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Can Macroeconomic Volatility Affect Industry Stock Return? A Study of the Banking Industry Using the GARCH Model

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Abstract: This study focused on developing a banking industry index and studying the impact of time-varying macroeconomic risk on the volatility of industry stock returns. The study considers DSE for industry index building and used five macroeconomic risk factors entitled consumer price index (CPI), T-bill rate (TBR), Broad money (M3), the exchange rate (EXCR), and DSE general index (DSEGEN). To achieve the specific objectives, the authors created an index for Banking sectors that takes into account all of the listed companies in the industry and adjusts for all types of corporate changes (i.e., new listings, deletions, bonus shares, and so on) to produce a clear picture of industry performance. All calculations were carried out utilizing data from 2005 to 2019. Several tests models, including the Augmented Dicky Fuller (ADF) Test and the Generalized Autoregressive Conditional Homoscedasticity (GARCH) Model, have been considered to find linkage evidence between industrial stock returns and macroeconomic conditions to facilitate the implementation of the study. The findings of the study suggest that Consumer Price Index, M3, Exchange rate do not significantly affect banking sectors return volatility, but general index return and T- bill rate is significant here. This study has shed light on how the banking industry performs in the face of various macroeconomic conditions. So, investors will infer whether the banking industry will provide the most benefit or not and how they should act in various portfolios and thus in investment decision-making.

Keywords: GARCH, ADF, Industry index, CPI, Volatility

1.0 Introduction

The question of whether time-varying macroeconomic risk contributes to stock price volatility is now a well-known fact for scholars to investigate. The changes in economic factors seem to be an essential and dominant exposure to the stock price fluctuation. The basic logic behind this assumption is that economic growth is crucial for stock market development as it provides liquidity and an avenue for risk-sharing and diversification. Furthermore, it enables organizations to allocate resources wisely to profitable initiatives and reduces information and transaction costs, allowing them to make remunerative investments (Ibrahim, 2011). Theoretically, the fundamental value of a corporate stock depends on expected future dividends. These dividends or future cash flows depend on the volatility of expected future economic conditions. Thus volatility of macroeconomic conditions affects the stock market performance or return. Volatility in stock outcome directs to the detachment in stock prices that alters in all respects to a time. The financial system's health, macroeconomic stability, and external market disruptions all play a role in stock market development (Aliyu, 2012). Several models indicating the inner relation between stock remuneration and its fixing factors are present today. The Capital Asset

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Pricing Model (CAPM) explains stock return variation as a linear function of market beta variations. These prophecies have become a focus of examination in a slew of subsequent studies. Much of the testimony revealed the CAPM theory's empirical contradiction (Fama and French, 1993). Most of these research recommended employing a multifactor approach to find the additional market factors that explain stock market price volatility (Campbell et al.1993). This approach is based on the concept that a few economic factors influence the stock return. Arbitrage Pricing Theory (APT), developed by Ross (1976), is the forerunner in this approach.

APT was tempered by Roll and Ross (1980) in the form of a model that could testify to its fitness. According to Saji (2013), APT, but a multi beta CAPM technique, can be utilized to find additional components to market return that contribute to stock return volatility. Bangladesh is an emerging economy, and over the last few years country's economies has witnessed significant development. The stock market, namely the Dhaka Stock Exchange (DSE), has also seen very high growth. The DSE all-share price index (DSI) has reached 3747.53 at the end of 2009, about 199 percent higher than that of 2005 **(**Rahman and Moazzem, 2011). This rally of enlarging trend is also optic for other major demonstrators such as the DSE general index (DGEN), the blue-chip companies (DSE 20), and their decisive influence on growing market capitalization. In the industry growth, the textile sector has a massive opportunity in the global market as Bangladesh is a cost-efficient labor country. On the other hand, as the pharmaceutical industry has excellent exposure to the global market, the global financial crisis badly affected the earnings of this sector, but it has great potential in the future. The performance of the fuel and energy industries has been affected by price variations in the oil market. The banking sector's performance is also affected by different factors. In order to boost investor confidence, some questions about the economy and volatility in return should be answered. This paper tries to figure out that answer.

The authors of this paper are inspired by the lack of evident and robust evidence on time-varying macroeconomic risk and industry/sectoral stock return volatility in Bangladesh based on DSE data. Although much research has been done in Bangladesh on volatility factors, they have always focused on the DSE's overall stock return volatility rather than the industry stock return. This is partly due to the lack of a dedicated industry index in the DSE and the difficulty in gathering data. There is no apparent index calculation methodology or rules in DSE, and if anyone wants to calculate this, it takes a long time. As previous research was flawed in this area, the authors find it crucial to determine the impact of time-varying macroeconomic risk and industry stock return volatility in DSE and calculate a valid sectoral index. The remaining study is arranged as follows: Section II provides theoretical and empirical findings from dynamic literature. Section III represents the study objectives; Section IV explores data and research methodology; Section V explains the analysis and results of the data and Section VI concludes the study.

2.0 Literature review

Economists and financial experts have used various methods to examine the relationship between macroeconomic variables and stock returns for various countries and times. Recently, the time-varying macroeconomic risk and volatility in industry stock return have become prominent issues for research.

Because CAPM only evaluates the one-factor effect, and the APT theory is based on the idea that various factors influence stock returns, multifactor asset pricing models are preferred over CAPM for this detailed examination (Economic online, n.d.). Moreover, GARCH type models are ruling over 30 years for measuring market data volatility (Bhowmik & Wang, 2010).

Chen (1983) was a pioneer in this field by giving an economic interpretation to statistical factors. However, Gertler and Grinols (1982) examined the relationship between unemployment, inflation, and common stock returns and discovered a statistical relationship between predicted security returns and macroeconomic parameters. Based on monthly data from 1953 to 1983, Chen et al. (1986) employed a six-factor model to discover that the significant stock checkerboards remuneration in the US market was industrial production, term structure premium, and risk premium. The well-preferred literature by Schwert (1989) investigated the relationship between stock volatility and the volatility of real and nominal macroeconomic variables in the United States. The author discovered weak evidence that macroeconomic volatility can predict stock return volatility using inflation, industrial production, and money supply data.

On the other hand, this study reveals a helpful link between macroeconomic instability and stock market volatility, with the direction of causality leaning more toward macroeconomic variables. Madura and Zarruk (1995) investigated the interest rate sensitivity of bank stock returns. Their sample included 29 banks from the United Kingdom, Canada, Japan, Germany, and the United States, with data collected from January 1988 to April 1993. They discovered that interest rate risk differed by country, partly attributed to differences in bank rules and managerial traditions.

Using panel data analysis, Diebold and Yilmaz (2008) investigated the relationship between macroeconomic and stock market volatility in a cross-section of around 45 developed and emerging nations from 1984 to 2004. One of the study's significant flaws is that it is only based on aggregate market-level data, excluding sector-level data and thus missing out on industry-level information. For Finland, ARMA et al. (2008) investigated the relationship between macroeconomic and stock market volatility. They discovered a bidirectional relationship between stock market volatility and monthly macroeconomic volatility using univariate GARCH and Vector Autoregressive Models.

Using the GARCH model, Butt et al. (2010) examined how stock returns varied by industry (banking and textile) and firm-level to specific economic variables. The test is applied to each firm's stock returns and the entire industry's data set, using data for the selected firms and economic indicators acquired for ten years. The outcomes reveal that market yield is mainly accounted for disparity in stock revenue. Other macroeconomic and industry-related variables, on the other hand, have added to the explanatory power of the stock returns variation. In terms of stock revenue, it has been discovered that economic manifestation is higher at the industry level than at the firm level. Chinzara (2010) investigated how systematic risk in the macroeconomy translates into stock market volatility. The study analyzes whether financial crises impact the link between macroeconomic uncertainty and stock market volatility using augmented autoregressive GARCH (AR-GARCH) and Vector Autoregression models. The findings show that stock market volatility is mainly controlled by macroeconomic uncertainty.

Wei-Chong et al. (2011) investigated the association between stock market volatility and some macroeconomic indicators in Japan using daily data on the currency exchange rate, oil price, gold price, and Nikkei 225 index from May 1997 to July 2009. They found no impact of macroeconomic variables on the volatility of Japan's stock market.

Using a GARCH-M model, Chancharat et al. (2007) investigated the effect of different stock market price indices and macroeconomic variables on the Thai stock market from 1988 to 2004. Changes in indices in Malaysia, Singapore, and Indonesia before the 1997 crisis and changes in Korea, the Philippines, and Singapore after 1997 immediately impacted returns in the Thai stock market. Only fluctuations in oil prices had a negative influence among five macroeconomic variables.

This study also discovered a significant association, although it suffers from the same flaws as Diebold and Yilmaz (2008). Most researchers utilized the GARCH model for volatility testing, and the majority of them discovered a strong relationship between macroeconomic and stock market volatility. However, using bivariate and multivariate VAR Granger Causality Tests and regression analysis for Malaysia.

Zakaria, and Shamsuddin (2012) found minimal support for the existence of a relationship between stock market volatility and macroeconomic volatility. GDP, Inflation, Exchange Rate, Interest Rates, and Money Supply were chosen as independent variables based on monthly data from January 2000 to June 2012, but the only interest rate and inflation volatility were determined to be Granger-caused stock market volatility. Granger does not generate stock market volatility because of the irregularity of macroeconomic events as a group. Regression analysis reveals that only money supply volatility is significantly related to stock market volatility. The unpredictability of macroeconomic variables as a whole is not linked to stock market volatility in a significant way. Due to the lack of institutional investors in the market, an uneasy alliance between stock market inconsistency and macroeconomic instability is possible. It could also point to a problem with information asymmetry among investors.

Saji (2013) uses monthly data from India's post-2000 period to examine a relationship between time-varying macroeconomic conditions and industry stock returns. The study used the Banking, Energy, FMCG, Information Technology, Pharmaceuticals, and Automobiles sectors to look at industry-level stock price return volatility. Multifactor modeling utilizing the GARCH model is used in the empirical methodology. According to the study's findings, India's expected premium on stock market investments varies over time and is driven by macroeconomic factors with time-varying conditional volatilities. The impact of economic changes differed by industry, and the sectoral disparities in stock market returns underscore the benefits of industry distribution in terms of investment risk diversification.

Emenike Kalu and Okwuchukwu (2014) investigated the impact of macroeconomic variables on Nigerian stock market return volatility by focusing on data related to all-share index, broad money supply, consumer price index, private sector credit, exchange rate, and net foreign assets from January 1996 to March 2013 and by applying the conditional variance model. It discovered that changes in the US dollar/Naira exchange rate and credit to the free enterprise sector positively influence NSE return variability, while changes in the broad money supply and inflation negatively impact. Changes in net

overseas assets, on the other hand, have a negative but not significant impact on stock market yield volatility. However, the most crucial point is that the sectoral differences were not included in this study.

Oseni and Nwosa (2011) used the AR (k)-EGARCH (p, q) approach to examine the unpredictability or elasticity in the stock market and macroeconomic variables, and the LA-VAR Granger Causality test to explore the nexus between stock market variability and macroeconomic variables instability in Nigeria using time-series data for the years 1986 to 2010. Stock market volatility and actual GDP irregularity are bi-causal, according to the research. The interest rate and inflation rate volatility have no causal relationship with stock market inconsistency. The study recommended reducing stock market volatility; the government should take a proactive role in creating a stable market by capitalizing on ordinary people's growing interest by increasing share supply.

To show the impact of macroeconomic volatility on stock market volatility in Bangladesh, Chowdhury and Rahman (2004) used a Vector Auto Regression (VAR) and seasonality adjusted forecasting model and found a unidirectional impact. Chowdhury et al. (2006) explored how expected macroeconomic instability is related to stock market elasticity in Bangladesh using monthly data on stock price, CPI, exchange rate, and industrial production from 1990:01 to 2004:12. Using the GARCH model, the authors found a relationship between stock market volatility and macroeconomic volatility. Finally, to analyze the relationship between the variables, VAR (Vector autoregression) is used. The findings reveal a notable unidirectional causality between industrial production ticklishness and market return instability, as well as market return elasticity and inflation volatility.

Using Vector Auto-Regression (VAR), Rahman and Moazzem (2011) attempted to empirically demonstrate a causal association between reported volatility in the country's major stock exchanges, mainly the Dhaka Stock Exchange (DSE), and the SEC's regulatory decisions. A statistically significant or relevant relationship was discovered between regulatory authority decisions and market outcomes.

Hossain et al. (2021) have forecasted the volatility of selected banks by applying the GARCH (p,q) model, where it is found that E-GARCH and GJR-GARCH are more suitable in determining the existence of asymmetry. Masuduzzaman and Wing (2013) used an impulse response function and a variance decomposition test to assess long-term and short-term performance based on five macroeconomic variables. The researchers discovered that short-term dynamics could not be estimated using macroeconomic variables, and there is a very weak long-term relationship. Rayhan et al.(2011) used the ADF, GARCH model to explore time-varying DSE overall return volatility. The tests showed that the monthly DSE price index follows a random walk but not the monthly DSE returns. Monthly DSE returns follow GARCH features, according to the study. The study's flaw is that it didn't take macroeconomic factors into account. Quadir (2012) also looked at the effects of macroeconomic factors on stock gains on the Dhaka Stock Exchange between January 2000 and February 2007 using monthly time series data and the Autoregressive Integrated Moving Average (ARIMA) model.

Using the Chittagong Stock Return Index from 04 January 2004 to 14 September 2014, ACMA (2015) investigated a wide range of popular volatility models for stock index

return, including Unit Root Test, Random Walk Model, Autoregressive Model, Generalized with Normal, and Student t-distribution assumption and discovered that the five models GARCH-z, EGARCH-z, IGARCH-z, GJRGARCH-z, and EGARCH-t could all capture the major characteristics of the Chittagong Stock Exchange (CSE). Ahmed et al. (2020) considered DSE to determine volatility based on historical circumstances in breakpoints were sightseeing around events and regulations.

The research gap the authors have found from the research work conducted in Bangladesh is that none of the research papers considered sectoral return volatility issues with time-varying macroeconomic risk. So this is the cardinal focus of this research paper.

3.0 Objectives

The general objective is to determine the time-varying macroeconomic risk and industry stock return volatility in the Dhaka stock exchange for 2005-2019. The specific objectives of the study include the following:

- To establish a reliable industry index (Banking) for DSE and to determine the returns of the same.
- To find out the macroeconomic risk factors contributing to industry stock return volatility.

4.0 Data and Methodology

The majority of the data for this study has been collected from online sources like various national and international data collection websites. The paper focuses on different statistical methods that are mostly learned and taken from online sources.

Sampling: The authors use monthly data from 2005 to 2019, which means the sample size is 180 months. Monthly frequency and this time frame have been chosen to maximize the observation so that robust estimation of the model can be possible. The sample is determined according to the data availability in DSE as well as other reliable sources. The sectoral index, one of the variables of this study, is determined based on the following condition.

- Weighted Average Price Index (WAPI) calculation methodology is employed.
- The market capitalization of each company is calculated by adjusting dividends and other changes.

Data and Variables: The study includes six independent macroeconomic risk factors entitled Consumer Price Index (CPI), three month T-bill rate, Broad money M3, Exchange rate, and DSE general index (DSEGEN) and the dependent variable is industry return (relative change in closing price index). The authors focused on the banking industry. For closing price index of all companies registered in DSE of banking sectors' is used. The following is the description of these variables and data:

1.	Inflation	The consumer price index is used to calculate inflation. It reflects the percentage change in the cost to the median consumer purchasing of a basket of goods and services that may be hooked at specified interims, such as yearly.
2.	Broad money (M3)	Currency and coins, deposits in current accounts, deposit accounts and small-time deposits, overnight repos at commercial banks, and non-institutional money market accounts make up broad money (M3). This is the dominant money supply standard and the economic yardstick for assessing the level of liquidity in the economy. This variable's data has been gathered from international financial statistics (IFS).
3.	Three-month T-bill rate	The three-month Treasury bill's coupon rate is used in this analysis. The data on Treasury bill interest rates were gathered from the Bangladesh Bank's website for the entire period.
4.	Exchange Rate	The rate at which one currency is exchanged for another is known as the exchange rate. We obtained this data from IFS and estimated the exchange rate as TK/$.
5.	Market Return	As a market index, the study used the DSE all-share index or the general index, with the relative change in these indexes serving as the return. The information was gathered from the Bangladesh Securities and Exchange Commission's quarterly review.
6.	Industry Return (relative change in closing price index):	All information was gathered from the DSE website. The closing price index is calculated using the WAPI approach and collecting all of the firms' monthly closing prices, number of securities information, and market capitalization.

Data Analysis Procedures and Modeling:

After selecting necessary variables and collecting data, the research has been continued by applying various statistical methods. Before that, the authors calculated the industry index. Price-weighted, Market Capitalization Weighted, Equal Weighted, and Factor Weighted are the four weighted average methods for index calculation. The authors employed the Price Weighted method detailed in the CFA Institute's Security Market Index presentation.

Weighted Average Price Index Method:

The price-weighted index works similarly like the Dow Jones Industrial Average Index (Fontanills and Gentile, 2006). According to the Chartered Financial Analyst (CFA) Institute, the weight on each constituent security is derived by dividing its price by the sum of all the prices of the constituent securities. But a problem may arise in stock split, and stock merge (reverse stock split) as these change the value of the weight on all securities. To solve this problem, we adjusted the value of the divisor properly. The Price weighted equation which is typically used is:

$$w_i^P = \frac{P_i}{\sum_{i=1}^{N} P_i}$$

The method we used for index calculation is according to a presentation given by Chartered Financial Analyst (CFA) Institute. The summary of the method is like this:

Index Today= Base Period Index* [1+∑ {market capital Weight*(EOP-BOP)/BOP}]

- Here Market Capital = Price*No of Shares Outstanding
- Weight=Market Capital of Individual Company/∑All companies Market capital
- EOP=Ending Price
- BOP=Beginning Price

GARCH (1, 1) has been focused on determining volatility because this is one of the best models and researchers use this frequently. For the stationarity test of data, the ADF test was conducted. The study also tries to find causal relationships using the granger casualty test and general statistics descriptive statistics. E-views 7.00 were used to perform all of these tests. The following is a general overview of the entire test:

Augmented Dickey-Fuller (ADF) Test: To solve the problem of autocorrelation of DF test, an advance procedure of DF test is initiated and called ADF test. For controlling higher-order correlation, this is a parametric test method. This is accomplished by attaching the dependent variable's lagged difference terms to the regression's right-hand side. There are three basic forms of ADF test. They are

i. $\Delta Y_t = \gamma Y_{t-1} + \sum_{j=1}^{p} (\delta_j \Delta Y_{t-j}) + \epsilon_t$

ii. $\Delta Y_t = \alpha + \gamma Y_{t-1} + \sum_{j=1}^{p} (\delta_j \Delta Y_{t-j}) + \epsilon_t$

iii. $\Delta Y_t = \alpha + \beta t + \gamma Y_{t-1} + \sum_{j=1}^{p} (\delta_j \Delta Y_{t-j}) + \epsilon_t$

Where

- t is the time index,
- α, a drift is an intercept constant,
- β is the time trend's coefficient,
- γ is the coefficient showing process root, i.e., the focus of testing,
- is the first-differences autoregressive system's lag order,
- e_t is an identically distributed residual term that is independent.

The standard form of equation used here is

$$\Delta Y_t = \alpha + \beta t + \gamma Y_{t-1} + \delta_1 \Delta Y_{t-1} + \cdots + \delta_{p-1} \Delta Y_{t-p+1} + \epsilon_t$$

Here α is a constant, β is the time trend's coefficient, and p is the autoregressive system's lag order.

Modeling a random walk with imposing the constraints $\alpha = 0$ and $\beta = 0$, and a random walk with a drift with the constraint $\beta = 0$.

The H_o hypothesizes that the time series Y_t is non-stationary (has a unit root). If the calculated ADF statistic is bigger (in absolute) than its critical value, the null hypothesis is rejected, implying that it is stationary.

GARCH (1, 1) Model: Volatility congregation is common in financial markets data, where time series show periods of high volatility and periods of low volatility. However, time-varying volatility is more common than constant volatility, and accurate modeling of time-varying volatility is critical in financial engineering. In such scenarios, the assumption of homoscedasticity is quite restrictive, and it is preferable to look at patterns that enable variance to be determined by its history.

Bollerslev (1986) developed the ARCH model to the Generalized Autoregressive Conditional Heteroskedasticity (GARCH), which shared many of the ARCH's essential traits but required considerably fewer parameters to explain the volatility process correctly. According to the GARCH Model, conditional variance is dependent on the previous mean and variance lags value.

If independent variables are chosen, including the specified exogenous variables, a GARCH model (GARCH = Generalized Autoregressive Conditional Heteroskedasticity) can be either a univariate or multivariate model. Below is the conditional variance equation.

$$h_t = \alpha_0 \sum_{i=1}^{q} \alpha_i \, \mathscr{E}^2_{t-i} + \sum_{j=1}^{p} + \beta_t \, h_{t-j}$$

As a result, the parameter p denotes the Generalized (or "AR") order, whereas the value q denotes the regular ARCH (or "MA") order. If p is non-zero, q must likewise be non-zero, else the model will be unidentifiable. Setting p to zero and q to a positive value, on the other hand, can be used to estimate a standard ARCH model (Saji, 2013).

The study used the standard procedure of unit root testing using the ADF test on the variables in level, first difference and second difference to determine stationary.

5.0. Analysis

5.1. Descriptive Statistics of Portfolio Returns:

The summary statistics of the banking sector's return for 2005-2019 are presented in Table 1. The highest and minimum rates of return provided by the banking sector's index over time and their respective mean, standard deviation (S.D), and skewness were summarized. A lower rate of volatility in the return distribution suggests greater market consistency and a lower risk of investors losing money. In most cases, a value of zero skewness indicates that the observed distribution is normal.

Table 1: Descriptive Statistics of Industry Return

	BANKR
Mean	-0.004
Maximum	0.17491
Minimum	-0.44917
Std. Dev.	0.04059
Skewness	-7.32273

The Banking sector's monthly mean return is the lowest -44.91 percent to its investors. The return in the banking sector is negative, and its risk term is 0.4%. The skewness coefficient for banking sector return is -7.32, which is less than zero, indicating that significant price decreases are more likely than price rises.

5.2 Unit Root test results:

The stationarity of all variables, both stock return, and economic variables, are tested by applying the Augmented Dicky Fuller test. The research has used two assumptions.

H_o: Time series has a unit root

H_1: The series has no unit root

Table 2: Unit root Test Result:

	At level		1st difference	
Variables	test stat	P- value	Test stat	P- value
M3	1.566320	0.9994	-0.348256	0.9137
CPI	- 1.70783	0.9997	-2.996725	0.0372
EXCR	-1.18674	0.6799	-3.394596	0.0124
TBR	-0.90456	0.7851	-12.05479	0.0000
DGNR	-12.5131	0.0000	-12.4329	0.0000
BANKR	-14.9215	0.0000	-10.2250	0.0000

Table 2 summarizes the ADF unit root tests results by considering intercept and trend at the level and first difference. Based on test statistics, at level among the economic variables, only the DSE general index (DGNR) and Bank index rate (BANKR) have no unit root or stationary as the respective P-value 0.000, and .0000 are < 5% and the T stat > t crit. So the H_0 is rejected.

The other macroeconomic factors M3, CPI, EXCR, and TBR have unit root as the respective P-values 0.9994, 0.9997, 0.6799, and 0.7851, are greater than 5%. So here we accepted H_0.

At the level (raw or initial data) which series is not stationary, 1st difference is used to make them stationary. So at 1st difference, all data series except M3 are stationary or have no unit root.

As M3 is not stationary at level and 1st difference, so 2nd difference has been applied to make it stationary as stationarity of data is a must for a model like GARCH, VAR, etc. If the data series under calculation is not stationary, then the result or t value may not be viable.

Table 3: Stationarity Test Result at 2nd difference

At 2nd Difference		
variables	t stat	P- value
M3	-16.25486	0.0000

Table 3 summarizes the results of ADF unit root tests by considering intercept at 2nd difference. From the statistics, it is clear that at the 2nd difference, M3 has no unit root that means it got stationary.

5.3 GARCH results

The authors have analyzed industry stock returns by using the GARCH model. The fitted GARCH models estimate the diverse relationship between the macroeconomic parameters and industrial stock returns in Bangladesh.

Table 4: GARCH test Result

	BANKING	
Dependent var	coefficient	p-value
M3	2.23E-16	0.8979
CPI	-3.02E-06	0.3998
EXCR	-5.19E-06	0.7442
TBR	-3.14E-05	0.0560**
DGNR	-0.002381	0.0013*
ARCH	0.043987	0.0355**
GARCH	0.554959	0.0000*

*significant at 1% level
** Significant at 5% level
*** Significant at 10% level

In the banking sector, ARCH has a p-value of .0355, which is less than 5% and 10%. So, the ARCH term is significant in this sector. As well the GARCH term also is statistically significant here. The P-value of the GARCH term is .000, which is significant at a 1% significant level which aligns with Saji (2013). That means the condition of the previous day's volatility or variability affects the characteristics of banking sector return but no effect of the previous day's volatility performance information.

Market exposure or market return or DSE general index significantly impacts determining industry stock return whis is also supported by Saji (2013).This is because market return expectation may affect industry return expectation. From the summary, it is

seen that DSE general index affects the banking sector's return as its p-value is significant at 1% significance level which is also supported by GARCH estimation result also provides the scope and evidence for the changes in stock performance to the changes in economic conditions. M3, and exchange rate have no significant effect on banking industry stock return which is also the same as (Saji, 2013) results. As well as Singh et al. (2010) also found that their money supply and exchange rate have a negative relationship with the return, whereas Saji (2013) found T- Bill rate is not statistically significant for the banking sector.

GARCH test model would be best if there is no serial correlation, residuals are normally distributed, and there is no ARCH effect.

Table 5: ARCH LM and Normality Test of Residuals

ARCH LM		Normality Test	
F-statistic	Prob. Chi-Square(1)	Jarque-Bera	Probability
0.001333	0.9707	59087.37	0.000

From Table 5, it is evident that the p-value of the ARCH LM test is greater than 5%. So here, the null hypothesis is rejected. That means there is no ARCH effect in the residuals. But the p-value of the normality test is less than 5 %, indicating that the residuals are not normally distributed.

6.0 Conclusion

The capital market is one of the most important venue for fund flow which deals with the investors' expectancy of gaining high and borrowers' expectancy to collect capital at a comparatively lower rate. These two expectations are a function of economic performance which creates investors' confidence. If investors are confident about return, then fund flow increases. So macroeconomic conditions have an important relation with stock market performance.

The cardinal focus of this research is to observe the impact of macroeconomic conditions on Banking industry stock returns by using multivariate asymmetric GARCH modeling concentrating on monthly data from 2005-2019. DSE general index has an important ability to explain the volatility of the banking sector's returns. Furthermore, the return volatility of the banking sector can be explained by its family shock that means by GARCH term, which means previous days squared residuals and previous days lag variance or volatility can explain today's return volatility. TBR can also explain the volatility of the banking sector's return. On the other hand, M3, and exchange rate have no significant impact on determining return volatility. CPI also can not affect stock return and Iqmal and Putra (2020) also found the same.

It is very obvious that the share market, economy, organization's performance, and the investors' tendency to invest are interrelated, and share returns are very sensitive to the economic news. New information related to the economy, like real GDP, inflation, etc., influences market participants to make adjustments that directly impact return volatility (Solakoglu & Demir, 2015). The study's primary weakness is that it was limited to the

banking industry. As a result, the findings of this study are unlikely to apply to other industries. Although macroeconomic volatility has an impact on industry returns, numerous other factors, such as investor behavior and unanticipated shock (COVID-19), have an impact on stock returns that are not taken into account here. So further study can be done by focusing on the behavioral issues of the investors and fund managers on fund management and thus on stock return. As well as there is a vast scope of the future focus on determining the impact of multiple external and internal factors impact on other industry's return volatility as well as the spillover impact of international economic factors on industry return.

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