.279]	-0.005 [-0.478]	-0.053938 [-2.595103]

Panel C: Residual Test

Variables	Regressors (Lag)			
	0	1	2	3
R^2	0.876	0.892	0.938	0.973
Adjusted R^2	0.838	0.854	0.875	0.895
δ	0.426	0.405	0.376	0.347
$F^2_{statistics}$	22.937 ***	23.047 ***	15.031 ***	12.430 ***
$\chi^2_{Autocorrelation}$	2.565 ***	0.233	1.961	16.646 ***
$\chi^2_{Heteroskedasticity}$	1.277	7.231 ***	6.007 ***	1.040
$\chi^2_{Normality}$	25.770 ***	24.290 ***	0.661	1.191
χ^2_{RESET}	1.232	0.622	1.889	1.187

Note 1: FDV for financial volatility, BM for broad money, DBD for domestic credit by financial sectors, DCP for domestic credit to private sectors, NPL for non-performing loan, RE for remittance inflow, TO for trade openness; **Note 2:** Δ represents short run; **Note 3:** *** indicates significance at 1% level, ** indicates significance at 5% level, * indicates significance at 10% level; **Note 4:** Coefficient value without any * mark indicates significance at more than 10% level; **Note 5:** 3 digits have been taken after decimal; **Note 6:** δ represents standard error of regression, R^2 for coefficient of Determination; **Note 7:** Bold values are considerable value based on selected lag; **Note 8:** Values without any bracket represents coefficient value for ARDL test and value under third bracket represents value of t statistics; **Note 9:** FDV is dependent variable and others are independent variables

CHAPTER V: DISCUSSION

5.1 Conclusions

Introduction: A stable and structured capital market is considered as the backbone of an economy. If a country wants continuous growth in the economy, then ensuring the growth of different business organizations is very vital and the growth of those businesses largely depends on the capital raised from the capital market. Because raising capital from the capital market is convenient and cost-effective for businesses. However, if an economy is tied up with a vulnerable or volatile capital market, then it becomes very difficult for them to raise a huge amount of capital for continuous growth. Though in the last decade, the economy of Bangladesh was rising; but there was very little contribution from the capital market. High remittance inflow, RMG and agricultural sectors are behind this. However, if Bangladesh wants to achieve its vision of becoming a developed country within 2041, then without a stable and efficient capital structure, it would not be possible at all.

Purpose: Fluctuation in the stock price depends on different types of factors. It can be affected by industry or firm-specific factors. It can also be affected by both economic and non-economic factors. Which factors and at which level each of the factors affects the financial volatility is very vital to know for all types of investors. Different researchers tried to establish the relationship of different factors with volatility ([Asgharian, Christiansen et al. 2015](#), [Kumari and Mahakud 2015](#), [Mittnik, Robinzonov et al. 2015](#), [Pinjaman and Aralas 2015](#), [Ndunda 2016](#), [Nikmanesh 2016](#), [Haider, Hashmi et al. 2017](#), [Ibrahim and Alagidede 2017](#), [Issahaku, Abor et al. 2017](#), [Mumo 2017](#), [Okoro 2017](#), [Papadamou, Sidiropoulos et al. 2017](#)). Different macro fundamental factors affect volatility such as GDP, money supply, CPI, remittance, export-import level, exchange rate, domestic credit, foreign reserve, etc. In this study, six vital macro factors have been chosen such as broad money, domestic credit by the private sector, domestic credit to private sectors, non-performing loans, remittance, and trade openness from analyzing the context of Bangladesh's economy. The main purpose of this study is to find out which of these six largely affect the volatility in stock price concerning all types of financial institutions of Bangladesh.

Methodology: Ordinary Least Square Regression analysis based ARDL model has been used to reach the purpose of this study. Data has been taken from 1976 to 2017 by an empirical study. To conduct any research, it is important to determine whether there exists the presence of unit root in the time series or not. Because the presence of unit root provides unreliable findings. So this study has conducted three popular unit root tests such as ADF, PP, and KPSS and based on the combined results of these three tests, the decision regarding the unit root has been taken which is consistent with studies like ([OlugBenga and Grace 2015](#), [Barakat, Elgazzar et al. 2016](#), [Okech and Mugambi 2016](#), [Mumo 2017](#)). Then, Linear ARDL Bound testing has been conducted to get the evidence of having a long-run relationship among the variables and also to determine, which variable can be considered as the best fitted dependent variable. After that, lag length has been selected for each of the variables and followed by it, the main ARDL test has been done to find the long-run relationship among the volatility and particular variable ([Khan, Tantisantiwong et al. 2015](#), [Raza, Jawaid et al. 2015](#)). After testing the long-run effect, short-run study has been conducted. This study ends with the residual test (coefficient of determination, standard error, F squared, normality test, RESET test, heteroscedasticity test, and autocorrelation test) which is conducted to support the findings of ARDL model ([Raza, Jawaid et al. 2015](#), [Ndunda 2016](#), [Okech and Mugambi 2016](#)).

Findings: This ARDL test has provided a separate relationship between volatility and one particular variable either positive or negative relationship. This study exposes that broad money and stock price volatility has a strong and positive relationship. Changes in broad money strongly affect volatility. Again, domestic credit by financial sectors has a positive influence on volatility, but the relationship is very weak or it can be stated that there is actually no impact of DBD on financial volatility. Now this study finds a negative relationship of volatility with other rest of four variables. Among those four relationships, domestic credit to the private sector and remittance both have a strong relationship. On the other hand, trade openness has a weak relationship with volatility. However, the non-performing loan has a moderate level of influence on stock price volatility. However, this study provides a contradictory result. In general sense, DCP and DBD should influence the volatility in the same direction. Again, the result of

the relationship between DBD and FDV is not supported statistically also. So further research is required to get more reliable results about the relationship between DBD and FDV. So finally a conclusive statement can be stated that broad money has the strongest influence on the volatility among these six macro fundamental factors.

Implications: Most of the individual investors have very poor knowledge about how different factors can affect volatility. Even many businesses take investment decisions without an in-depth study of all the variables which affect the volatility. This study reveals the relationship of six macro fundamental factors with volatility and also the level of extent. These six factors are very vital for the overall economy of Bangladesh and they also have an influence on stock price volatility. Now, if the investors know the actual relationship of these six factors with financial volatility, then they will be able to take the right decision about when to invest in the stock market and to which extent.

When there is an increase in broad money, then according to this study, there will be high volatility which indicates that investing at that time is not a wise decision. Because if any investor invests at this point in time, he or she will face high stock volatility. It may happen that he may earn a huge return or huge loss from this volatile market. Again, this study reveals that there is a negative relationship between volatility and domestic credit to private sectors which indicates that if the amount of domestic credit decreases, then stock volatility will be high. So, it is obvious that it is not a perfect time for the investors to purchase a share from the stock market. These outcomes from this study will help the investors to take such an investment decision. Now if the investors invest based on these results, then slowly the stock market will get stability.

Along with the knowledge of this study, if they have knowledge regarding firm-specific and other remaining factors, then there is a high chance that they will not face loss from the stock market and slowly, the market will be efficient and structured. No bullish or bearish trend will exist in the market for a long time and so, a stable stock market will come into the light. Thus, a business institution will be able to raise capital from this market very conveniently.

5.2 Suggestions for Future Research

As it is not a comprehensive study that considers all the factors that can influence the financial volatility, there may have scopes for future researchers to go with more in-depth study. Different suggestions have been presented regarding this,

- ❖ As it has already been mentioned that this study is based on six major macro fundamental factors. However, there are other macro variables as well as non-economic factors. Again, firm-specific factors also influence the financial volatility of the stock market. So future research consisting of both economic, non-economic and firm-specific factors will give a reliable and accurate result for the purpose of the right investment at the right time.
- ❖ Again, this study has been carried out by using the OLS based ARDL model. However, there is an updated version of the ARDL model named the Non-Linear ARDL model. Conducting future research by including this non-linear ARDL with the traditional ARDL model will give more reliable results regarding the financial volatility of the Bangladesh stock market.
- ❖ In the last decade, Bangladesh is facing an increasing amount of non-performing loans which directly affects the stock market because financial institutions are the victims of NPL. However, no particular research has yet been conducted about the impact of NPL on financial volatility. So in the future, a particular type of research can be conducted basing NPL as the independent variable and financial volatility as the dependent variable.
- ❖ In this study, a contradictory result has been come out between FDV; DCP and FDV; DBD. Even statistically, the result was not reliable. So an in-depth study can be processed in future basing DCP and DBD as independent variables and financial volatility as the dependent variable. Even, different variables can be taken as a supported variable that affects DCP and DBD. Thus, a conclusive result may come out.

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