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# Nexus between Macroeconomic Variables, Firm Characteristics and Stock Returns: An ARDL Bound Testing Approach

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**ABSTRACT:** This study examines the cointegrating relationship between macroeconomic variables, firm characteristics and stock returns period of 1993/94 to 2017/18. The gross domestic product (GDP) and interest rate (IR) has been taken as proxy of macroeconomic variables, and the systematic risk (beta), equity market capitalization (size) and book to market equity ratio has been taken as proxy of firm characteristics.

This study has used Autoregressive Distributed Lag (ARDL) model to examine the cointegrating relationship among the variables under the study. The stationarity of the variables has been examined by applying Augmented Dickey-Fuller (ADF) test and Phillips-Perron (PP) test. ARDL bond test shows that variables are cointegrated, thus the study has also estimated long run relationship and short-run dynamic. This study reveals that beta and GDP is positively related with stock returns and interest rate, book to market equity, and the size is negatively related with the stock returns of Nepalese enterprises. Similarly, this study finds a significant negative coefficient value of 0.896491 for ECT(-1). It is, therefore, the study concludes that the disequilibrium in long run is corrected by near about 90 percent per year.

**KEYWORDS:** Autoregressive Distributed Lag (ARDL), Cointegration, Macroeconomic variables, Firm characteristics.

## I. INTRODUCTION

The relationships between firm specific attributes, macroeconomic variables and stock returns have been extensively studied in recent years. The empirical study has concluded that there exist the significant impact of macroeconomic variables such as GDP, interest rate, inflation, broad money supply, oil price, gold price, import, export, and remittance etc and stock returns. (Aggarwal, 1981; Naka, Mukherjee and Tufte, 1998; Chen, Roll and Ross, 1986) and stock returns. On other hand, some empirical evidences also revealed that there is a significant impact of firm specific fundamental such as risk, size of the firm, book to market equity, dividend yield, earning yield, leverage ratio on stock return (Bhandari, 1988; Kim, 1997, Fama and French; 1992, Pradhan, 2003, Theriou et al., 2010 and Mpofu, 2011).

Hassan & Nasir (2008) used ARDL model to analyze the long run relationship between macroeconomic factors and equity price in the context of Pakistan. Hasan and Nasir found that interest rate, exchange rate and money supply have significant long run effect on equity prices whereas industrial production, oil prices, and inflation rate have no significant impact. Furthermore, Hasan and Nasir concluded that change in interest rate, exchange rate, and money supply have significant short term effect whereas change in industrial production, oil price and inflation have no significant effect on stock price in short run. Similarly, Ali (2011) analyzed the effect of macroeconomic variables on all share price index of Dhaka Stock Exchange. Ali used consumer price index (CPI), GDP, foreign remittance and import payment as proxy of macroeconomic variable. The study investigated the long run equilibrium, short run dynamics adjustment and causal relationship between macroeconomic variables and all share price index. Ali found the cointegrating relationship among the variables. Further, Ali concluded that there exist unidirectional causality from CPI and foreign remittance to stock price index and bi-directional causality between import payment and stock price index. Finally, Ali concluded that there exist no causal relation between GDP and stock price index.

Rad (2012) examined the relationship between stock price index of Tehran Stock Exchange (TSE) and monetary variables in Iran. The study used Autoregressive Distributed Lag (ARDL) approach and Error Correction Model (ECM) to analyze the effects of liquidity (M2) and exchange rate and legal reserve on price index in long run and short run. Using the monthly data for the period of 2004 to 2009, the study found that liquidity (M2) has a positive effect on TSE price index in long run whereas the free market exchange rate (FR) and legal reserves (LR) have a negative effect on

TSE price index in long run. Similarly, Rad also revealed that monetary and exchange variables have a significant effect on TSE price index in short run. On the other hand, Asghar et al. (2013) also examined the impact of macroeconomic variables such as market return, oil price, exchange rate and interest rate changes on stock returns in Tehran Stock Exchange (TSE). The study was based on the monthly data for the period of November 2003 to November 2008. Using the multivariate regression model and autoregressive distributed lag (ARDL) model they concluded that market return, oil price, exchange rate and interest rate changes have significant impact on some industries returns. Furthermore, Applying ARDL approach Khan et al (2017) investigated the short-run and long run relationship between macroeconomic factors and stock returns of Shanghai stock exchange. They have used the monthly data from January 2000 December 2016. The study found a cointegrating relationship among the variables expect inflation rate. Further they concluded that exchange rate and inflation rate have positive effect on stock returns whereas interest rate has negative effect on stock return of Shanghai stock exchange. Finally, they concluded that both the local and regional factors directly and indirectly can explain the stock return of Shanghai stock exchange.

On the other hand, the explanatory power of firm specific variables on stock price in Indian context, has been analyzed by Sharma (2011). Sharma revealed that EPS, DPS and book value per share has significant impact on the stock market price. In the context of Nepalese capital market Shrestha (2011) observed the relationship between company attributes and common stock returns of the Nepalese stock market. Shrestha found a significant positive impact of size and significant negative impact of book to market equity (BE/ME) and sales per share to stock price (S/P ratio) on stock return. Likewise, the effect of firm specific variables and macroeconomic variables on stock price in the context of Nepal has been analyzed by Bhattarai (2018). Bhattarai used the data of seven commercial banks and six insurance companies for the period of 2009/10 to 2014/15, Bhattarai concluded that the major firm specific variables that affect share price are ROE, ROA, EPS, DPS, P/E Ratio, size and major macroeconomic variables that affect share price are MS, GDPR, ER and IR in Nepalese context.

The above mentioned studies conducted in various markets reveals that the stock return is affected by various macroeconomic variables as well as firm specific fundamentals too. In the context of Nepal more studies have not been conducted to evaluate the explanatory power of macroeconomic variable for stock market price. This study, therefore, aims to examine the cointegrating relationship between macroeconomic variables, firm characteristics, and stock returns of Nepalese enterprises. This study has used interest rate and gross domestic product as proxy of macroeconomic variables, and beta, book to market equity ratio, and size as proxy of firm characteristics. Other firm characteristics such as earning yield, cash flow yield, and dividend yield etc. which also affects the stock return and other macroeconomic variables such as inflation, industrial production, broad money supply, and oil price etc. have not been incorporated in this study.

Thus, this paper empirically examines the cointegrating relationship between macroeconomic variables, firm characteristics, and stock returns using an Autoregressive Distributed Lag (ARDL) bound testing approach. The rest of the paper is organized as follows: The objective of the study has been included in *Section 2*. Similarly, *Section 3* presents the methodology used in this study. The empirical results are presented in *Section 4*. Finally, *Section 5* presents the conclusion of the study.

## II. OBJECTIVE OF THE STUDY

The main objective of this study is to examine the cointegrating relationship between macroeconomic variables, firm characteristics and stock returns of Nepalese enterprises whereas other specific objectives of the study are as follows:

- To identify the long run relationship between macroeconomic variables, firm characteristics and stock return.
- To analyze the short-run relationship between macroeconomic variables, firm characteristics and stock return.
- To observe the speed of adjustment of disequilibrium in the long run relationships of variables under the study.

## III. METHODOLOGY

**Research Design:** This study has adopted ARDL bound testing approach to identify the cointegrating relationship between macroeconomic variables such as interest rate and gross domestic product, and firm characteristics such as: stock return, beta, book to market equity, size of the firm, and common stock return. The ARDL model is based on the assumption that all the variables should be stationary at level or at first level or both and should not be stationary in second difference i.e.  $I(2)$ . This study has adopted ADF (Augmented Dickey-Fuller) test and the Phillips-Perron test to examine the stationarity the variables and ARDL bound test has been used to examine cointegrating relationship. When

variables are found to be cointegrated the long run relationship and short-run dynamics of macroeconomic variables, firm characteristics on stock return has also been estimated. In ARDL model the stock return of ( $R_t$ ) is considered as the dependent variable and macroeconomic variables such as interest rate and gross domestic product, and firm characteristics such as beta, book to market equity ratio, size is considered as the explanatory variables. The models used for regression analysis and ARDL model has been described in the following section.

**Nature and Sources of Data:** This study is based on secondary data. The required data for this study are collected from various sources. The firm specific data are collected from the annual report of Nepal Stock Exchange (NEPSE), annual reports of sample firms, and annual report of Security Board of Nepal (SEBON). Similarly, the data related to macroeconomic variables has been collected from the report of Nepal Rastraya Bank (NRB), Economic Survey etc.

**The Model:** The co-integrating relationship between the macroeconomic variables, firm characteristics and stock return has been observed through ARDL model. At first the ARDL bound test is conducted by utilizing following Unrestricted Error Correction Model (UECM).

$$\begin{aligned} \Delta R_t = & \alpha_0 + \sum_{i=1}^n \alpha_1 \Delta R_{t-1} + \sum_{i=0}^n \alpha_2 \Delta \ln(IR)_{t-1} + \sum_{i=0}^n \alpha_3 \Delta \ln(GDP)_{t-1} + \sum_{i=0}^n \alpha_4 \Delta \ln(BE/ME)_{t-1} \\ & + \sum_{i=0}^n \alpha_5 \Delta \ln(ME)_{t-1} + \sum_{i=0}^n \alpha_6 \Delta (BETA)_{t-1} + \theta_1 R_{t-1} + \theta_2 \ln(IR)_{t-1} + \theta_3 \ln(GDP)_{t-1} \\ & + \theta_4 \ln(BE/ME)_{t-1} + \theta_5 \ln(ME)_{t-1} + \theta_6 \ln(BETA)_{t-1} + \varepsilon_t \end{aligned}$$

Similarly, the long run relationship between the macroeconomic variables, firm characteristics and stock return has been estimated by using following model.

$$R_t = \theta_1 \ln(IR)_t + \theta_2 \ln(GDP)_t + \theta_3 \ln(BE/ME)_{t-1} + \theta_4 \ln(ME)_t + \theta_5 \ln(BETA)_t + \varepsilon_t$$

Finally, the short-run relationship between the macroeconomic variables, firm characteristics and stock return and speed of adjustment has been estimated by using following error correction model.

$$\begin{aligned} \Delta R_t = & \alpha_0 + \sum_{i=1}^n \alpha_1 \Delta R_{t-1} + \sum_{i=0}^n \alpha_2 \Delta \ln(IR)_{t-1} + \sum_{i=0}^n \alpha_3 \Delta \ln(GDP)_{t-1} + \sum_{i=0}^n \alpha_4 \Delta \ln(BE/ME)_{t-1} \\ & + \sum_{i=0}^n \alpha_5 \Delta \ln(ME)_{t-1} + \sum_{i=0}^n \alpha_6 \Delta (BETA)_{t-1} + \varepsilon_t \end{aligned}$$

Where,

- $R_t$  = Average rate of return of stock for time t
- $IR_t$  = The interest rate of Treasury bill for time t
- $GDP_t$  = The gross domestic product for time t
- $BE/ME_t$  = Average book to market ratio for time t
- $ME_t$  = Average market equity for time t
- $BETA_t$  = Average systematic risk ( $\beta$ ) for time t
- $\ln$  = The natural logarithm, and
- $\varepsilon_t$  = the residual error term.

**Data Analysis Techniques:** The collected data are analyzed using the EViews 10 software. The output of EViews has provided descriptive statistics, unit root statistics, and ARDL estimates. Augmented Dickey-Fuller test and Phillips-Perron test has been used to ensure that none of the variables are stationary in second level difference because the ARDL model is based on the assumption that the variables should be stationary in their level i.e.  $I(0)$  or in their first difference i.e.  $I(1)$ . After estimating the ARDL model, bound test has been conducted to observe whether the variable are cointegrated or not. When the variables are found to be cointegrated the long run relationships, short run relationship and speed of adjustment has been estimated through long run form and error correction model respectively.



IV. EMPIRICAL RESULTS

**Summary Statistics:** The summary statistics of for the period of 1993/94 to 2017/18 are presented in Table 4.1 The mean of natural logarithm of gross domestic product [Ln(GDP)] is 13.508 with minimum and maximum value of 12.202 and 14.917. The standard deviation of Ln(GDP) is 0.837. Furthermore, short-term interest rate [Ln(IR)] shows mean value of 1.087 with minimum and maximum value of negative 2.040 and 2.392 respectively. The standard deviation of Ln(IR) is 1.010.

**Table 4.1 Summary Statistics for the period of 1993/94 to 2017/18**

The table exhibits summary statistics (minimum and maximum values, range, mean, median, standard deviation, skewness, kurtosis, Jarque-Bera, probability and number of observations) of the variables being studied for the period of 1993/94 to 2017/18. Ln(GDP) is the natural logarithm of the annual millions of Nepalese rupees of the gross domestic product. Ln(IR) is the is the natural logarithm of the annual interest rate of 91-day treasury bill. Ln(BE/ME) is the natural logarithm of the annual average book to market ratio. Ln(ME) is the natural logarithm of the annual average equity market capitalization and beta( $\beta$ ) is the annual average beta.  $R_j$  is annual average stock return which is denominated in percentage.

Variables	Minimum	Maximum	Range	Mean	Median	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Prob.	N
Ln(GDP)	12.202	14.917	2.714	13.508	13.391	0.837	0.133	1.766	1.661	0.436	25
Ln(IR)	-2.040	2.392	4.432	1.087	1.258	1.010	-1.398	5.059	12.554	0.092	25
Ln(BE/ME)	-1.838	-0.355	1.483	-0.902	-0.868	0.453	-0.480	2.053	1.893	0.388	25
Ln(ME)	4.809	9.168	4.360	6.804	6.513	1.388	0.249	1.855	1.624	0.444	25
$\beta$	-0.006	1.712	1.718	0.611	0.442	0.425	1.047	3.622	4.970	0.083	25
R	-8.394	139.859	148.253	41.773	36.235	40.684	0.834	3.057	2.904	0.234	25

On the other hand, the Table 4.1 also depicts result of summary statistics of variable related to firm characteristics. As per the result shown in Table 4.1 the mean value of book to market equity ratio Ln(BE/ME) is -0.902 with minimum and maximum value of negative 1.838 and negative 0.355 respectively. The standard deviation of Ln(BE/ME) is 0.453. Likewise, the mean value of equity market capitalization [Ln(ME)] is 6.804 with minimum value of 4.809, maximum value of 9.168 and standard deviation of 1.388. Furthermore, the mean value of risk ( $\beta$ ) is 0.611 with minimum value of negative 0.006, maximum value of 1.712 and standard deviation of 0.425. Finally, the stock return ( $R_j$ ) shows the mean value of 41.773 percent with minimum value of negative 8.394 percent, maximum value of 139.859 percent and standard deviation of 40.684 percent.

Similarly, the skewness value shows that Ln(IR), Ln(ER), Ln(REMIT), and Ln(BE/ME) are negatively skewed whereas Ln(GDP), Ln(ME),  $\beta$  and  $R_j$  is positively skewed. Finally, kurtosis value and jarque-bera statistics shows that all the variables are normally distributed.

**Unit Root Test:** In time series analysis, before running the any test the variables must be tested for stationarity. For this purpose, in this study ADF (Augmented Dickey-Fuller) test and the Phillips-Perron test has been used. The ARDL model is based on the assumption that the variables are I(0) or I(1). So, before applying this test, this study has determined the order of integration of all variables using the unit root tests. The results of the stationarity tests are given in Table 4.2.

The result of the Panel (a) of Table 4.2 depicts that stock return (R) is stationary at 1 percent level of significance at level data i. e. stock return (R) is stationary in I(0) and rest of all variables are stationary at their first level i. e. they are stationary in I(1). Similarly, Panel (b) of Table 4.2 also shows that stock return (R), is stationary at 1 percent level of significance and Ln(BE/ME) is significant at 5 percent level of significance at level data. i. e. R and Ln(BE/ME) is stationary in I(0) and rest of all variables are stationary in their first level i. e. they are stationary in I(1).

It is evident from Table 4.2 that none of the variables are stationary at the second difference i.e. I(2). Thus, the result of unit root test presented in Table 4.2 permits to apply ARDL model to examine the long run relationships and short run dynamic among the variables under the study. Therefore, this study empirically examines the long run relationships and short-run dynamic interactions among the variables of interest (company specific attributes such as: stock return, beta,



book to market equity ratio, size of the firm, and macroeconomic variables such as GDP and interest rate), applying the autoregressive distributed lag (ARDL) cointegration technique.

**Table 4.2: Unit Root Test at Level and 1<sup>st</sup> Difference**

Panel (a) Augmented Dickey-Fuller Test				
Variables	Data at level		Data at 1 <sup>st</sup> Difference	
	ADF t-stat	p-value	ADF t-stat	p-value
R	-4.938220*	0.0010		
B	-2.289448	0.1831	-5.50866*	0.0002
Ln(BE/ME)	-2.990452	0.0508	-4.067062*	0.0049
Ln(ME)	-0.051255	0.9443	-4.328189*	0.0027
Ln(GDP)	0.867534	0.9931	-3.678052**	0.0118
Ln(IR)	-2.144353	0.2303	-5.150142*	0.0004

Panel (b) Phillips-Perron Test				
Variables	Data at level		Data at 1 <sup>st</sup> Difference	
	ADF t-stat	p-value	ADF t-stat	p-value
R	-3.763028*	0.0094		
B	-2.023583	0.2754	-4.553806*	0.0016
Ln(BE/ME)	-3.153113**	0.0359		
Ln(ME)	-0.264188	0.9167	-4.328189*	0.0027
Ln(GDP)	0.775329	0.9913	-3.678052**	0.0118
Ln(IR)	-2.248959	0.1955	-5.148221*	0.0004

Note: All variables are presented in logs except stock return ( $R_t$ ) and risk of the stock ( $\beta$ )  
 \* (\*\*) denotes the rejection of the null at 1% (5%) significance level.

**ARDL Estimates:** The ARDL model for macroeconomic variables, firm characteristics and stock return has been estimated from a selection of the optimal number of lags. Akaike Information Criterion (AIC) is used to select the optimum number of lags of dependent as well as the explanatory variables. While selecting the lag length serial correlation, heteroskedasticity, and normality of the model has also been considered. Considering these criterion, the study found the optimum lag for p the dependent variable i.e. stock return is 1 and for the independent variables  $q_1, q_2, q_3$  is 2 and for  $q_4$  is 0 and for  $q_5$  is 2. The result shows that there is no problem of serial correlation, heteroskedasticity and normality in these lags. Table 4.6 presents the result of serial correlation, heteroskedasticity and Figure 4.3 presents the result of normality.

**ARDL Bound Test:** ARDL bound test has been applied to examine the cointegrating relationship among the variables. The result of ARDL bound test is presented in Table 4.3. The computed value of F-statistics is observed to be 4.336396, which exceeds the upper bound critical value of 3.79 at 5% level of significance. Since, the computed value of F-statistics exceeds the critical value; it can be revealed that variables are co-integrated. After verified the variables are co-integrating with each other, the study has estimated the long run relationship.

**Table 4.3: ARDL Bound test Results**

Computed F-Statistic	4.336396
1% critical bound Value	
I(0)	3.41
I(1)	4.68
5% critical bound Value	
I(0)	2.62
I(1)	3.79
10% critical bound Value	
I(0)	2.26
I(1)	3.35

**ARDL Long Run Form:** The second stage of an ARDL modeling for co-integration test is to estimate the long run coefficients of the model. The result of the long run coefficients among macroeconomic variables, firm characteristics and stock return are presented in Table 4.4.



Table 4.4 depicts the result of the long run coefficients of macroeconomic variables, firm characteristics. As shown in Table 4.4 the coefficient of macroeconomic variables, gross domestic product (GDP) is observed to be positive and the coefficient of interest rate (IR) is to be observed negative. The positive coefficient of GDP implies that as the GDP of economy increases the stock return also increases. Likewise, the negative coefficient of interest rate indicates that as the interest rate of the economy increases, stock returns of Nepalese enterprises decreases.

**Table 4.4: ARDL Long Run Form**

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
BETA	34.99457	17.62718	1.985263	0.0824
Ln(BE/ME)	-59.71862	54.33643	-1.099053	0.3037
Ln(ME)	-56.12581	41.31396	-1.358519	0.2114
Ln(IR)	-0.994446	4.391257	-0.226460	0.8265
Ln(GDP)	78.91172	54.93848	1.436365	0.1888

EC = R - (34.9946\*BETA - 59.7186\*Ln(BE/ME) - 56.1258\*Ln(ME) - 0.9944\*Ln(IR) + 78.9117\*Ln(GDP) )

Similarly, the coefficient of firm characteristics, book to market equity ratio [Ln(BE/ME)] and size [Ln(ME)] is found to be negative whereas the coefficient of beta is found to be positive. It indicates that there is a positive impact of risk (beta) and negative impact of book to market equity and size of the firm on stock return on long run. The negative impact of book to market equity and size of the firm on stock return is consistent with the finding of Fama and French (1992). Similarly, the positive impact of beta on stock return is corroborating with the finding of Kim (1997), Theriou et al. (2010) and Mpofu (2011).

The long run model of the corresponding ARDL (1, 2, 2, 2, 0, 2) model for stock return (R) can be presented as:

$$R = 34.9946 \text{ BETA} - 59.7186 \text{ Ln(BE/ME)} - 56.1258 \text{ Ln(ME)} - 0.9944 \text{ Ln(IR)} + 78.9117 \text{ Ln(GDP)}$$

**Error Correction Model (ECM):** After determining the long run coefficients, the error correction model has been estimated to evaluate the short run dynamic relationship between stock returns and macroeconomic variables and firm specific variables and to confirm the reliability of the long term coefficient. The results are presented in Table 4.5

**Table 4.5: Error Correction Representation for ARDL Model**

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
C	-676.7911	99.74879	-6.784956	0.0001
Δ (BETA)	17.19114	5.678020	3.027664	0.0164
Δ (BETA(-1))	-16.35775	5.161867	-3.168961	0.0132
ΔLn(BE/ME)	-110.4603	16.94155	-6.520083	0.0002
ΔLn(BE/ME(-1))	52.31521	17.44262	2.999276	0.0171
ΔLn(ME)	11.89848	16.50743	0.720795	0.4916
ΔLn(ME(-1))	33.65696	11.38948	2.955093	0.0183
ΔLn(GDP)	82.12256	41.54395	1.976763	0.0835
ΔLn(GDP(-1))	166.1156	42.41848	3.916115	0.0044
ECT(-1)*	-0.896491	0.137873	-6.502296	0.0002
R-squared	0.990922	Akaike info criterion		6.864600
Adjusted R-squared	0.984637	Schwarz criterion		7.358293
F-statistic	157.6718	Durbin-Watson stat		2.108626
Prob(F-statistic)	0.000000			

The result of Table 4.5 depicts the significant negative coefficient of 0.896491 for ECT(-1) which indicates that the speed of adjustment of disequilibrium is near about 90 percent per year. Similarly, the result of Table 4.5 exhibits that all the coefficients are significant except the coefficient of size (Δ(ME)). Furthermore, the coefficient of one lag beta (Δ(BETA(-1))) and book to market equity ratio (ΔLn(BE/ME)) found to be negative and significant at 1 percent level of significance.

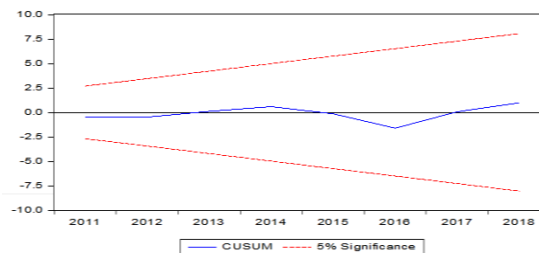
Similarly, the coefficients of all other variables are found to significant and positive in short run. Similarly, the value of adjusted R-square 0.984637 indicates that the stock return is explained by 98 percent by the explanatory variables of the study in short run and the value of F-statistics 157.6178 with prob. value of 0.0000 indicates that the model is



significant at 1 percent level of significance and value Durbin-Watson statistics 2.108626 indicates that there is no problem of auto correlation.

**Stability Test of the Model:** The stability of the model has been estimated by using Recursive CUSUM test at 5 percent level of significance. The result of stability of the model is presented in Figure 4.1.

**Figure 4.1: Plot of recursive residual (CUSUM)**



The straight lines of Figure 4.1 are the critical bounds at 5% significance level. It is observed that the plot of CUSUM lie within the critical bounds. It can be, therefore, revealed that the estimated ARDL model is stable over the study period.

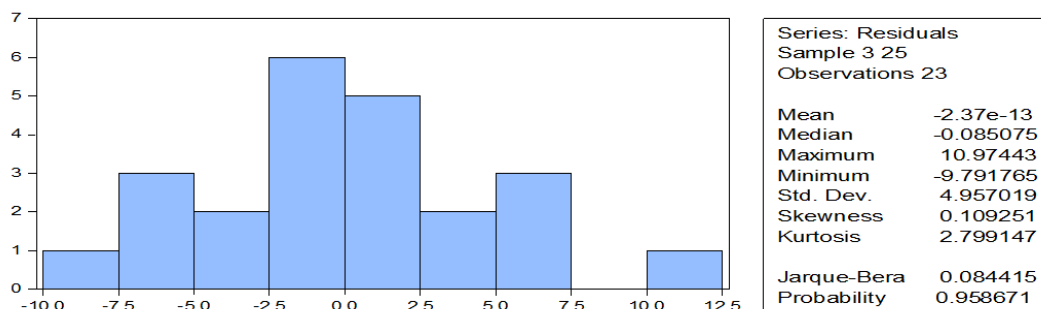
**Diagnostic Test Result of the Variables:** Furthermore, the study has applied Breusch-Godfrey Serial Correlation LM Test and Breusch-Pagan-Godfrey of Heteroscedasticity Test to examine the the serial correlation, and heteroscedasticity of the model. The result of the serial correlation and heteroscedasticity of the model is presented in Table 4.6. Since, the probability values of both tests are observed to be greater than 0.05, it indicates that that there is no problem of serial correlation and heteroscedasticity in the estimated ARDL model.

**Table 4.6: Result of Serial Correlation and Heteroskedasticity**

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.176851	Prob. F(2,6)	0.8421
Obs*R-squared	1.280378	Prob. Chi-Square(2)	0.5272
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.748791	Prob. F(14,8)	0.6963
Obs*R-squared	13.04495	Prob. Chi-Square(14)	0.5230
Scaled explained SS	1.419722	Prob. Chi-Square(14)	1.0000

Similarly, the normality of the residual terms included in the model has been tested by using Jarque-Bera test statistics. The result of Normality is presented in figure 4.2.

**Figure 4.2: Plot of residual terms (Normality test)**



The Jarque-Bera test statistics is observed to be 0.084415 with probability value of 0.958671, which accepts the null hypotheses i.e. the residual terms are normally distributed from the model. Hence, the estimated model has no problem of normality.



## V. CONCLUSION

This study has examined the nexus between macroeconomic variables, firm characteristics and the stock returns of Nepalese stock market. This study has used Autoregressive Distributed Lag (ARDL) bound testing approach to identify the cointegrating relationship. This study is based on the annual data for the period of 1993/94 to 2017/18.

The result bond test concludes that the macroeconomic variables, firm characteristics and the stock returns of Nepalese stock market are cointegrated. Similarly, the result of long run relationship shows that beta and GDP is positively related with the stock return of Nepalese enterprises. Therefore, the study concludes that there is a significant positive impact of systematic risk and gross domestic product on stock return of Nepalese market. It implies that as the systematic risk increases the stock return also increases. Similarly, positive impact of gross domestic product on stock return indicates that as the higher the gross domestic product, higher would be the stock return of Nepalese stock market. On the other hand, the result shows that interest rate, book to market equity, and the size is negatively related with stock return. The negative coefficient of interest rate, book to market equity and size indicates that there is a negative impact of interest rate, book to market equity, and the size on stock return of Nepalese enterprises. The negative impact of interest rate on stock return reveals that as the interest rate of the economy decreases stock return of the Nepalese market increases. Likewise, the negative impact of book to market equity and size reveals that lower the book to market equity and size of the firm higher would be the stock return.

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