

## Cross Section of Stock Returns in Nepal

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### Abstract

*This paper investigates the significant firm-specific factors that explain the variation in cross section returns of non-financial firms listed in Nepal Stock Exchange (NEPSE). Firm size, book to market equity ratio, debt equity ratio, earning yield, cash flow yield and dividend yield have been tested to find out explanatory power on explaining variation in cross-section returns of non-financial firms. A total of 14 non-financial firms has been selected for this research. Among them, 6 were hydropower companies, 3 were manufacturing companies, 2 were tourism companies and 1 was from another sector. Judgmental sampling design is implemented for sampling procedure. Sampling frame and daily stock prices are obtained from official website of NEPSE. Firm-specific accounting data is collected from annual reports of listed companies. Descriptive, correlational, and analytical research designs are used to explore the research question. A multiple linear regression model was used for data analysis and it was found that only cash flow yield and dividend yield are found to be significant predictors explaining the variation in cross-section returns of non-financial firms listed in NEPSE. Other variables such as firm size, book to market equity ratio, debt equity ratio and earning yield are found to be insignificant variables to explain variation in cross-section returns.*

*Keywords:* cross-section stock returns, non-financial firms, asset pricing model

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### Introduction

Stock return has always been an intriguing research topic in the literature of finance. Harry Markowitz (1952) developed Modern Portfolio theory, which was the foundation of numerous theories developed in the field of risk and return. Modern Portfolio theory is based on mean-variance analysis which seeks trade-off between the expected return and variance of returns on a portfolio. In other words, it always tries to maximize the investors' return while keeping risk at minimum level. The theory explains how to diversify the portfolios to get optimal risk adjusted returns. The essence of this theory is that combination of highly risky assets in a portfolio gives lesser risk to the investors as compared to holding the highly risky assets individually.

On the foundation of Modern Portfolio theory, Sharpe (1964), Lintner (1965), and Black (1972) developed the Capital Asset Pricing Model. CAPM explains that the equilibrium return of any asset is a function of its systematic risk, measured by beta and hence, any other variable except beta is not required to explain cross-section returns of any asset. However, Ross (1976) found that cross-sectional volatility in stock returns can be explained by beta only upto the extent of 40%. Ross's criticism of CAPM resulted directly to the innovation of the Arbitrage Pricing theory (APT). Nevertheless, there is growing consensus among researchers that only beta is insufficient to adequately explain the variation in average stock returns, therefore the CAPM has come under intense skepticism. Book-to-market equity ratio effect of Stattman (1980), the size effect of Banz (1981), the earnings-price (E/P) ratio effect of Basu (1983) and the leverage effect of Bhandari (1988) have challenged the CAPM model.

Fama and French (1992) explored that the relationship between average returns and beta is statistically insignificant. Rather, they claimed that the cross-sectional volatility in average returns is explained by firm size and the book-to-market equity significantly. Furthermore, Fama and French (1993) argued that the size effect and the value effect are CAPM anomalies. They created a three-factor model that accounts for anomalies discovered in the CAPM. Similarly, the four-factor model was established by Carhart (1997). It added one more effect to the Fama-French three factor model which is known as momentum factor effect. It states that stocks which have performed well in the past, would continue to perform well in the future and similarly, stocks which have performed bad in the past, would continue to perform bad in the future. During evolution of asset pricing model, Fama and French (2015) developed five-factor asset pricing model. They argued that volatility in stock returns is explained by five components namely market risk premium, size premium, value premium, profitability factor and investment factor. The evolution of asset pricing theories aforesaid is a clear indicator that there are numerous predictors of stock return beside market beta. Hence, the relationship between risk and return no longer seems to be best described by a single factor model.

Nepalese stock market is still in infant stage and Nepalese investors lack adequate knowledge and skills for decision making in investment. They are always in dilemma as to what factor they should consider while buying and selling scripts. The motivation for conducting this research is to make Nepalese investors aware about significant firm specific factors that influence the stock return. Since, Nepal Stock Exchange (NEPSE) is also emerging capital market in South Asia, rapidly expanding in terms of millions number of investors and billions of rupees of transactions, it is worthwhile to examine the risk-return

relation through a multifactor asset pricing approach. Furthermore, lots of studies have been conducted on cross-section of stock returns of financial firms in Nepal but rare studies have been conducted focusing on non-financial firms. Hence, this study aims to investigate on firm-specific factors that explain the cross-section returns of non-financial firms listed in Nepal Stock Exchange.

The second section incorporates empirical review of related articles. The third section includes research methodology which incorporates research design, sampling design, nature and sources of data, data collection techniques and tools of data analysis. The fourth section contains result and discussion. Finally, the fifth section contains conclusion.

### **Review of Literature**

The conventional Capital Asset Pricing Model is refuted by empirical data. Contrary to the prediction of CAPM, it is gradually accepted by many researchers that stock returns are not only affected by market beta, but it has additional predictors too. Banz (1981) discovered that there is a significant negative relationship between firm size and stock returns. To speak more precisely, average stock returns of small size firms are higher than large size firms. Hence, market equity, as a proxy for firm size, adds to the explanation of the average returns. Stattman (1980) and Rosenberg et al. (1985) found that average returns in the US stock markets are positively related to the ratio of a firm's book value of common stock to its market value, BE/ME. Similarly, Chan et al. (1991) also found a similar positive BE/ME and average returns relationship in the Japanese stock market. Ball (1978) argued that E/P can serve as a proxy for unnamed factors in expected returns. Similarly, Basu (1983) discovered that the E/P ratio also has significant predictive power in stocks returns in America beside size and beta. Furthermore, Bhandari (1988) found that stock returns are also affected by firm's leverage ratio. It was found that a higher leverage ratio results in higher returns. Fama and French (1992) found that beta lost explanatory power to describe cross-section return, when tests allow for variation in beta unrelated to size. Moreover, size and book-to-market equity ratio has a significant relationship with cross-section return.

Similarly, Lam (2002) found that market beta is unable to explain the average monthly returns. Rather, firm size, book-to-market equity ratio and E/P ratios were found to explain the volatility of cross-sectional average monthly returns. Chou, Chou and Wang (2004) explored that the predictive ability of size and BM diminishes for the periods 1982-2001 and 1990-2001, respectively. However, Bali, Cakici, and Tan (2009) found significant positive relationship between conditional beta and the cross-section of predicted returns which strongly support the conclusion of CAPM. Drew and Veeraraghavan (2010) suggested that the market beta alone is not sufficient to describe the cross-section of expected returns. They discovered that book-to-market equity and firm size are significant predictors in explanation of the volatility in average stock returns. Ibrahim and Bala (2017) studied the stock returns of listed food and beverage companies in Nigeria and suggested that firm size, as measured by market capitalization has a significant negative impact on the stock returns whereas the impact of debt-to-equity ratio and earnings per share is found to be positive and statistically significant. Chhajer, Mehta, and Gandhi (2020) advocated that market beta, book to market equity ratio, dividend yield and return on equity influence stock returns significantly. However, leverage ratio and firm size were unsuccessful to explain the volatility of stock returns. Atodaria, Shah, and Nandaniya (2021) compared the Fama-French Three Factor Model and Capital

Asset Pricing Model in terms of performance and revealed that Fama-French Three Factor model was better than CAPM in forecasting stock returns. Moreover, market beta, book to market equity ratio, and firm size are found significant to explain equity returns.

In Nepal, Pradhan and Balampaki (2004) explored that size, book-to-market equity ratio, earning yield and cash flow yield are significant predictors to explain dividend yield, capital gains yield and total yield. Chhetri (2019) studied the behavior of stock returns on non-financial enterprises listed in Nepal Stock Exchange and revealed that firm size and the book-to-market equity ratio have a significant negative impact on stock returns.

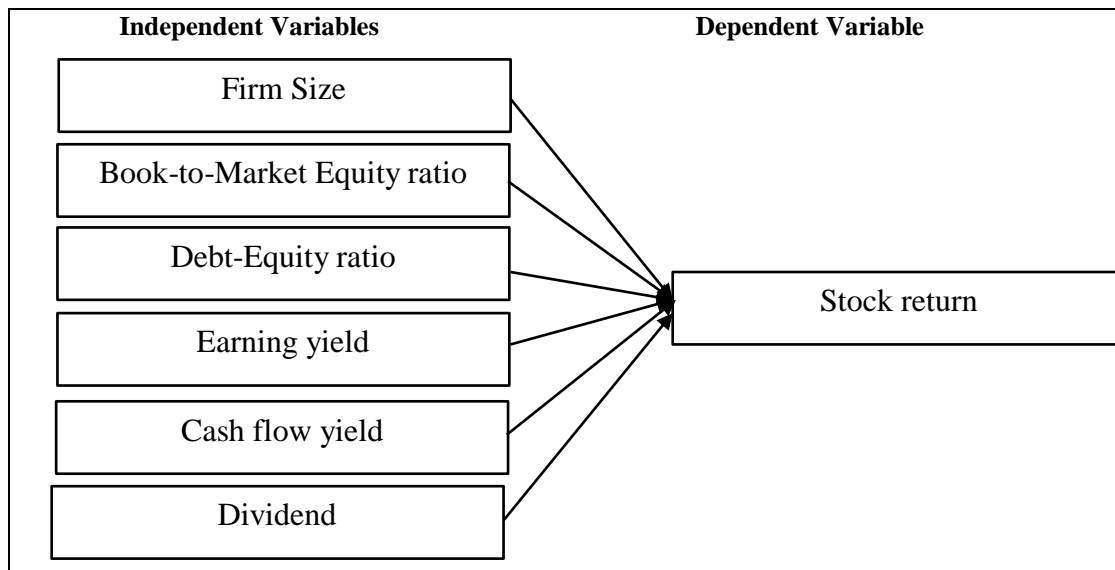
Based on the study of aforementioned empirical studies, it is concluded that cross-section equity returns aren't explained only by market beta but other predictors such as firm size, book-to-market equity ratio, leverage, earning yield, cash flow yield and dividend yield also have predicting power on cross-section returns. But, the results of previous studies are not consistent. Hence, it is relevant to test the relationship between these variables in Nepalese context too.

### Conceptual Framework

Following figure represents the conceptual framework which gives conceptual knowledge about the scope of study:

**Figure 1**

*Conceptual Framework*



## Hypotheses

Based on the conceptual framework, following alternative hypotheses are established.

H<sub>1</sub>: There is a significant relationship between firm size and stock return.

H<sub>2</sub>: There is a significant relationship between book-to-market equity ratio and stock return.

H<sub>3</sub>: There is a significant relationship between debt-equity ratio and stock return.

H<sub>4</sub>: There is a significant relationship between earning yield and stock return.

H<sub>5</sub>: There is a significant relationship between cash flow yield and stock return.

H<sub>6</sub>: There is a significant relationship between dividend yield and stock return.

## Operational Definition of Variables

Variables under the study are categorized as dependent and independent variables which are explained below:

### a. Stock Returns

Stock return or yield is used as dependent variable in this study. Stock return is calculated as natural logarithm of returns. Returns are calculated as the ratio of the stock price at the end of the year  $t$  divided by stock price at the end of the year  $t-1$ .

$$\text{Stock return } (r_{it}) = \frac{P_t}{P_{t-1}} \dots \dots \dots (1)$$

In equation (1),  $r_{it}$  represents return of stock  $i$  at time  $t$ .  $P_t$  represents price of individual stock at the end of year  $t$ ,  $P_{t-1}$  represents price of individual stock at the end of previous year  $t-1$ .

### b. Size

Size is used as one of the predictors of stock returns. It is calculated as a natural logarithm of market equity of a firm. Market equity is calculated as the product of the number of shares outstanding and stock price at the end of year  $t$ .

### c. Book to Market Equity ratio

Book to market value ratio is another predictor of stock returns. Book value is defined as shareholder's equity of the firm which includes paid up equity and preference share, share premium, reserve, and surplus, other reserve and fund related to shareholders after deducting any fictitious assets. Book to market equity ratio is calculated as the ratio between book value of equity and market value of equity of the firm.

### d. Leverage

Debt-Equity ratio is used as a proxy for leverage. Debt-Equity ratio can be obtained as the ratio of book value of total debt and book value of shareholders' equity.

**e. Earning yield**

Earning yield is used as predictor of stock returns. It is calculated as a fraction of net income to market value of equity of the firm.

**f. Cash flow yield**

Cash flow yield is used as another predictor of stock returns. It is calculated as net income plus depreciation and amortization divided by market value of equity of the firm.

**g. Dividend yield**

Dividend yield is used as another predictor of stock returns. It is calculated as dividend divided by stock price at the end of the year.

### **Research Methodology**

#### **Research Design**

The descriptive, correlational, and analytical research designs are used in this study. Characteristics of cross-section returns, and its predictors have been explained through the descriptive research design. To determine the directions, magnitudes, and shapes of the observed link between various dependent and independent variables, this study also used a correlational research design. Also, this work has used an analytical (causal comparative) research design to investigate the variables influencing cross-section returns.

#### **Sampling Design**

Judgmental sampling design is implemented to select sample from firms actively traded in Nepal Stock Exchange as on January 10, 2023. The following criteria are considered to select sample firms.

- i. Firms should be non-financial firms.
- ii. Suspended firms by Nepal Stock Exchange are excluded from sample selection.
- iii. NEPSE has created the highest peak at the index of 1881.88 on July 27, 2016. Nepalese capital market has spent a complete cycle of bull and bear from that day. Hence, the study has taken 6 years of study period from July 16, 2016, to July 16, 2022. Non-financial firms should be listed in NEPSE before July 16, 2016, for sample selection.
- iv. Sample firms should not go for merger and acquisition during the study period.

#### **Population and Sample**

228 companies are listed in Nepal Stock Exchange as on July 5, 2023. Among them, 79 hydropower companies, 6 manufacturing and processing companies, 2 trading companies, 6 hotels and tourism companies and 2 other sector companies are listed as non-financial firms. Hence, the population of the study consists of 95 non-financial firms. Sample firms are selected which meet the criteria set in sampling design. Among these, 14 firms (6 hydropower companies, 3 manufacturing and processing companies, 2 trading companies, 2 hotels and tourism companies and 1 company listed in other sector) are

selected as sample which fulfilled the criteria of judgmental sampling design. Name lists of sample firms are presented in Appendix 1.

### Nature and Sources of Data

Panel data is used for the study. Data is collected from secondary sources. The study has taken the study period of 6 years from July 16, 2016, to July 16, 2022. Sampling frame and daily stock price is obtained from official website of Nepal Stock Exchange (NEPSE). Firm-specific accounting data is obtained from annual reports of listed companies.

### Methods of Analysis

Descriptive statistical tools such as mean, standard deviation, minimum and maximum values, and inferential statistical tools such as correlation and regression model are used to find the result of the study. The data is processed through SPSS software version 26 for the analysis of the collected data.

Stock return with studentized deleted residual more than 3 is eliminated to avoid outliers in dependent variables. Normality test is done through graphical and statistical tests. Histogram along with normal curve and PP-plot is used as visual tool to examine normality of data. Similarly, Kolmogorov-Smirnov and Shapiro-Wilk test was conducted for normality test. Furthermore, Durbin-Watson test is conducted to test autocorrelation of the data. Similarly, scatter diagram is conducted as visual inspection to examine heteroscedasticity. Similarly, Variance Inflation Factor (VIF) is calculated to measure multicollinearity among predictors.

Correlation matrix is presented to analyze the linear relationship among variables. ANOVA table is presented to test the fit of the model. R-square is used to explain the percentage change in dependent variable explained by independent variables. The regression model explains the significant predictors which impacts the stock returns.

### Empirical Model

The empirical model used in this study is explained as follow:

$$R_{it} = \beta_0 + \beta_1 \ln \ln (MC) + \beta_2 BM + \beta_3 DE \text{ ratio} + \beta_4 EY + \beta_5 CFY + \beta_6 DY + e_i$$

Where,

$R_{it}$  = Stock returns of firm  $i$  at time  $t$

$\beta_0$  = Constant parameter

$\beta_1, \beta_2, \beta_3, \beta_4$  and  $\beta_5$  = Parameters to be estimated

$\ln (MC)$  = Natural logarithm of market capitalization

BM = Book to market value of equity ratio

DE ratio = Debt-Equity ratio

EY = Earning Yield

CFY = Cash Flow Yield

DY = Dividend Yield

### Results and Discussion

One of the pre-requisites of the multiple linear regression model is normality of data. To ensure normality, both visual inspection and statistical test is conducted. Histogram along with normal curve is bell-shaped (Appendix 2). Similarly, PP-plot is near to equi-distribution line (Appendix 2). Table 1 shows that p-value of Kolmogorov-Smirnov and Shapiro-Wilk test is more than 0.05 indicating normality of data set. Hence, all of the aforementioned visual and statistical tests show that the collected data is normally distributed.

**Table 1**

*Test of Normality using Kolmogorov-Smirnov test and Shapiro Wilk test*

		Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Studentized Residual	Deleted	0.076	56	.200*	0.975	56	0.289

Note: \*\* indicates significance at 0.05 level

Table 5 shows that VIF of all independent variables are less than 5 indicating no presence of multicollinearity. Similarly, scatter plot of standardized residual along with standardized predicted value (Appendix 2) shows no presence of any pattern which indicates absence of heteroscedasticity.

**Table 2**

*Table Showing Test of Influential Observation*

	Residuals Statistics <sup>a</sup>				
	Minimum	Maximum	Mean	Std. Deviation	N
Stud. Deleted Residual	-2.626	2.257	-0.010	1.025	56
Cook's Distance	0.000	0.116	0.019	0.029	56
Centered Leverage Value	0.019	0.637	0.107	0.094	56

Note: <sup>a</sup> denotes residual statistics of Dependent Variable: Return

Maximum values of studentized deleted residuals are within the range of -3 and +3 which indicates that there are no outlying variables in dependent variable stock return. Centered Leverage values is less than  $3k/n$  (where  $k$  = number of independent variables and  $n$  = number of cases) which indicates that



there are no outlying variables in independent variables. Similarly, maximum value of Cook's distance is less than 1 which indicates that there is no influential observation in both dependent and independent variables.

**Table 3**

*Descriptive Statistics*

	Statistics					
	N		Mean	Std. Deviation	Min.	Max.
	Valid	Missing				
Return	56	0	-0.2620	0.25170	-0.88	0.33
Firm Size	56	0	9.9591	0.68290	8.33	11.20
Book to market Equity ratio	56	0	0.5359	0.37249	0.04	1.41
Debt Equity ratio	56	0	0.6118	0.52510	0.03	1.85
Earning Yield	56	0	0.0600	0.06188	-0.05	0.25
Cash Flow Yield	56	0	0.0663	0.07054	-0.02	0.46
Dividend Yield	56	0	0.0348	0.02904	0.00	0.10

Table 3 shows the descriptive statistics of dependent and independent variables. Mean return of 14 sample firms is -0.2620. Mean returns of sample firms are negative which indicates that the shareholders incurred loss in these firms during study period. Nevertheless, the mean value of earning yield, cash flow yield and dividend yield of these firms are positive. It indicates that mean stock returns are negative despite positive fundamental returns provided by sample firms.

**Table 4***Correlation Matrix*

	Return	Firm Size	Book to market Equity ratio	Debt Equity ratio	Earning Yield	Cash Flow Yield	Dividend Yield
Return	1						
Firm Size	.238	1					
Book to market Equity ratio	.018	-.463***	1				
Debt Equity ratio	-.090	-.136	-.261	1			
Earning Yield	.136	.308**	.155	-.163	1		
Cash Flow Yield	.271**	-.012	.521***	.086	.523***	1	
Dividend Yield	.371***	.278**	-.023	-.336**	.114	.036	1

\*\*\* denotes correlation is significant at the 0.01 level (2-tailed).

\*\* denotes correlation is significant at the 0.05 level (2-tailed).

\* denotes correlation is significant at the 0.1 level (2-tailed).

Table 4 shows correlation between dependent and independent variables. It indicates that the relationship between stock returns and cash flow yield and dividend yield are significantly positive. Correlation between stock returns and other predictors such as firm size, book to market equity ratio, debt-equity ratio, and earning yield are insignificant.

**Table 5***Regression Analysis*

Variables	Coefficient	Standard Error	t-statistics	Sig.	VIF
Constant	-0.890	0.659	-1.351	0.183	
Firm Size	0.053	0.062	0.849	0.400	1.854
Book to market Equity ratio	-0.071	0.137	-0.519	0.606	2.647
Debt Equity ratio	-0.024	0.076	-0.314	0.755	1.622
Earning Yield	-0.581	0.657	-0.884	0.381	1.685
Cash Flow Yield	1.408	0.690	2.042	0.047**	2.411
Dividend Yield	2.719	1.190	2.286	0.027**	1.216

$R^2 = .0241$ , Adjusted  $R^2 = 0.148$ , F-Stat = 2.589, P-value = .029, DW = 2.041

*Note.* Predictors: (Constant), Dividend Yield, Book to market Equity ratio, Earning Yield, Debt Equity ratio, Firm Size, Cash Flow Yield;

\*\*\* denotes correlation is significant at the 0.01 level (2-tailed).

\*\* denotes correlation is significant at the 0.05 level (2-tailed).

\* denotes correlation is significant at the 0.1 level (2-tailed).

Table 5 shows the result of regression analysis. The regression model depicted that R-Square is 0.241. This means 24.1 percent of variation in returns is explained by predictor variables in the model. DW test of 2.041 shows there is no serious problem of autocorrelation. Similarly,  $F_{(6,49)}$  is 2.589 with  $p < 0.05$  which indicates that the regression model is fitted well.

t-statistics of individual predictors are conducted. Regression coefficient of firm size, book to market equity ratio, debt equity ratio and earning yield are insignificant ( $p > 0.05$ ). It can be concluded that firm size, book-to-market equity ratio, debt-equity ratio and earning yield are unable to explain the variation in cross-section stock returns of non-financial firms in Nepal. Similarly, beta coefficient of cash flow yield and dividend yield are significant ( $p < 0.05$ ) which indicates that cash flow yield and dividend yield are found to explain the variation in cross-section return of stocks.

### Discussion

This study is conducted to analyze the significant predictors of stock returns. The study examines the explanatory power of firm size, book to market equity ratio, debt equity ratio, earning yield, cash flow yield and dividend yield on stock returns. The result of the study shows that only cash flow yield and dividend yield can significantly explain the variation in cross section stock returns of non-financial firms in Nepal.

Comparing with previous studies, the result of the study is consistent with only few previous studies. Firm size, book to market equity ratio, debt-equity ratio, and earning yield are found to be insignificant which is not consistent with previous studies (Fama & French, 1992; Lam, 2002; Drew & Veeraraghavan, 2010; Chhetri, 2019). Cash flow yield and dividend yield are found to be significant in explaining variation in cross section stock returns which is consistent with few previous studies (Chhajer et al., 2020; Pradhan & Balampaki, 2004).

### Conclusion

This study is intended to investigate firm-specific factors which explain variation in cross-section stock returns of non-financial firms in Nepal. The results of the study suggested that firm size, book to market equity ratio, debt equity ratio and earning yield do not explain the variation in cross-section stock returns of non-financial firms in Nepal. Only cash flow yield and dividend yield can explain the variation in cross section stock returns of non-financial firms in Nepal.

This study is anticipated to examine the relationship between equity returns and its predictors. Firm-specific variables are very important to explain cross-section equity returns. This study may be insightful to future researchers, academics, finance scholars and capital market investors. As, this study examines the cross-section returns of non-financial firms listed in NEPSE with limited firm-specific variables. Further research can be conducted to examine the cross-section returns of financial firms as well. Similarly, the relationship between cross-section returns and macro-economic variables can also be examined.

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**Appendix 1:****List of Sample firms****Table A1***Lists of Hydropower Companies*

SN	Name	Symbol	Sector
1	National Hydro Power Company Ltd.	NHPC	Hydro Power
2	Api Power Company	API	Hydro Power
3	Barun Hydropower Limited	BARUN	Hydro Power
4	Butwal Power Company Limited	BPCL	Hydro Power
5	Chilime Hydropower Company Ltd.	CHCL	Hydro Power
6	Arun Valley Hydropower Dev. Co. Ltd.	AHPC	Hydro Power

Source: Nepal Stock Exchange

**Table A2***Lists of Manufacturing and Processing Companies*

SN	Name	Symbol	Sector
1	Unilever Nepal Limited	UNL	Manufacturing And Processing
2	Himalayan Distillery Limited	HDL	Manufacturing And Processing
3	Bottlers Nepal (Terai) Limited	BNT	Manufacturing And Processing

Source: Nepal Stock Exchange

**Table A3***Lists of Hotel and Tourism Companies*

SN	Name	Symbol	Sector
1	Soaltee Hotel Limited	SHL	Hotels And Tourism
2	Taragon Regency Hotel Limited	TRH	Hotels And Tourism

Source: Nepal Stock Exchange

**Table A4***Lists of Trading Companies*

SN	Name	Symbol	Sector
1	Salt Trading Corporation	STC	Tradings
2	Bishal Bazar Co. Ltd.	BBC	Tradings

Source: Nepal Stock Exchange

**Table A5**

List of Other Companies

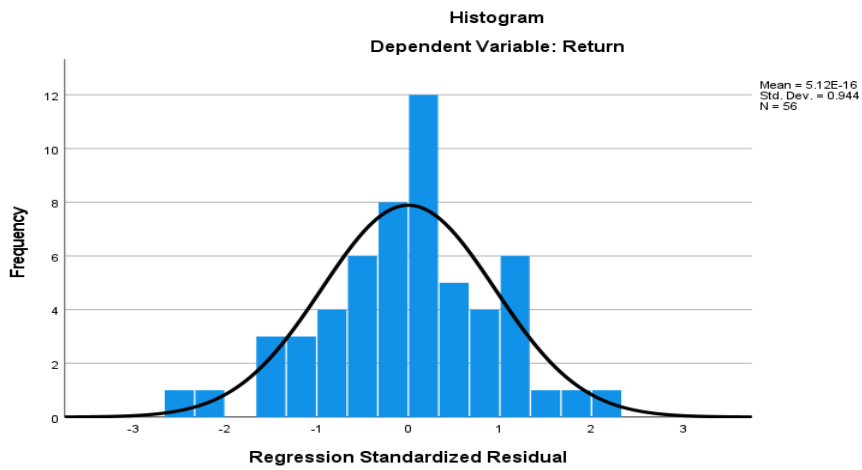
SN	Name	Symbol	Sector
1	Nepal Doorsanchar Company Ltd.	NTC	Others

Source: Nepal Stock Exchange

**Appendix 2:**

**Figure A1**

Histogram with normality curve of stock returns



**Figure A2**

PP plot

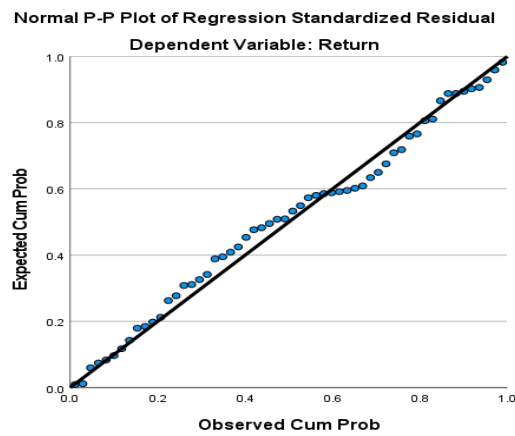


Figure A3

Scatter plot of standardized residual with standardized predicted value

