

**CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE**

**Faculty of Economics and Management**

**Department of Economics**



**Diploma thesis**

**Economic analysis of Nepalese Stock Index**

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# Economic analysis of Nepalese Stock Index

**CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE**

Faculty of Economics and Management

## **DIPLOMA THESIS ASSIGNMENT**

Chhabi Lal Kandel

Economics and Management

Thesis title

**Economic analysis of Nepalese stock index**

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### **Objectives of thesis**

Evaluate factors that influence performance of Nepalese stock index NEPSE. Assess how individual factors such as GDP, inflation, market cap, exchange rate and others influence this index.

### **Methodology**

Literature review is done using methods of extraction, synthesis, deduction and induction. Analytical section is done using methods of comparative analysis for the index. Also, methods of regression and time series analysis are utilized.

# Economic analysis of Nepalese Stock Index

## The proposed extent of the thesis

50-60 pages

## Keywords

financial sector, stocks , stock index, regression, Nepal

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## Recommended information sources

Heather Hammonds. 2006. Banking. Black Rabbit Books

McCauley, R. N., and S. Yeaple (1994): How Lower Japanese Asset Prices Affect Pacific Financial Markets, Federal Reserve Bank of New York, Quarterly Review. Spring.

Park, Y. C. (2002): Financial Liberalization and Economic Integration in East Asia, mimeo. Asian Development Bank Institute.



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Prague on 29. 03. 2016

# Economic analysis of Nepalese Stock Index

## **Declaration**

I hereby declare that I have worked on my Master Thesis titled “**Economic Analysis of Nepalese Stock Index**” by myself and I have used only the sources mentioned at the end of the thesis. As the author of the diploma thesis, I declare that the thesis does not break copyrights or any third person.

In Prague on 31<sup>th</sup> March 2016

.....

Chhabi Lal Kandel

# Economic analysis of Nepalese Stock Index

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# Economic analysis of Nepalese Stock Index

## Abstrakt

Tato práce zkoumá vliv makroekonomických proměnných na výkonnost Nepálského Akciového Indexu v období od 1994 do 2015. Během tohoto výzkumu bylo aplikováno několik empirických testů, aby byl vyzkoušen vliv vybraných makroekonomických veličin na výkonnost akciového indexu. Z empirického testu vyplývá, že hrubý domácí produkt, index spotřebitelských cen a inflace má kladný vztah na Nepálský Akciový Index, zatímco reálný směnný kurz a dummy proměnné D1 a D2 mají negativní vztah na výkonnost Nepálského Akciového Indexu. Toto naznačuje, že investoři v Nepálu skupují akcie jako zajištění proti inflaci a považují zásoby jako alternativní finanční nástroj. Test normality Jarque-Bera (JB) ukázal, že termínové chyby jsou obvykle distribuovány a model je signifikantní v různých úrovních důležitosti. Výsledek z testu jednotkového kořene naznačil, že všechny proměnné byly nalezeny stacionárně na úrovni a první rozdílnosti. Nakonec, Johansenovo ko-integrační test a Grangerův test kauzality byly provedeny za účelem objevit vztah mezi proměnnými v krátkodobém i dlouhodobém horizontu. Další významné zjištění ukázalo, že změny v oblasti životního a politického prostředí na akciový index a zákony mění Nepálskou Centrální Banku v oblasti půjček proti podílu zajištění.

**Klíčová slova:** Akciový Index, Nepál, Makro-Ekonomika, Hospodářský Růst, Akcie, Finanční sektor, regrese, směnných kurzů, akciový trh, inflace, hrubý domácí produkt

# Economic analysis of Nepalese Stock Index

## **Abstract**

This paper examines the effect of macroeconomic variables on Nepalese Stock Index performance from 1994 to 2015. This research applied several empirical tests to examine the impact of selected macroeconomic variables on Stock Index performance. From the empirical test, Gross Domestic Product, Consumer Price Index, inflation has the positive relationship with Nepalese Stock Index while real exchange rate, dummy variable D1 and D2 has a negative relationship with Nepalese Stock Index performance. This suggests that in Nepal share investors seems to take equities as a hedge against inflation and consider stock as an alternative financial instrument. The Normality Jarque-Bera (JB) Test showed that the error terms are normally distributed and the model is significant at different significance level. The result from unit root test indicated that all variables found stationary at level and first difference. Lastly, Johansen Co-Integration Test and Granger Causality test has been carried out to discover the short and long-run relationship between the variables. Another major finding of the environmental and political response in the stock index and the policies changes of Nepal Central Bank's on lending against share collateral has also been used.

**Keywords:** Stock Index, Nepal, Macroeconomic, Economic Growth, Stocks, Financial Sector, Regression, Exchange Rate, Stock Market, GDP, Inflation

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## List of Abbreviations

NEPSE	: Nepalese Stock Exchange
SEC	: Securities Exchange Center
SEA	: Securities Exchange Act
BSE	: Bombay Stock Exchange
SEBON	: Security Board of Nepal
CA	: Constitution Assembly
NRB	: Nepal Rastra Bank
MOF	: Ministry of Finance
GDP	: Gross Domestic Product
BFI	: Banks and Financial Institutes
INF	: Inflation
RER	: Real Exchange Rate
USD	: United State Dollar
NRs	: Nepali Rupees
E-views 9	: Econometric views 9
OLS	: Ordinary Least Square
IMF	: International Monetary Fund
ADF	: Augmented Dickey Fuller
PP	: The Phillips Perron
JB	: Jarque – Bera

# **1 Introduction**

Nepal is a landlocked country surrounded by India to the west and south and China to the north, which is one of the least of developing countries in the world. The Stock index plays the important role in the development of the country. Banks and Financial institutions are the key player in the stock market which uplifting the country's economy by creating opportunities for their stakeholders and adding value to the overall Gross Domestic Product.

## **1.1 Background of Nepalese stock index**

The stock market is one of the vital parts of capital markets in the country economy. The history of a stock market is not so large in Nepal compared with other neighbor countries. Securities Exchange Center (SEC) was established in 1976 with an objective of facilitating and promoting the growth of capital market (Gurung, 2004). However, In 1981, Nepal Rastra Bank opened its floor for the trading of shares, which was only for government bonds (NRB, 1996). Securities Exchange Act 1984, Securities Exchange Center opened its corporate share trading also, but it was in limited. The basic objective of NEPSE is to convey free marketability and liquidity to the government and corporate securities by facilitating the transaction in its daily trading floor through a member, market intermediaries, such as the broker, market makers, etc. Nepal Stock Market was established to promote the mobilized capital alternative to traditional banking sector for economic growth and development in the country.

The NEPSE opened its trading floor on 13 January 1994; until on 4, April 2015 number of listed companies is 232, which include sub- indicator of macroeconomic variables such as commercial banks, hydropower, insurance companies and finance companies. Whereas, Nepal stock exchange has registered 61 brokers as of July 2015. The NEPSE index is primary all equity market index of NEPSE. Within a short timeframe since its beginning, the NEPSE index witnessed significant ups and downs. In recently, after the results of the second CA election in November 2014, the NEPSE index took increasing trend until August 2014. On July 14, 2014, the benchmark index goes up to 1036.1, the highest in the last six years. The

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Past on August 31, 2008, the Nepalese stock exchange index had reached its all-time high of 1175 points earlier plunging to a record low of 292 on June 15, 2011, due to the banking crisis. In 2011, some development bank and commercial banks faced liquidity crises and caused panic in the general public (Kandel, 2012/13).

The government of Nepal, Nepal Central Bank, Nepal Industrial Development Corporation and members are the shareholders of NEPSE. NEPSE have nine boards of directors by Securities Exchange Act, 1983; six directors nominated by the government of Nepal and different institutional investor. Two from the licensed members and the General Manager of the NEPSE is Ex-Officio Director of the Board. The Members of NEPSE are permitted to act as intermediaries in buying and selling of Government Issue bonds and listed corporate securities. At current, there are 28 member brokers and three market makers, who operate on the trading floor as each the Securities Exchange Act, 1983, rules and regulation of the exchange.

NEPSE provide the online trading system for buy and sells the stock. It means transactions of securities are conducted using the Internet. It helps promote investment in a country economy. Withal, a rapid increase in the stock market index is always a matter of concern. If the rise in the index is no justified by the fundamentals, such an increase cannot be sustained, and eventually, the index collapses the economic and financial stability of the country. So, it is essential that the central bank keeps eyes on the stock market development and be ready to take appropriate measures, if needs arise, to avoid the accumulation of bubbles and collapse in the stock market. For this, it is necessary to know the relationship between the stock market index and the factor that influence it. The stock market is affected by several factors. Effect on cash flows of firms goes directly impact on the stock exchange and shares in the discount rate. However, those factors are affecting to the degree will differ from country to country, depending on the trading size, type and other characteristics of the economy and the market. Through this content, this paper aims to analyze the relationship between the performance of NEPSE index and major macroeconomic variables in Nepal using annual data that span from mid-August 1994 to mid-July 2015. In addition to main variables, this thesis also assesses the impact of changes in politics and Nepal Central Bank's policy on lending

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against share collateral. It expects that the findings of this study will provide some remarkable visions to understand the determinants of the performance of Nepalese Stock market useful for both policymakers and investors.

Furthermore, in the development observation of the Nepalese stock market history of equity market has hardly entered the first stage. Due to current political and economic instability, a weak regulatory framework of a stock exchange and absence of growth-oriented policies has failed to gain investors' courage. Unavailability of timely information and poor supervision and monitoring has made the stock market highly risky for global investors. Investors have not yet accepted investment in inventory as an alternative to bank deposits and government securities except in the case of stock of some commercial banks (K.C. and Snowden, 1997: 1083)

The stock market is a barometer of the Nepalese economy. Growth in stock index is regarded as a good symbol since it implies the investors are confident about the future prospect of the economy. There are many types of research have been done on the performances of stock market analysis such as Yosuf and Majid (2007), Asprem (1989), Yosuf and Majid (2007), Rahman et al. (2009)), Singh (2010), Hsing (2014), Quadir (2012), Eita (2012), Jauhari and Yadav (2014), Naik and Padhi (2012), and Khan (2014). Very few studies have been complete on the Nepalese stock market such as Dangol (2010), Bhatta (2010), Pradhan and KC (2010). These research mainly focused on micro perspective rather than macro and policy perspective. This study differs from them since we have examined the impact of macroeconomic variables as well as the impact of politics and NRB's policy changes on the stock market performance.

## 1.2 Regulation of Security Markets

Securities Board (SEBON) of Nepal is the superlative body to regulate the Nepalese stock markets. It was established on 26 May 1993 under the provision of the Securities Exchange Act, 1993. The primary objective of the board is to promote and protect the interest of investors by regulating the securities markets, Not only these, to regulate, monitor, direct and coordinate the entire capital market is also the objective of the SEBON. SEBON works

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under the Ministry of Finance (MOF). SEBON regulates both primary and secondary markets. To regulate primary markets different acts and laws have been approved. The public issue activities through the central market are governed by the Securities Exchange Act, 1983, the regulation and guidelines are made under the act as well as the Company Act, 1997. The related rules and directives are Securities Exchange Regulation 1993, Securities Registration and Issue Approval Guidelines, 2002 and Securities Share Guidelines, 1997. Similarly, to regulate the public issue it has made it mandatory to take services of an issue manager by the issuing companies. To control markets as well as the members, different Acts like Member of Stock Exchange and Transaction Byelaws 1998, and securities Listing Byelaws 1996 have been passed. SEBO also monitors whether the activities carried out by the NEPSE are by the above laws or not. Similarly, SEBO regulates all the members of the secondary as well as primary markets like issue managers, stock brokers, dealers, market makers and corporations.

## 1.3 Statements of the Problems

Development of stock market, in particular, is a must for a stable industrial development of the country. Capital market institutions support to mobilize the remaining unit into the deficit units for productive investments. It is an active instrument of expanding production capacity of the country. Due to the lack of information and poor knowledge investors are manipulated or exploited by the financial institutions or other market intermediaries such as extent that investing in common stock is extremely hazardous. Investor's attitude and perception play a vital role in an analytical decision which influenced by the knowledge and access to the data required for the analysis. Most of the Nepalese investor invests their fund in single securities due to less knowledge about risk-return behaviors of the securities.

The evolution of the stock market in Nepal is both challenging and arduous. The problem likes the lack of professionalism in brokers, independent buyers and sellers, well-trained manpower; management postponement of shares, rational investor exists from Nepalese stock market. Because of evolving nature, Nepalese stock market is not effective enough to evaluate the price of stock. No, any private open investment companies are operating at a present time. Therefore, the government needs to create incentives for capital mobilization remove impediments to private sector development and provide necessary legal,



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regulatory reforms. The companies used different rules and regulation in stock market development. There is no any act provide by the government to the public sector. The Central Bank of Nepal makes an individual institute incorporates under a special charter governs accountancy profession.

The connection between macroeconomic variables and the stock index performance in the developed country had well studied over the past decades. Shubita and AL-Sharkas (2010) study on the relationship between macroeconomics factors in stock return of New York Stock Exchange while Tangjitprom (2012) investigate the macroeconomic factors that influence Thailand stock market. Therefore, it is motivated to conduct the research in Nepalese stock market determine the macroeconomic variables that significantly affect Nepali stock market performance since there is only a few research on developing the country.

In conclusion, the focus of this research is to identify how the macroeconomic variables affect the stock index performance in Nepal.

## **1.4 Importance of the Study**

This study focused on analyzing the performing effect on the stock index of Nepal though macroeconomic variable. From the stock market effect, many shareholders who are directly and indirectly dealing with the securities system can have an advantage from this research. If the investor invests in the stock market then investors require proper knowledge of share price i.e. How it is formed ? What is the future expected return? What factor are responsible for the determination of its price and so on. A few studies have been done regarding securities listed in NEPSE. However, most of the studies made up to present capital structure analysis, dividend policy and risk and return of stock price. This research aims to identify the factors respective for performances of the stock index and their relationship with macroeconomic variables so that it will give a better observation into the stock market. Moreover, this study is proposed to meet the following objectives;

- To examine the performance of Nepalese Stock Index.
- To identifies the existing problems and challenges faced by the Nepalese Stock Index.
- To analyze prospects of Nepalese stock index.

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## 1.5 Research Question

- 1). How do the macroeconomic variables affect the Nepali Stock Index?
- 2). Does the exchange rate (NRs/USD) have a significant effect on Nepali Stock Index performance?
- 3) Does the inflation rate (CPI) have a significant effect on Nepali stock index performance?
- 4) Does the Consumer Price Index have a significant effect on Nepalese stock index performance?
- 5). Does the Environmental & political and Nepal Central Bank lending policy event have a significant effect on Nepali stock index performance?
- 6) Do the variables are stationary?
- 7) Do the dependent variables and independent variables possess Granger causality relationship in the short run?

## 1.6 Hypotheses of the Study

The chosen macroeconomic variables in this research to represent dependent variable are Nepalese stock index (SI) independent variables are Gross Domestic Product (GDP), Consumer Price Index (CPI), Real Exchange Rate (NRs/ USD) and Inflation (INF). Furthermore, we include two dummy variable environmental and political events and the NRB policy changes events. Also, Nepalese Stock Index (NEPSE) is chosen to capture the stock market performance in Nepal.

### 1.6.1 Gross Domestic Product

H0: There is an insignificant relationship between Gross Domestic Product and stock index performance.

H1: There is a significant relationship between Gross Domestic Product and stock index performance.

# Economic analysis of Nepalese Stock Index

GDP is the overall measure of the fulfillment of an economy, and there is a close and important relationship between GDP and stock index return. There are many studies have been investigated the effects of GDP on stock returns empirically. The most cited studies are Fama (1990), Investigated the relationship between GDP and the stock market performance using US data between 1953 and 1987. According to Fama (1990), the standard valuation model posits three sources of variation in stock returns: i) shocks to expected cash flow, ii) predictable return variation due to variation through time in the discount rate that price expected cash flows, and iii) shocks to lower costs. He found that variables that are proxy for expected returns and expected return shocks captured thirty percent of the variance of annual NYSE value-weighted returns. Whereas, Growth rates of production used to proxy of shocks to expected cash flows, explain forty-three percent of the return variance. The combined explanatory power of the variables is about fifty-eight percent.

## 1.6.2 National Consumer Price Index

H0: There is an insignificant relationship between consumer price index and stock index performance.

H1: There is a significant relationship between consumer price index and stock index performance.

Consumer price index used as a proxy for inflation. The relationship between consumer price index and stock returns can be positive or negative depending on whether the economy is facing unexpected or expected inflation. Inflation happens when demand exceeds supply, causing an increase in prices to stimulate more supply. Since this expected by the firms, increase in prices would also enhance their earnings which would lead to them paying more dividends and hence increase the price of their stocks. On the other hand, when inflation is unexpected, an increase in price will lead to the growth in the cost of living, and this will shift resources from investment to consumption. Naturally, if inflation rises, nominal interest rates will also increase. The discount rate used to regulate intrinsic values of stocks will therefore increase, and thus this will reduce the present value of net income leading to lower stock prices. This negative relationship between unexpected inflation and stock prices is

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hypothesized by Fama (1981) as the relationship between unanticipated real activity and inflation in the economy.

## 1.6.3 Exchange Rate

H0: There is an insignificant relationship between exchange rate and stock index performance.

H1: There is a significant relationship between exchange rate and stock index performance.

Exchange rate refers currency converter rate to a different currency. This research employs the exchange rate of Nepali Rupees against US dollar (NRs/USD). According to Kibria et al (2014), the stock returns and exchange rate have an organization. The foreign investors will pull back their investment during the depreciation of investing country's currency. Therefore, it will increase the cash outflows of the country, decrease the foreign direct investment in stock market and hence decrease the stock price. This result is consistent with Ouma and Muriu (2014) also found that the depreciation of local currency will decrease the stock price. For the import-dominated country, the cost of the production will increase when the exchange rate increase. So, the profit of the state will decrease and decline the stock market performance. So, we expect that H1 statement is supported.

## 1.6.4 Inflation, on Consumer Price

H0: There is an insignificant relationship between inflation and stock index performance.

H1: There is a significant relationship between inflation and stock index performance.

Many countries in the world are facing the accession of the commodity price due to an economic and political event such as economic growth, financial crisis, speculation attack and war. This increment of commodity price named inflation. We can find much research on this variable macroeconomic effect on the stock market. An increase in inflation will bring uncertainty and discourage future economic activity (Eita, 2012). Furthermore, high inflation will increase the potential investors' living cost and thus shift the monetary resources from

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investments to consumption (Adam & Tweneboah, 2008). Thus, the inflation is expected to have a significant effect on stock market performance in Nepal.

## **1.6.5 Environmental and Political Events (Dummy)**

H0: There is an insignificant relationship between Environmental and Political Events and stock index performance.

H1: There is a significant relationship between Environmental and Political Events and stock index performance.

Disaster and political events will be including in this research as the qualitative variable. In Nepal, government spending on CA election during 2009 to 2014 was more enough. Constitution election was failed two times and finally proved on 20 September 2015. Last year earth quack made big disaster to Nepal. Economic policy will be reconsider based on the cabinet's perspective of a future economic trend. Furthermore, country politics have the significant effect on income distribution and prosperity which will affect the activities in the stock market (Alesina & Jeffrey, 1987). The uncertainty that comes from the general election will influence the investor's perspective on the future stock market movement.

## **1.6.6 NRB Policy Change (Dummy)**

H0: There is an insignificant relationship between Policy Change events and stock market performance.

H1: There is a significant relationship between Policy Change events and stock market performance.

The Central Bank of Nepal, NRB plays the vital role in the stock exchange. All Bank and financial institutions (BFIs) are under the Nepal Rastra Bank; NRB provides a license to the stock market to work in the market. I will test the data of the policy change through events and finalize effect of dummy variables.

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## 1.6.7 Significance of the Study

The stock market recognizes the situation of the country economy. When the stock market is growing the economy is healthy and when the stock market is declining the economy is bad. Equity markets have a direct relation to the economic growth. Economic increases come with more gaining capacity, opportunities to save and also the chance to invest. It must note that economic growth is, to a significant degree, dependent on the industrialization of a country.

It performs the study to find out the problem, prospects and growth in the near future. What policies can be regulated? What formulated and those acts are needed and necessity of reforms regarding the rules and regulation to develop it and make the perfect market functioning? The standard is one of the elements of stock market development. The financial statement should maintain accordingly which fulfill the requirement of related parties needed information.

This study will be useful to the university students who are curious to know about the current status of Nepalese stock index, its growth, issues and challenges of the stock market.

## 1.7 Limitation of the Study

The study tries to explore the Economic analysis of Nepalese Stock index. Data are analysis through empirical research from the different empirical test. Data are collection from the Central Bank of Nepal, World Bank and SEBON from the 21 yearly data observation. The study covers only the past and present state of the stock market in Nepal and the future forecasting of the stock index.

# Economic analysis of Nepalese Stock Index

## 2 Objectives and methodology

### 2.1 Introduction

This section deals with macroeconomic variables, Gross Domestic Product, Consumer Price Index, Real Exchange Rate, Inflation, environmental, political and Nepal Rastra Bank events on Nepal stock market performance. This research consists dependent variable, independent variables and dummy variables. This study will cover from 1994 to 2015 and included 21 observations for the sample size. All the data except for dummy variable derived from the World Bank Data, Nepal Rastra Bank and Government of Nepal Ministry of Finance and Security Board of Nepal. The date of the dummy variables arising from the journals, news and official website. Some econometric tests are carried out to ensure the model is fulfilling all the assumptions of Classical Linear Regression Model to achieve Best Linear Unbiased Estimator (BLUE) for all the variables included in this research.

### 2.2 Data and sample collection

Data collected on the availability and their relevancy as guided by the literature and the considering the features of the Nepalese stock index. Following data are taken to examine the performance of the stock market in Nepal.

# Economic analysis of Nepalese Stock Index

**Table 1. Variables and their description**

Variable	Description	Unit
SI	NEPSE Index	
GDP	Annual real GDP	In billion US\$
CPI	Consumer Price Index, monthly average	
RER	Real Exchange Rate	Percent in US\$
INF	Inflation, on Consumer Price	Annual Percentage
D1	Environmental and Political Event Dummy ( takes value one if negative scenario, zero if it is relaxed )	
D2	NRB Policy Change Dummy (takes value one if margin lending is tightened, zero if it is relaxed)	

Given table shows the macroeconomic variables other than the monetary policy tools mentioned above. The level of real economic activities is also crucial in determining stock market performance and the scale of returns. One of the most important measures for such activities is the gross domestic product (GDP), Consumer Price Index, Real Exchange Rate, and Inflation this macroeconomic indicator also affects the stock market returns. All the data calculated on monthly basis.

## 2.3 Model design

The selected macroeconomic variables explain the stock index analysis. The model will be developed for the time series data to explain the factors influencing the performance of the Nepalese Stock Index and to find the correct estimation. The study has used the following estimation model.

$$SI_t = f(GDP_t, CPI_t, RER_t, INF_t, SI_{t-1}, D1, D2) \dots\dots\dots (1)$$



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In the chosen behavioral model 1, the macroeconomic variables NEPSE (SI) is the endogenous variables and Gross Domestic Price, Consumer Price Index, Real Exchange Rate, Inflation in consumer price are exogenous variables. Where the following symbols described in the table one, the two dummy D1 and D2 have introduced the impact of environmental & political changes and the NRB's policy changes.

In my research, all the hypothesis testing and diagnostics checking will be run by using E-views 9 software. The main function of E-views 9 software is to perform an econometrical and statistical analysis. It is suitable for this research since this software developed by the researchers which are using time series data, cross-section or longitudinal data and this research is focus more on the time series data. E-views can help to manage and run the data efficiently, and it combined with the flexible and consumers oriented technology and interface.

However, the model used in this research, Ordinary Least Square (OLS) model is suitable to run by using E-views due to its features comprise of OLS method. The result of the OLS can use to test in the other normal tests like t-test and F-test to check the significance of the variables and model. The additional, Johansen Co-integration test and Granger casualty test for the long run or short run relationship between the variables, to run this test E-views software is used.

## 2.3.1 Ordinary Least Squares

Carl Friedrich Gauss founded the method of ordinary least squares (OLS) in 1795. According to Hutcheson (2011), the OLS procedure is the simplest type of estimation procedure used to analyze data and forms the fundamentals of many others technique such as Generalized Linear Models and Analysis of Variance (ANOVA). It is the one of the most general and powerful methods of regression analysis for it can trace the model assumptions such as constant variance, linearity and the effects of outliers easily by using the simple graphical methods (Hutcheson, 2011).

The OLS estimators would have the Uniformly Minimum Variance of all unbiased estimators (UMVU) if it fulfilled all the assumptions overhead (Michaelmas, 2010).

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## 2.3.2 Heteroscedasticity

Based on William (2002), heteroscedasticity problem refers to inconsistent variances of the error term in the model. Heteroscedasticity normally caused by model misspecification, measurement error and nature of data. Heteroscedasticity will come out with three consequences on OLS estimators. First, the coefficients of OLS estimators remain constant and still unbiased as the independent variables are uncorrelated with the error terms. Second, the estimators of OLS become inefficient due to higher variance. Finally, heteroscedasticity tends to underestimate the variances and standard errors and hence none of the hypothesis testings, neither T statistics or F statistic is reliable (Long & Laurie, 1998). When the heteroscedasticity problem occurs, there are two types of remedial measures can be applied to solve this problem, which is Weighted Least Squares (WLS) and Generalized Least Squares (GLS).

The hypotheses for this test stated as below:

***H0: There is no heteroscedasticity problem.***

***H1: There is heteroscedasticity problem.***

The level of significant,  $\alpha$  is 0.05. The decision rule is to reject H0 if the probability value is lower than  $\alpha$  value. Otherwise, do not reject the H0.

## 2.3.3 Autocorrelation

Autocorrelation means that there is a relationship among error terms. In another word, the error terms of the observations are related to each other. The regressions must fulfill all the assumptions of Classical Linear Regression Model (CLRM). One of the CLRM assumptions is no autocorrelation or serial correlation between the error terms. There are two types of autocorrelation which are perfect serial correlation and impure serial correlation. The good autocorrelation happens due to the underlying distribution of the error term of an original specification of an equation. In contrast, the impure autocorrelation is made by the specification bias functional incorrect form and omitted variables. There are two ways to detect the problem which is using the Durbin's h test and Breusch-Godfrey LM test for the research which is using the time series data (Gujarati & Porter, 2009).

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The hypotheses for this test stated as below:

***H0: There is no autocorrelation problem.***

***H1: There is autocorrelation problem.***

The test statistic for Durbin's h test stated as below:

$$h = \left(1 - \frac{d}{2}\right) \sqrt{\frac{n}{1 - n(SE(\gamma))^2}}$$

The decision rule of Durbin's h test is H0 will be rejected if the test statistic value is more than upper critical value or less than lower critical value. Otherwise, do not reject the H0.

While the test statistic value for Breusch-Godfrey LM test is:

$$(n - P)R^2$$

The decision rule is to reject H0 if probability value is lower than  $\alpha = 0.05$ . Otherwise, do not reject the H0.

## 2.3.4 Normality Test

The function of normality test is to examine the normal distribution of disturbance in the model. Disturbance, also named error term is the random variable that represents the factors that also affect the stock market index but is not taken into account. This research has applied Jarque-Bera Test to carry out normality test. Jarque-Bera Test was named after Carlos Jarque and Anil K. Jarque-Bera Test was computed based on skewness and kurtosis measure of the OLS residuals (Jarque & Bera, 1987).

The hypotheses for this test stated below:

***H0: Error terms are normally distributed.***

***H1: Error terms are not normally distributed.***

The decision rule is that reject H0 if probability value is lower than the significant level,  $\alpha = 0.05$ . Otherwise, do not reject the H0.

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The test statistics of Jarque-Bera (JB) Test is stated as below:

$$JB = n \left[ \frac{S^2}{6} + \frac{(K - 3)^2}{24} \right]$$

Where,

n = Sample Size

S = Skewness

K= Kurtosis

## 2.3.5 T-Test

William Sealy Gosset (1908) had developed the t-test statistic. This statistic is used to examine whether the independent variables which consist of Gross Domestic Product, Consumer Price Index, Real Exchange Rate, Inflation and environmental & political event and NRB policy event are individually significant in illustrating the dependent variable, Nepal Stock Index (SI) in this research. According to De Winter (2013), T-test statistic is suitable for the researchers that have extremely small sample sizes in which the number of parameters is less than or equal to five. However, this test statistic cannot check the overall performance of the model. T-test statistic is based on one of the assumptions which are the error terms are normally distributed. This research will use the E-views 8 to conduct the T-test statistic, and the values of each parameter will be showed out. Besides that, the p-value of every parameter can also be acquired from the output (Gujarati & Porter, 2009).

The hypotheses for this test stated as below:

***H0: There is no significant relationship between the independent and dependent variable ( $\beta_i = 0, i = 1, 2, 3, 4, 5$ ).***

***H1: There is a significant relationship between the independent and dependent variable ( $\beta_i \neq 0, i = 1, 2, 3, 4, 5$ ).***

The test statistic for T-test is stated as below:

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$$t = \frac{\hat{\beta}_i - \beta_i}{se(\hat{\beta}_i)}$$

The decision rule of this test is to reject H0 if the test statistic value is smaller than lower critical value or larger than upper critical value or the probability value is lower than the significance level,  $\alpha = 0.05$ . Otherwise, do not reject H0.

## 2.3.6 F-Test

Ronald Aylmer Fisher (1924) had developed the F-test statistic which used to measure the significance of the entire model. By using the E-views 9, the F-test statistic value and p-value can be obtained from the output (Gujarati & Porter, 2009).

The hypotheses for this test stated as below:

***H0: The overall model is insignificant.***

***H1: The overall model is significant.***

The decision rule of F-test states that the H0 will be rejected if F-test statistic value is lower than the lower critical value or higher than the upper critical value or the probability value is lower than the significance level,  $\alpha = 0.05$ . Otherwise, do not reject the H0.

## 2.4 The unit root test

Unit root tests can be used to determine if trending data, data that must be the first difference on deterministic functions of time to render the data stationary. An important econometric task is to identify the most appropriate trend in the data. For example, in ARMA modeling, the data must be transformed to stationary from the past to analysis. If the data are trending, then some form of trend removal is required. Two common trend removal procedures are first differencing and time-trend regression. The First, differencing is appropriate for I (1) time series and time-trend regression are suitable for trend stationary I (0) time series. The properties of stationary time series can also express in equation term as below:

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Constant mean:  $E(y_t) = \mu$

Constant Variance  $var(y_t) = \sigma^2$

Additionally, economic and finance theory often suggests the existence of long-run equilibrium relationships among non-stationary time series variables.

The hypotheses for this test are:

***H0: All variables are not stationary and have a unit root.***

***H1: All variables are stationary and do not have a unit root.***

In this research, the H0 will be rejected if the probability value of unit root test is less than the significant level,  $\alpha = 0.05$ . Otherwise, do not reject H0.

## 2.4.1 Augmented Dickey Fuller Test (ADF)

The ADF test tests the null hypothesis that a time series  $y_t$  is I(1) against the alternative that it is I(0), assuming that the dynamics in the data have an ARMA structure. Said and Dickey (1984) augment the basic autoregressive unit root test to accommodate general ARMA(p, q) models with unknown orders and their test is referred to as the augmented Dickey Fuller (ADF) test. The ADF test is based on estimating the test regression

$$y_t = \beta^{D_t} + \phi y_{t-1} + \sum_{j=1}^p \phi_j \Delta y_{t-1} + u_t$$

Where,  $D_t$  is a vector of performances terms or constant errors. The p lagged difference terms  $\Delta y_{t-1}$  are used to estimate the ARMA structure of the errors, however, the value of p is set so that the error  $u_t$  is serially uncorrelated. The error term is also assumed to be homoskedastic. The specification of the deterministic terms depends on the assumed behavior of  $y_t$  under the alternative hypothesis of trend stationary is described. Under the null hypothesis,  $y_t$  is I(1) which implies that  $\phi = 1$ .

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## 2.4.2 Phillips Perron (PP).

Phillips and Perron (1988) developed a sum of unit root tests that have become general in the financial time series analysis. The Phillips-Perron (PP) unit root tests differ from the ADF tests mainly in how they deal with serial autocorrelation and heteroskedasticity in the errors term. In specific, the ADF tests use a parametric autoregression to approximate the ARMA structure of the errors in the test regression; the PP tests ignore any serial correlation in the test regression. The test regression for PP tests is

$$\Delta y_t = \beta^{D_t} + \pi y_{t-1} + u_t$$

Where  $u_t$  is  $I(0)$  and may be heteroskedastic. The PP tests correct for any serial correlation and heteroskedasticity in the errors  $u_t$  of the test regression by directly modifying the test statistics  $t_{\pi=0}$  and  $T\pi$ .

## 2.5 Johansen Co-integration test

Based on Gujarati and Porter (2009), co-integrated occur when two or more time series variables are integrated and non-stationary in the same order. The Johansen Co-integrating test is a test for determining the number of co-integration that allows for more than one co-integration relationship. Moreover, this test is used to examine whether the cointegration vectors hold the long run equilibrium relationship. “Trace Test” and “Maximum Eigen value Test” are the two types of Johansen test used to estimate the co-integration ranking. Johansen Co-integration test is Vector Error Correction Model (VECM) will only apply in this research when the selected variables are co-integrated. When there is Co-integration, it stated that the selected variables have the long run equilibrium relationship.

The hypotheses of this test stated as below:

**H0: There is no long-run relationship between the variables.**

**H1: There is a long-run relationship between the variables.**

The decision rule is to reject H0 if the probability value is lower than the level of significance,  $\alpha = 0.05$ . Otherwise, do not reject H0.

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## 2.6 Granger Causality Test

Granger Causality Test is formed to examine whether a time series regression is useful in forecasting and define the ability to estimate the future values of a time series adopting past values of another time series (Granger (1969)). The test is appropriate in time series data analysis for examining the short run causality effect between the variables. An independent variable is held to granger cause the dependent variable through a series of t-test and F-tests on lagged values of the independent variable in the short run analysis. Later, this test is suitable for the research to study the causal relationship between the dependent variable and independent variables individually. By adopting this test, it can also assist the research in determining the unidirectional or bidirectional causality between the variables. Though, this test will not show the positive or negative sign for the causal effects (Gujarati & Porter, 2009). To examine the Granger causality between the variables, the Wald F test used in this research.

The hypotheses of this test are stated as below:

***H0: Variable X does not Granger causes the variable Y.***

***H1: Variable X does Granger causes the variable Y.***

The test statistic for Wald F test stated as below:

$$F = \frac{(SSE_{reduced} - SSE_{full}) / (SSE_{full} - SSE_{reduced})}{SSE_{full} / (n - K_{full} - 1)}$$

The decision rule of Granger Causality is to reject H0 if the test statistic value is more than the critical value or the probability value is less than the significance level,  $\alpha=0.05$ . Otherwise, do not reject H0.



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## 3 Literature review

### 3.1 Macroeconomic Variables and Stock Market

In the global contexts, there are many research papers, articles, books and journals relating to the capital market and organized stock market. Similarly, some of the major determinants of the stock price in various stock exchanges have been identified. Although the capital market is not well developed in Nepal, there are different researches made on it. It is very infancy; the factor which affects the stock price of large and well-developed stock market may vary from that of NEPSE. Nonetheless, some of the common elements are worldwide. The stock market is affected by lots of factors, main factors political, environmental and social rumored. Several studies have been conducted in recent years to analyze the relationship between the stock market index and macroeconomic variables.

According to Singh (2010) in the stock index, the stock price movements are influenced by macroeconomic factors, social or political events, market expectations about the future exchange rate and the economic growth path, monetary and fiscal policy announcement and others. Higher money supply leads the country economic growth. In the case of money supply Mukherjee and A. Naka (1995) argue that if an increase in money supply leads to economic growth, stock prices will benefit from the expansionary monetary policy.

Darrat (1990) found that budget deficits, long-term bond rates, the amount of industrial production and the volatility of interest rate have an impact on the stock returns. The Arbitrage Pricing Theory, introduced by Stephen A. Rose (1976), establishes the theoretical framework to link stock expected returns with several sources. Macroeconomic variables are selected to examine the performances of the stock market trend to differ slightly across studies (Rahman et al, 2009). This section will present some empirical evidence on analysis the performance of stock index in different countries. Scholars have considered different variables to explain the moment of stock returns, where there is no one –size-fit situation.

In the context of Nepal, Bhatta (1996) in his thesis paper “Assessment of the performance of listed companies in Nepal” concludes that a highly significant positive correlation ship has been addressed between risk and return division of the enterprise.

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Investors expect a higher return from that stock, which associates increased risk. Moreover, his next study on “Dynamic of Stock Market in Nepal” revealed that resource mobilization has a dynamic role in the developing economy like Nepal. The development of Stock Market in Nepal is a must for the resource mobilization. There are various problems of Nepalese Stock market, which have checked the mobilizing resources in the economy (Bhatta’s, 1997). Pant (2000) has analyzed the “Current Status and Problems of Stock Market in Nepal” with an objective to analysis the problems and trends of a present state of Nepal Stock Market and provide a measurement of the improvement of a stock market. The researcher frequently used secondary data collected from books; company Act, Official records of the NEPSE, Securities listings By-laws, Act, Government publication, etc. She found in her study that the development of stock market primarily depends on the government policies and program and their proper implementation. So, the government should develop an acceptable policy framework to increase the demand for the supply of securities.

This section presents empirical evidence on the performance of stock market index in different countries. There is no size fit situation where the scholar has considered different variables to explain the movement of stock indexes. Some studies have tried to examine the relationship between the NEPSE index and the macroeconomic variables in the literature and found different variables determining the performance of the stock index. In a recent study by covering three South Asian countries such as Pakistan, India and Sri Lanka, Aurangzeb (2012) identified the factor affecting the performance of the stock market in South Asia using the data from the period of 1997 to 2010. They originate that significant positive impact on foreign direct investment and exchange rate on the performance of stock market. On the other hand, they found the significant but negative impact of interest rate on the performance of the stock exchange, but the insignificant impact of inflation. Inflation is also an important variable in the stock market that investor consider before making an investment decision on the stock. Hypothetically, Asprem (1989) put forward that inflation should be positively related to stock return if stocks provide a hedge against inflation. According to Fisher (1930) who posits that equity markets are independent of inflation expectations since equities are claimed against actual assets of the company. Even though, Fama (1981) disagrees with the generalize Fisher hypothesis on the basis that an increase in inflation cause uncertainty and reduces future

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economic activity, which reduces the stock price. In comparison, Fama (1981) argues that an increase in money supply lead to the country economy to inflation, which in turn increases the discount rate and lowers the stock market returns. Nearby the study of Hsing (2014) to the Estonian and Hungarian stock market index have a positive relationship with debt/ GDP ratio, real GDP and German stock market index and the negative relationship with the exchange rate, the domestic interest rate, the expected inflation rate and the euro area government bond yield.

The case study of Namibia by Eita (2012) an increase in economic activity and the money supply increase stock markets prices, while an increase in inflation and interest rate decrease stock prices. However, the result suggests that equities are no a hedge against inflation in Namibia, and Contractionary monetary policy depresses stock prices. In Jordon, money supply, gross capital formation, inflation, and credit to the private sector have a significant positive relationship, and income and net remittance have a negative correlation with the stock market (El-Nadar, 2013). Furthermore, there is a co-integrating relationship of Malaysian stock market index with changes in money supply, interest rate, exchange rate, reserves and industrial production index (Rahman et al, 2009). In the case of India, the macroeconomic variables like GDP, capital information, industrial output, savings, gold price, money supply, exchange rate, and interest rate have concurrence with the variability of the Sensex index (Jauhari, S. and H. S. Yadav, 2014). On the other side, Naik et al, (2012) also examined the Indian stock market index (BSE Sensex) and observed the positive relationship between stock price and money supply and industrial production but negative correlation with inflation.

The prices will largely determine recent Inflation in neighboring India through international fuel prices, food prices, and rigidity in the supply blockades. In the fiscal year 2013, inflation was 9.9%, up from 8.3% in the fiscal year 2012. Meanwhile, in the financial sector, a market correction is ongoing in real estate and housing prices, and the BFIs are adjusting their loan portfolios to comply with the NRB's directives. Aiming to consolidate the BFIs and reduce their numbers, the NRB and the Ministry of Finance MOF are encouraging mergers. The government is also planning to introduce stricter regulations and supervision of

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proliferating credit and savings cooperatives, whose risky deposit and lending behavior might negatively impact the financial sector at large and, through it, the real sector. Assuming a steady increase in the growth of remittances and tourism receipts, the balance of payments will remain positive.

Osei (2006) investigates both the short run and the long run relationships between the Ghana stock market and macroeconomic variables. The study estimates that there is cointegration between the macroeconomic variables and Ghana stock market. The results of the short run dynamic analysis and the evidence of cointegration mean that there are both long run and short run relationships between the macroeconomic variables and the index. Regarding Efficient Market Hypothesis (EMH), the study establishes that the Ghana stock market is scholarly inefficient particularly on inflation, Treasury bill rate and world gold price.

Another variable of interest used in the literature is the real exchange rate. The real exchange rate influences the firm's cash flow and the amount of dividend to be paid, especially in the open economy (Eita, 2012). The 'exchange rate channel' by Pan Ming-Sun et al, (2007) is consistent with the 'flow oriented' exchange rate model, introduced by Fisher (1980). They confirm that real exchange rate movements initially affect the international competitiveness and trade position, followed by the actual output of the country, and finally affects the current and future cash flows of companies, which can infer from the stock price movements. In brief, both exchange rate channel and flow oriented model hypothesize that a depreciation (appreciation) of a local currency leads to increase (decrease) in the firm value of transferring firms and vice versa for the importing firms. Even if a firm does not directly involve in the export-import business, Adler (1984) show domestic enterprises that have minimum international activities can still be affected by the real exchange rate movements if their input prices, output prices, or product demand depends on the fluctuation of exchange rate. To outline, the impact of exchange rate on stock price depends on the importance of a nation's international trade in its economy as well as the degree of the trade balance. However, higher interest rates or discount rates would reduce the present value of cash flows, which would reduce the attractiveness of investment, later, shrinks the value of stock returns (Rahman et al, 2009). The additional impact could be through portfolio replacement, a rise in

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the interest rate increases the opportunity cost of holding cash, which later on leads to a substitution effect between stocks and other interest-bearing securities like bonds (Rahman et al, 2009). In the literature, the common interest rate proxies are the treasury bills rates as being employed by Mukherjee et al, (1995), Yusof R. M et al, (2007), and Eita (2012).

Investigate the effects of macroeconomic variables such as Treasury bill rate and industrial production on stock returns on Dhaka Stock Exchange for the dated between 2000 and 2007 using monthly series data by applying Autoregressive Integrated Moving Average (ARIMA) model (Quadir, 2012). Though the results show a positive relationship between the selected variables and stock market returns, the coefficients are statistically insignificant. The typical interest rate substitutions are the treasury bills rates and the interbank rates as being employed by Mukherjee et al, (1995) Maysami (2000) and Hooker (2004). Another new measure for the interest rate is the yield spread. Accept the yield spread to measure the term structure effect on the Taiwanese hotel stock return (Chen MH et al, 2005). Their yield spread is derived from a subtraction of 10-year government bond yield and 3-month treasury bills rate. Their result shows that yield spread is not a significant determinant of stock prices. Due to the point highlighted by Mukherjee T.K et al, (1995) who propose that changes in both short and long-term rates are expected to affect the discount rate in a similar way.

One of the most significant variables in the stock market is a monetary unit, the level of real economic activity is the key factor in determining the stock market returns (Rahman et al, 2009). There is a consensus that an increase in economic activity causes stock market returns to increase Eita (2012). The traditional measure of real economic activity is the gross domestic product (GDP) of the given country. Unfortunately, data on GDP is on an annual basis and only in some countries; it can be available at a quarterly frequency. Precise use of industrial production index as another measure for real economic indicator (Rahman et al, 2009). In addition, researchers have used other supplementary variables as well such as debt/GDP ratio and yields of other financial assets by Hsing (2014) foreign reserves by Rahman et al, (2009) and variables like capital formation and price of gold by Jauhari et al, (2014) gross capital formation relative to GDP, credit to the private Sector to GDP and net remittance relative to

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GDP by (El-Nadar et al, 2013) and federal fund rate by Yusof et al, (2007) as factors affecting the performance of stock market.

## **3.2 Political situation affects Stock Market**

In general, the stock index is considered as the reflection of the expectation of future probability of the companies. The stock market tends to be influenced not only by the macroeconomic fundamentals but also by the sudden political events as well as policy changes. The stock market and the stock prices, in general, can be influenced by world events such as citizen terrorism unrest and war. However, these influences can be direct and indirect, and they often occur in chain reactions. For example, the social disturbance and fear generated by the terrorist attacks on September 11th, 2001 affected markets directly as is triggered many investors in the United States to trade less and to an emphasis on stocks and bonds with less risk. Circuitously, we can expect that the stocks of military equipment companies and weapons manufacturers to rise in value as a nation gears up for armed conflict due to increased demand. Quite a few studies have found the relationship between the political event and the stock market performance. For example, Beaulieu et al. (2006) investigated the short run impact of the political uncertainty associated with the 1995 Quebec referendum on the stock returns. The research found that the uncertainty surrounding the election outcome had short run impact on stock returns of Quebec firm, implying that the stock market was directly influenced by the political risk and ambiguity. Other political events which can affect the stock markets are government elections.

Traders view elections impact on currency as a case of potential political uncertainty which typically equates to more volatility in the value of a country's currency. Likewise, Jensen and Schmith (2005) estimated the impact of the four main Brazilian presidential candidates on the mean and variance of the Brazilian stock market using time-series regressions. They argue that political events can be created by the election of a politician that is expected to enact "market-friendly" policies, lead to increases in stock market returns while political events that are supposed to have an adverse impact on the economy and specific firms result in decreases in return in the stock exchange. For example, unplanned elections can wreak havoc on a currency especially in cases where upheaval among citizens results in

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protests and work stoppages. In most situations, the political instability will overshadow any anticipated positive outcomes from a new government in the short run and related currencies will usually suffer losses. In the long-term basic valuation factors and principals will once again apply, and currencies should settle at or around a rate indicative of the country's economic growth prospects.

In the context of Nepalese stock market many banks and the financial Institution were facing big problem from politics. Maoist revolution early in 2000, thousands left their villages and towns to settle in the most secure part of Nepal, the Kathmandu valley. There was a sudden growth of population in the Kathmandu valley and logically the demand for land and housing went up to accommodate the immigrants. The smooth rise of the immigration rate did not go down significantly because youths migrated to the cities for education and work.

Nepal has been struggling to continue macroeconomic balance for a couple of years. High unemployment, a balance of payment deficient, Low growth rate, high inflation and ballooning trade deficit are some of the pressing challenges existing in macroeconomic challenges. Economic survey of Nepal Rastra Bank financial institution in Nepal was reeling under the liquidity crunch. Interest rates went up; lending went down, and investments suffered (NRB 2011).

### **3.3 Effect of News and Stock Market**

The stock index is heavily affected by news and rumors, like a “beauty contest” as described by Keynes (1936). News can affect the shareholder's sentiments, expectation as well as overconfidence of the investors and performance of the companies. However, many people interpret news differently based on their intellectual power. There is some example on estimations on the impacts of news on the stock market performance. Such as Boudoukh et. al (2013) investigated the relation between news and the stock prices of 795 S&P500 companies, covering the period from 2000 to 2009 using advanced textual analysis method. They find that when the information can be recognized and that the tone (i.e., positive versus negative) of this information can be determined, there is a closer link between stock prices and information.

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Furthermore, Alanyali et. al. (2013) investigated daily print issues of the Financial Times from 2nd January 2007 to 31st December 2012 to quantify the relationship between decisions taken in financial markets and developments in the financial news. They found that positive correlation between numbers of times the name of a company declared in daily Financial Times and the transaction daily volume of a company's stock both on the day before and on the same day of the news released. Their results provide quantitative support for the suggestion that movements in financial markets and movements in the financial news are closely interlinked.

## **3.4 Historical Empirical Evidence of Share market from Nepal**

Some studies have been done to understand the performance of Nepali stock market, mainly from micro perspectives. For example, Dangol (2010) examines random walk behavior on daily market returns of the Nepal Stock Exchange (NEPSE) using Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) unit root test for the period from July 14, 2000, to January 14, 2010. This study provides that the evidence of Nepalese Stock Market does not show characteristics of random walk and thus, it is not efficient in the weak form. Another finding by Bhatt et al, (2010) that the Nepalese Stock Market did not follow random walk hypothesis as well as inefficiency in weak form for daily, weekly and monthly returns series by using autocorrelation and runs the test. On the other contrary, Pradhan and KC (2010) reported inconclusive results of their study regarding the random walk hypothesis and weak form of market efficiency using autocorrelation and runs tests for weekly stock prices of 26 individual companies on three years basic period between mid-July 2005 and mid-July 2008. They found that random walks hypothesis holds for less frequently traded stocks but do not hold for the highly traded stock at Nepalese Stock Market.

In another study of Dongol (2008) focuses on market reaction to announcements new unanticipated political events using the event analysis methodology, from the period 2001 to 2006. His finding provides a consistent conclusion regarding the existence of information content hypothesis in the Nepalese stock market. This finding suggests that the Nepalese stock market is inefficient at a semi-strong level, but there is a strong linkage between political



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uncertainty and common stock returns in Nepal. Another empirical evidence done by Joshi (2012) examined the impact of dividends on stock price in the context of Nepal and found the impact of dividends is more pronounced than that of returned earning on stock prices in Nepal.

## **3.5 Research Gap on Stock Index**

Economic evaluation on the stock market of Nepal very few studies has done in the past. Nepal stock market has been undergoing significant changes in the last few years with the introduction of new rules and regulation by laws, for improvement in the infrastructure of trading and entry of mutual funds and market makers. These studies will include analysis to fill the research gap by exploring the performance of the NEPSE index using the modernized stock market data of Nepal.

## **3.6 Fuel shortage and power cut effect on Stock market**

Fuel shortage and prolonged power cuts enforce many Bank and Financial Insinuations to reduce banking hours. In the modern context of Nepal, many BFIs are still shuttering their branch before three pm, reduction their normal banking services. Shortage of diesel still prevails. Shortage of petrol has hit regular operations of the banks, fascinating them to shorten their operation hours (Republica 2015). However, the fuel shortage and the power cuts effect to make a big problem in stock market capitalization because all BFIs connected to stock index in Nepal. Chairperson of CEO of Sunrise Bank Ltd Ratna Raj Bajracharya said. "Shortage of petrol has hit regular operation of the Banks, compelling them to shorten their operation hours. In the context of another country like the Philippines continues to face power supply challenges, and Filipinos pay some of the highest electricity prices in Southeast Asia (Moss 2014).

## **3.7 Natural disasters and blockades effect in Stock Market**

Nepal exists in one of the "most semicircles hazardous regions on Earth," where two backup continental plates formed the Himalayan mountain range and periodically unleashed devastating earthquakes that have killed or displaced millions, according to the Geological Survey. Earthquakes cause more catastrophes in countries like Nepal, which incline to have

# Economic analysis of Nepalese Stock Index

relaxed building standards. The country's economy is among the smallest in the world, with one in four citizens living below the poverty line and more than 70 percent of a farmer working in agriculture. The earthquake could also be devastating for the country's tourism sector, which employs 3.5 percent of Nepal's workers. This natural disaster could put a damper on an economy that is already lagging behind its neighbors in economic growth.

According to the IMF Chief Christine Lagarde said that the Nepal's macroeconomic performance has been held back by the earthquakes and the recent unrest and disruptions to transportation and trade routes following the promulgation of a new constitution. The earthquakes problem in April and May and aftermath protests and trade disruptions following the promulgation of a new constitution in September have exacerbated the macroeconomic policy challenges facing the Nepalese economy," the IMF said, referring to the blockade of trade routes with India due to protests by Indian-origin minorities who are opposed to splitting the country in seven provinces.

In 2015, Nepal is facing big problem from the earthquake and the unofficial blockade by India in 2015. Nepal Central Bank (NRB), which helped in Penrith District Netball Association (PDNA) process to ascertain the impact of the earthquake on banks and the financial institutes (BFIs) and report \$ 5 billion losses from the earthquake in the financial sector, including both banking and insurance. Another big problem is the Indian blockade problem in the petroleum product. On 23 September 2015, Nepal economy has failed to withstand the shock of the third Indian blockade the past blockades were imposed in 1988-89. In 1970, due to the country's excessive dependence on the southern neighbor. Recent, Minister of Finance Bishnu Prasad Paudel announced that the heavy shrinking of economic activities in the country was related to an India-imposed blockade of the main border points, as well as prolonged strikes and protest from the different minorities (Madheshis and Tharus) demanding right and the freedom of Madeshi people. The political blockade done by India and the earthquake make the stock market index down trend.

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**Table 2. Effect from the earthquakes in different country**

Year	Country	Billion \$	GDP
2006	Indonesia	3	1%
2010	China	14	21%
2011	New Zealand	40	28%
2012	Japan	309	6%
2015	Nepal	5	26%

Sources: World Bank (GDP)

The table shows that the international earthquake disaster in a different country and the effect in the country Gross Domestic Product. Natural disaster makes the stock market panic and turmoil in the country economy. On 25, April 2015 earthquakes make the country economy downturn. The earthquake that depressed entire villages in Nepal over the weekend and killed at least above 8000 people is expected to inflict about \$5 billion in total economic costs on the small South Asian country.

Aftermaths the oil strikes from India make the big bubble in the country economy. The earthquakes in April and May claimed many lives and caused major damage. It also caused economic growth to slow to 3.4 percent in 2014/15, down from 5.5 percent in 2013/14. The losses in agricultural production and damage to transport systems pushed up prices, raising inflation to about 7 percent (IMF 2015). The IMF mission discussed the macroeconomic policies needed to support Nepal's recovery from the earthquakes while maintaining macroeconomic and financial stability. According to the International Monetary Fund, the growth is expected to rebound gradually to about 4.4 percent in 2015/16 and around 5.4 percent by 2016/17, as economic activity improves from the earthquakes and reconstruction gain momentum. Inflation is projected to rise to about 8.5 percent over the next 12 months. Nevertheless, over time, as agricultural production recovers and transportation infrastructure improves, inflationary pressures should ease. Stepped-up foreign aid and higher inflows of

# Economic analysis of Nepalese Stock Index

remittances will further boost liquidity pressures in the financial system, necessitating active liquidity management to avoid excess inflation about India.

# Economic analysis of Nepalese Stock Index

## 4 EMPIRICAL FINDINGS

### 4.1 Introduction

This section deals with the finding of the research. It starts with the descriptive statistics, which provide the information data. Then after the result of empirical tests are mentioned clearly with the evidence. To perform this task data of macroeconomic variables were used as the sample population using the annual data from 1994 to 2015.

### 4.2 Features Nepalese Stock market index

Nepalese stock market is still in struggling stage. Current regulations require banks and financial institutions to float at least 30 percent of shares publicly and get listed on the stock exchange within a given period. Nevertheless, there has certain progress. In the last two decades, the number of registered companies at NEPSE has increased from 107 in 1999 to 232 in 2015. Banks and the financial institutions have the highest share in the Nepal Stock Market. There is no such a mandatory requirement for companies to enroll in the real sector but very few real sector company have been registered in the stock market.

Nepalese stock prices are considered to be very unstable. Surya G.C (2008) Volatility Analysis of Nepalese Stock Market of Nepalese Stock Exchange Index has a huge difference between its maximum and minimum returns and the standard deviation is also very high. It has also shown that NEPSE has non-symmetric returns, and there is the presence of negative values. This is not great news because it means that there is a higher chance that some of the stocks can give negative return earnings. The study revealed strong evidence of time-varying volatility, a tendency of the periods of high and low volatility to the cluster. Nepalese stock market is not shielded completely from outcomes in the global market. Often, investors make their decisions to trade based on happenings in the global market.

# Economic analysis of Nepalese Stock Index

**Table 3. Glance at the Nepalese Stock Index**

Year	No. of listed Companies	Market Capitalization(Rs in Million)	Market Capitalization/GDP(%)
1999	107	23508	6.9
2000	110	43123.3	11.4
2001	115	46349.4	11.9
2002	96	34704	10.4
2003	108	35240	10.2
2004	114	41425	11.1
2005	125	61365.9	10.4
2006	134	96763.8	12.5
2007	135	186301.3	20.2
2008	142	366247.6	30.3
2009	159	512939.1	35.2
2010	176	376871.4	31.6
2011	209	323484.3	29.3
2012	216	368262.1	30.7
2013	230	514492.1	38.5
2014	237	1057165.8	54.8
2015	232	989404	50.1

Sources: (NRB, 2014/15)

Interpret, from the mid-August 2015, stock market capitalization has increased by 12.9 percent to NRs. 1192.47 billion. The ratio of market capitalization to the GDP of 2014 place at 54.8 percent in mid-August 2015 compare to such ratio of 50.1 percent a year ago. It decreases

## Economic analysis of Nepalese Stock Index

by 4.7 percent due to a massive earthquake and the petroleum product strikes from India. Of the total registered companies, the number of BFIs (including insurance companies) stood at 197 followed by manufacturing and processing industries (18), hydropower (6), hotels and trading (4 each) and other companies. On a year to year basis, total paid-up capital of the listed companies increased by 24.7 percent to Rs. 212.99 billion in mid-August 2015. In the first month of 2015/16, the total securities worth of Rs. 788 million was listed in the NEPSE, in which the value of bonus shares was Rs. 188 million and the debenture was Rs. 600 million (NRB 2014).

**Table 4. Structure of the Nepalese Stock Market**

Types of Institutions	Number	Market Capitalization (%)
Bank and financial institutions	176	77.7
Manufacturing & Processing	18	3.0
Hotel	4	2.5
Trading	4	0.1
Hydro Power	6	7.0
Others	2	8.6
Total	231	100

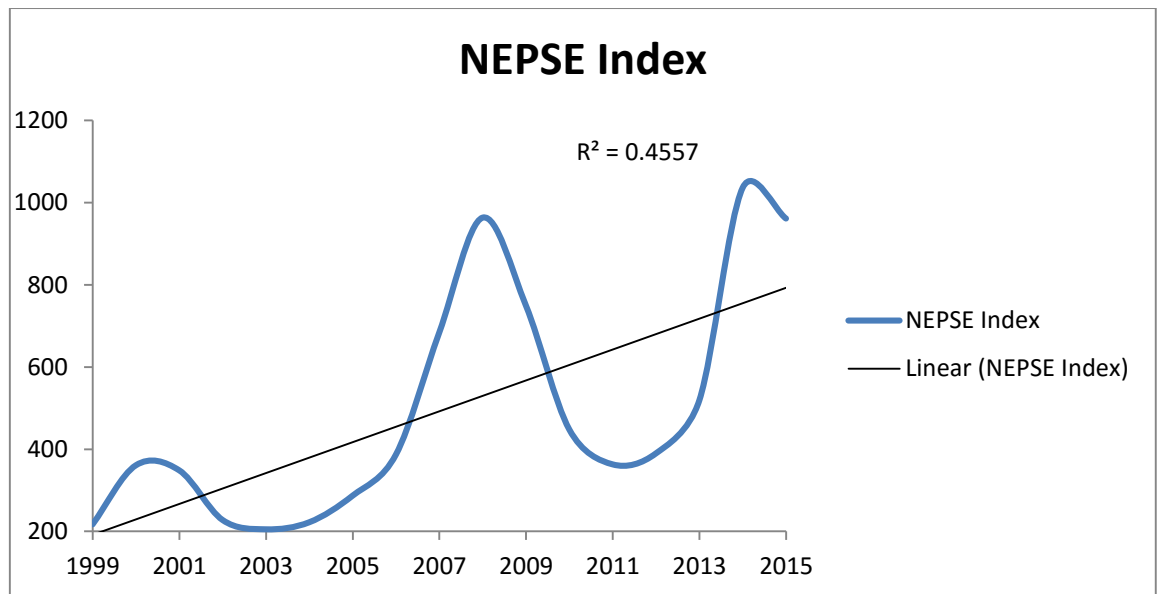
Source: (NRB, 2014/15)

Interpret the recent review of market capitalization as of mid-July 2015, the share of banks and financial institutions (including insurance companies) which stood at 77.7 percent. Hydropower, manufacturing and processing companies, hotels, trading and others recorded a share of 7.0 percent, 3.0 percent, 2.5 percent, 0.1 percent and 9.7 percent respectively.

# Economic analysis of Nepalese Stock Index

## 4.3 Movement of the Nepalese Stock Index

The recent listed off the NEPSE index experienced a high amount of volatility as a result of the shocking earthquake that hit the nation on 25th of April, 2015. As expected the benchmark index fell immensely for four consecutive days as soon as the market opened for trading. Surprisingly, the market picked up momentum and recovered the fall caused by the quake after 11 trading days. The fall witnessed by the market in the past 30 days is not as much as compared to the drop witnessed in the month prior. NEPSE decreased by -12.1 points (or -0.94%) to close at 926.09. The 50-day moving average is moving below the 200-day moving average. This shows that the overall outlook of the market does not look good at all. However, this short-term view of the market is likely due to various NEPSE corrections.



**Figure 1. NEPSE Index (Mid- month)**

Source: [www.nepalstock.com.np](http://www.nepalstock.com.np)

Interpret, in 1994 till 1999 the movement of the stock market is around 200 points between, from this was also the period Nepalese stock market was evolving the market capitalization of the listed companies. In 2000 Nepalese stock goes trends upwards due to the number of listed companies increased to 115 by the end of the fiscal year 2000/01. It is evident to point out that the commercial banks to the total turnover stood at 82 percent by the



# Economic analysis of Nepalese Stock Index

end of the fiscal year 2000/01 with those share accounting for 62.4 percent of the total market capitalization (Paudel, 2002). In 2007 December till August 2008 NEPSE is in the sharp plunge. After the second Constituent Assembly election in 2014 NEPSE index reached as high as 1036.1 points in mid-July 2014. However, the NEPSE index going well until 2014. In the graph, R2 is 0.4557 that indicate the Nepalese stock market is not good due to the turmoil in real estate market in 2011 and the disaster earth quack 2015 and other political reason.

## 4.4 Distribution of Real Estate Loan in BFIs

The Table (5) presents the share of real estate loan and personal residential home loan on a total loan of real estate sector and its distribution among the banks and financial institutions as of mid-April 2012. The table presents the credit exposure of development banks, commercial banks and finance companies as per real estate loan classification based on NRB Directives.

**Table 5. Real Estate and Personal Home Loan of BFIs as at mid-April 2012**

S. No.	Particulars	Real Estate Loan (1)	Personal Home loan (2)	Total (1 + 2)	Share in Real Total Estate loan %	Share in Total Personal Res. Home loan %
1	Development Banks	13,424.62	4,653.83	18,078.45	13.0	12.5
2	Commercial Banks	71,084.20	26,054.80	97,139.00	68.7	69.8
3	Financial companies	18,914.08	6,644.97	25,558.99	18.3	17.8
	Total	103,422.84	37,353.60	140,776.44	100.00	100.00

(Rs. In Million)

Sources: Nepal Rastra Bank 2012

The above table illustrates that the share of development banks, commercial banks and finance companies in personal residential home loan stood at 17.8%, 12.5% and 69.8 percent respectively in total. The majority of share in real estate loan and the personal home loan is

# Economic analysis of Nepalese Stock Index

occupied by commercial banks which is natural. There is a minor difference in the distribution of the loans in real estate sector.

## 4.5 Turmoil in real estate sector

In Nepalese stock market, banks and the financial institutions play the important role of country economic growth. Nepali banking sector is going through a change in institutional and governance reform, in anticipation of sound corporate governance in Nepal. Sharma, M. M. (2011). NRB our central bank implant money to the bank and financial institutions and also took over the management. In 2011, due to the housing crisis many bank and financial instructions are in boom conditions such as Vibor Bikash Bank was in the crunch of a liquidity crisis. Due to excessive loan to the real estate, housing and contraction sectors Nepali banking sector went into trouble. Bank and financial institutions (BFIs) had to land in the wrong path sooner or later it comes to disaster. Thus, Interest rates went up; lending went down, and investment suffered. However, the immediate measures were taken by the Central Bank of relaxation on income declaration requirements, low credit flow, higher interest rates on deposits and elevated level of remittance inflows contributed to the current improved liquidity position. Nonetheless increase in liquidity had not the obvious effect of decreasing the credit crunch. According to a survey conducted by the Research Department of Nepal Rastra Bank, primarily to analyze exposure of banks to real estate, real estate and the housing sector has been ranked number one lending sector.

**Table 6. Percentage of Real Estate Value Accepted as Collateral**

Institution	Average percentage
Commercial Banks	71.44
Development Banks	65.00
Finance Companies	59.48

Source: Real Estate Survey 2011

# Economic analysis of Nepalese Stock Index

Interpret, the given table 6 indicate that the higher credit flow in real estate from financial Institute. In global crisis period 2009 Bank and the Financial Institutes borrowed Rs 247 billion in Real Estate. Amounts to 61.44 percent of total loans made by the Commercial Banks, higher loan in the financial market. The, even more, shocking is total loans made against the collateral of land and building is nearby 50 percent of the total loans of the whole financial system. The survey classifies the Bank, and Financial Institutions have been assessed for hoarding money, not moving towards the new areas of the market or expanding the traditional lenders.

Nepal Rastra Bank the central bank authorized banks to reduce combined real estate and banking loans to 30 percent in 2011 and 25 percent in 2012 (NRB 2011). The result shows heavy risk in housing and residential loans market. Then after, balance sheets of banks today carry less risk from real estate price movement.

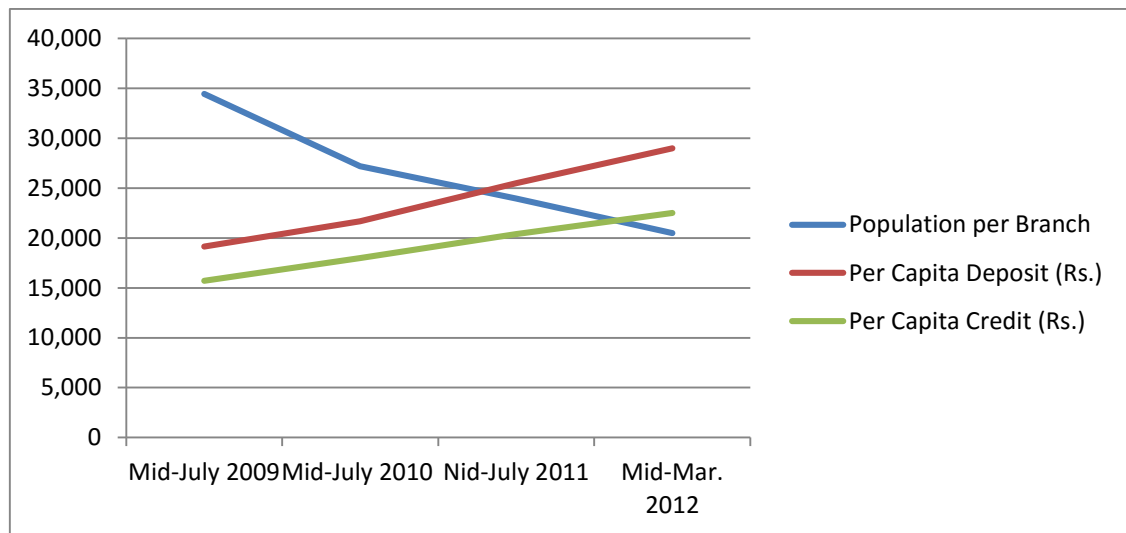


Figure 2. Financial Expansion and Deepening of commercial bank

Source: Nepal Rastra Bank, Own calculation.

The given graph shows banking sector has a decreasing number of populations as it enlarges its sector. The number of population per branches decreases from 2009 July to March 2012. The per capita deposit and per capita credit of banks are increasing continuously. It means that banks are promoting credit and deposit even though the number of population is

# Economic analysis of Nepalese Stock Index

low. However, an increasing number of banks cannot occupy the mass of the population in the increasing rate.

## 4.6 Ordinary Least Square Method

**Table 7. OLS method estimation**

Independent Variable	Expected Sign	Actual Sign	Coefficient	p-value
Log(GDP)	Negative	Negative	-2.012115	0.1369
log(CPI)	Negative	Negative	3.683845	0.0616
Log(ERE)	Positive	Negative	-1.299118	0.2646
Log(INF)	Negative	Negative	0.367740	0.2621
D1	Positive	Negative	0.504776	0.0039
D2	Positive	Negative	0.070025	0.7146
$R^2 = 0.8407$		Adjusted R- squared : 0.77696		

Sources: Authors' calculation using E-views 9 software

$R^2$  is used to measure the percentage of variation independent variable is explained by the total variation of independent variables while the Adjusted R- square measured the fitted regression line after considered the sample size and regresses. Based on  $R^2 = 0.8407$  indicated that 84.40% of the variation in Nepalese stock Index performance is explained by the total variation in GDP, CPI, RER, INF, D1 and D2. On the other side Adjusted R- square = 0.7769 implied that 77.69% of the total variation in Nepalese stock index performance is explained by the total variation in gross domestic product, consumer price index, real exchange rate, inflation, environmental & political event and Policy Change events after taking into account the degree of freedom.

# Economic analysis of Nepalese Stock Index

## 4.6.1 T-test

*H0: There is no significant relationship between the independent and dependent variable ( $\beta_i = 0, i = 1, 2, 3, 4, 5, 6$ ).*

*H1: There is a significant relationship between the independent and dependent variable ( $\beta_i \neq 0, i = 1, 2, 3, 4, 5, 6$ ).*

Decision Rule: Reject H0 if probability value is lower than significant level,  $\alpha$ . Otherwise, does not reject H0.

**Table 8. Result T-Test**

Independent Variable	Significant Level, $\alpha$	P- value	Decision Making	Conclusion
Log(GDP)	0.05	0.1369	Do not reject H0	Insignificant.
log(CPI)	0.05	0.0616	Do not reject H0	Insignificant.
Log(ERE)	0.05	0.2646	Do not reject H0.	Insignificant.
Log(INF)	0.05	0.2621	Do not reject H0.	Insignificant.
D1	0.05	0.0039	Reject H0	Significant.
D2	0.05	0.7146	Do not reject H0	Insignificant.

Sources: Authors' calculation using E-views 9 software

The above table indicates that a macroeconomic performance indicator environmental & political event is significantly affecting the stock market performance in Nepal. However, the Gross Domestic Product, Consumer Price Index, Real Exchange Rate, Inflation rate and NRB policy events are insignificant in the performance of the Nepalese Stock Index.

Besides that, the movement in the gross domestic product, consumer price index, real exchange rate, inflation and NRB changing policy for this research has a negative effect on the movement of Nepalese stock index performance. However, the t-test results declared that

# Economic analysis of Nepalese Stock Index

gross domestic product, exchange rate, consumer price index, inflation and NRB changing policy are not individually important in explaining the stock market index performance since there are many other macroeconomic variables can be used to capture the stock index performance such as broad money supply, Treasury bill, remittance, official development grant, etc.

## 4.6.2 F-test

*H0: The overall model is insignificant.*

*H1: The overall model is significant.*

Decision Rule: Reject H0 if probability value is lower than significant level,  $\alpha$ . Otherwise, does not reject H0.

**Table 9. Result F-test**

Independent Variable	Significan Level, $\alpha$	T	P- value	Decision Making	Conclusion
D1	0.05		0.0039	Reject H0	Significant

Sources: Authors' calculation using E-views 9 software

The F- test is used to measure the overall significance of the model. As shown in Table 9, the probability value is less than the significance level, therefore, the H0 is rejected indicating that the entire model in this research is important in explaining the stock index performance.

## 4.7 Heteroscedasticity

The heteroscedasticity problem refers to the inconsistent characteristic of variances of the error term. It can be tested by using Autoregressive Conditional Heteroskedasticity (ARCH) Test in this research.

# Economic analysis of Nepalese Stock Index

**Table 10. Autoregressive Conditional Heteroskedasticity (ARCH) Test**

Autoregressive Conditional Heteroskedasticity (ARCH) Test	
p- value = 0.1470	$\alpha = 0.05$

Sources: Authors' calculation using E-views 9 software

Decision rule: Reject H0 if probability value less than significant level,  $\alpha$ . Otherwise, do not reject H0.

Conclusion: Do not reject H0 as the probability value of 0.1470 is more than  $\alpha = 0.05$ . Hence, there is no heteroscedasticity problem in the model.

## 4.8 Autocorrelation

Autocorrelation problem occurs when the error term for observation is related to error term of another observation. The autocorrelation problem is tested by using Breusch-Godfrey Serial Correlation LM Test in this research.

**Table 11. Breush-Godfrey Serial Correlation LM Test**

Breush-Godfrey Serial Correlation LM Test	
p- value = 0.1949	$\alpha = 0.05$

Sources: Authors' calculation using E-views 9 software

***H0: There is no autocorrelation problem.***

***H1: There is autocorrelation problem.***

Decision rule: Reject H0 if probability value less than significant level,  $\alpha$ . Otherwise, do not reject H0.

Conclusion: Do not reject H0 since the probability value of 0.1949 is more than  $\alpha = 0.05$ . So, the model in this research is correctly specified.

# Economic analysis of Nepalese Stock Index

## 4.9 Normality Test

The normality error terms are tested by using Jarque-Bera test in this research.

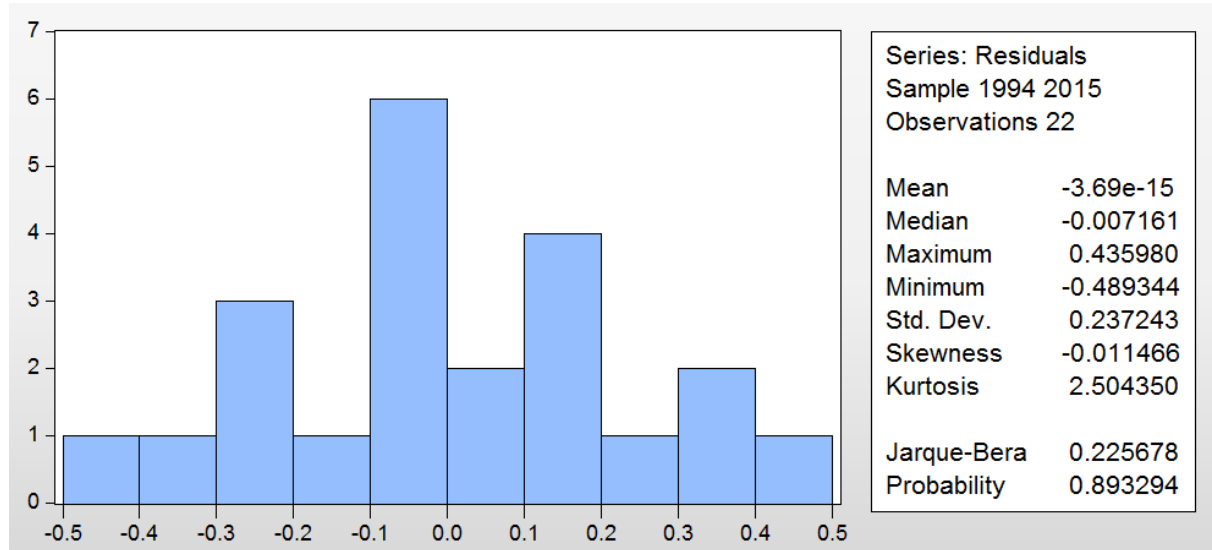


Figure 3. Figure 3 Jarque-Bera test

Sources: Authors' calculation using E-views 9 software

*H0: Error terms are normally distributed.*

*H1: Error terms are not normally distributed.*

Decision rule: Reject H0 if probability value less than significant level  $\alpha$ . Otherwise, do not reject H0.

Conclusion: Do not reject H0 since the probability value of 0.893294 is more than  $\alpha=0.05$ . Hence, the error terms are normally distributed.

## 4.10 Unit root test result

Order to deciding on the appropriate method, a preliminary examination of the nature of the data is necessary. I follow the standard procedure of unit root testing by employing the Augmented Dickey Fuller (ADF) tests are conducted to test the stationary of the data series.



# Economic analysis of Nepalese Stock Index

As the ADF test is often criticized for low power, Phillips-Perron (PP) tests are also carried out.

**Table 12. Augmented Dicky Fuller (ADF) and Philip Perron (PP) test**

Variables	ADF Test	Philips Perron Test	Order of Integration
	H0: Variables is non-stationary	H0: Variables is non-stationary	
log(SI)	-0.9774	-0.726	I(1)
Dlog(SI)	-4.690***	-2.445*	
log(GDP)	0.098	0.061	I(1)
dlog(GDP)	-4.366**	-4.399**	
log(CPI)	0.538	0.373	I(1)
dLog(CPI)	-3.058***	-3.091**	
log(RER)	-0.955	-0.886	I(1)
dlog(RER)	-4.735***	-4.749***	
log(IN)	-1.665	-0.926	I(1)
dLog(IN)	-5.277***	-7.755*	
log(D1)	-4.049	-4.044	I(1)
dlog(D1)	-5.152***	-7.097***	
log(D2)	-2.848	-2.804	I(1)
dlog(D2)	-4.892***	-6.158***	

(\*\*\* implies significant at 1% level, \*\*implies significant at 5% level and \* implies significant at 10% level.)

Sources: Authors' calculation using E-views 9 software

Intercept: The H0 for all log variables in the ADF and PP test results indicate that SI, GDP, CPI, RER, IN, D1 and D2 are non-stationary at level phases and first difference phase. Nonetheless, these series are found to be stationary at 1, 5 or 10 percent significance level at first difference. So, unit root tests indicate all these variables are integrated of the order I (1).

# Economic analysis of Nepalese Stock Index

## 4.11 Regression Result

The result shows that all selected variables are in same order, we cannot follow VAR or co-integration approach. Moreover, application of VAR method may not be appropriate when the real sector variables are missing. Relatively the following models are estimated by OLS using the first difference of I(1) variable. It seems that the following four models are estimated as shown below. Considering the possibility of multicollinearity among explanatory variables, we do the estimation on step by step basis, and finally, all explanatory variables are included in equation (6)

$$dlog(SI) = \alpha + \beta_1 dlog(GDP) + \delta_1 D1 + \delta_2 D2 + \gamma dlog(SI(-1)) + \varepsilon \quad \dots (2)$$

$$dlog(SI) = \alpha + \beta_2 dlog(CPI) + \delta_1 D1 + \delta_2 D2 + \gamma dlog(SI(-1)) + \varepsilon \quad \dots (3)$$

$$dlog(SI) = \alpha + \beta_3 dlog(RER) + \delta_1 D1 + \delta_2 D2 + \gamma dlog(SI(-1)) + \varepsilon \quad \dots (4)$$

$$dlog(SI) = \alpha + \beta_1 dlog(INF) + \delta_1 D1 + \delta_2 D2 + \gamma dlog(SI(-1)) + \varepsilon \quad \dots (5)$$

$$dlog(SI) = \alpha + \beta_1 dlog(GDP) + \beta_2 dlog(CPI) + \beta_3 dlog(RER) + \beta_4 dlog(INF) + \delta_1 D1 + \delta_2 D2 + \gamma dlog(SI(-1)) + \varepsilon \quad \dots (6)$$

**Table 13. Regression Analysis**

Dependent variable: dlog(SI)

Number of observation: 20

	Eq 1	Eq2	Eq3	Eq4	Eq5
Constant	0.0430 (0.658)	0.0135 (0.938)	0.196** (0.028)	0.1401* (0.090)	-0.0375 (0.8346)
dlog(GDP)	1.916 (0.144)				0.699 (0.638)
dlog(CPI)		1.971 (0.439)			3.3911 (0.189)
dlog(RER)			-1.379 (0.103)		-1.5210 (0.1532)

# Economic analysis of Nepalese Stock Index

dlog(IN)				0.1998 (0.347)	0.1767 (0.3741)
d1	-0.359*** (0.1810)	-0.1240 (0.5828)	-0.260 (0.252)	-0.1240 (0.578)	-0.3351 (0.0119)
d2	-0.4590** (0.0168)	-0.3871** (0.039)	-0.353 (0.030)	-0.398** (0.033)	-0.5527*** (0.0119)
dlog(SI(-1))	1.0678** (0.0102)	0.7378** (0.023)	0.873*** (0.0084)	-0.398** (0.025)	1.0967*** (0.0096)
Adj R Square	0.3082	0.230	0.332	0.245	0.354
D-W Test	1.654	1.740	1.564	1.513	1.338
(***) implies significant at 1% level, **implies significant at 5% level and * implies significant at 10% level. Figures in parenthesis are the respective P- values)					

Sources: Authors' calculation using E-views 9 software

The table shows the result of the given model, estimated by the E-views 9 software. Each of the macroeconomic variables GDP, CPI, RER, and IN rate is found to be statistically significant. Whereas the dummy variable for the environmental and political events as well as for Nepal Central Bank's lending policy against share collateral are also found to be significant. The signs of the coefficient are also as expected.

The growth in Nepalese stock market is found to be positively related to the growth in Gross Domestic Product (GDP), Consumer Price Index (CPI), and Inflation (IN), and inversely related to Real Exchange Rate (RER). This implies that the higher exchange rate between Nepali Rupees and US dollar introduced investors to invest in equity as a hedge against inflation, thereby pushing up stock prices. Likewise, growth in exchange rate leads to greater demand for stocks as a result of portfolio substitution with ample liquidity. Given the limited supply of stocks, this exerts rising pressure on stock prices.

The negative signs for the coefficients indicate that environmental and political uncertainty and tightening of loans against share collateral by the NRB have a negative impact on the NEPSE index. The positive coefficient for stock market index the term indicates of the

# Economic analysis of Nepalese Stock Index

past month's stock price has a significant impact on the current month stock index. It shows the perseverance behavior, in other words, chartist behavior in the stock market. Furthermore, stock market changes daily while other macroeconomic data are not available on a daily basis.

## 4.12 Johansen Co-Integration Test

The long run effect between the variables is tested by using Johansen Co-integration test.

**Table 14. Johansen Co-integration Test**

Hypothesized No. of CE(s)	Trace			Max-Eigen		
	Statistic	Critical value (5%)	p-value	Statistic	Critical value (5%)	p-value
r = 0	232.0482	95.75366	0.0000	121.086	40.07757	0.0000
r ≤ 1	110.9622	69.81889	0.0000	48.2676	33.87687	0.0005
r ≤ 2	62.69462	47.85631	0.0011	30.6868	27.58434	0.0193
r ≤ 3	32.00782	29.79707	0.0274	20.4836	21.13162	0.0614
r ≤ 4	11.52421	15.49471	0.1812	10.3754	14.26460	0.1884
r ≤ 5	1.148718	3.841466	0.2838	1.14871	3.841466	0.2838

Note: \*denotes significant at 5% significant level

Sources: Authors' calculation using E-views 9 software

***H0: There is no long-run relationship between the variables.***

***H1: There is long-run relationship between the variables.***

Decision rule: Reject H0 if probability value less than significant level,  $\alpha$ . Otherwise does not reject H0.

# Economic analysis of Nepalese Stock Index

Conclusion: Reject H<sub>0</sub> since the probability value for Trace statistic (0.0000), (0.0000), (0.0011) and Max-Eigen (0.0000), (0.0005) is less than  $\alpha = 0.05$ . Hence, the variables are co-integrated implies that there is long-run relationship between the selected variables.

## 4.13 Granger Causality Test

Granger Causality Test is conducted in this research is used to examine the direction of causality and the main lag relationships between the selected independent variables and Nepalese Stock Index (SI). The results are reported in the table and summarized in the figure below.

*H<sub>0</sub>: X does not Granger cause Y.*

*H<sub>1</sub>: X does Granger cause Y.*

Decision rule: Reject H<sub>0</sub>, if probability value less than significant level,  $\alpha$ . Otherwise, do not reject H<sub>0</sub>.

**Table 15. Granger Causality Test Result**

Variable X	Variable Y	Significance level, $\alpha$	P- Value	Decision	Conclusion
Log(GDP)	Log(SI)	0.05	0.0071	Reject H <sub>0</sub>	Ganger cause
Log(SI)	Log(GDP)	0.05	0.0999	Do not reject H <sub>0</sub>	No ganger cause
Log(CPI)	Log(SI)	0.05	0.0092	Reject H <sub>0</sub>	Ganger cause
Log(SI)	Log(CPI)	0.05	0.5371	Do not reject H <sub>0</sub>	No ganger cause
Log(RER)	Log(SI)	0.05	0.1763	Do not reject H <sub>0</sub>	No ganger cause
Log(SI)	Log(RER)	0.05	0.6174	Do not reject H <sub>0</sub>	No ganger cause
Log(INF)	Log(SI)	0.05	0.0014	Reject H <sub>0</sub>	Ganger cause
Log(SI)	Log(INF)	0.05	0.3890	Do not reject H <sub>0</sub>	No ganger cause
D1	Log(SI)	0.05	0.2469	Do not reject H <sub>0</sub>	No ganger cause
Log(SI)	D1	0.05	0.0073	Reject H <sub>0</sub>	Ganger cause
D2	Log(SI)	0.05	0.3482	Do not reject H <sub>0</sub>	No ganger cause
Log(SI)	D2	0.05	0.0191	Reject H <sub>0</sub>	Ganger cause

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Log(CPI)	Log(GDP)	0.05	0.9950	Do not reject H0	No ganger cause
Log(GDP)	Log(CPI)	0.05	0.0028	Reject H0	Ganger cause
Log(RER)	Log(GDP)	0.05	0.7570	Do not reject H0	No ganger cause
Log(GDP)	Log(RER)	0.05	0.2182	Do not reject H0	No ganger cause
Log(INF)	Log(GDP)	0.05	0.0868	Do not reject H0	No ganger cause
Log(GDP)	Log(INF)	0.05	0.1921	Do not reject H0	No ganger cause
D1	Log(GDP)	0.05	0.4913	Do not reject H0	No ganger cause
Log(GDP)	D1	0.05	0.5300	Do not reject H0	No ganger cause
D2	Log(GDP)	0.05	0.1098	Do not reject H0	No ganger cause
Log(GDP)	D2	0.05	0.3782	Do not reject H0	No ganger cause
Log(RER)	Log(CPI)	0.05	0.0031	Reject H0	Ganger cause
Log(CPI)	Log(RER)	0.05	0.1566	Do not reject H0	No ganger cause
Log(INF)	Log(CPI)	0.05	0.0474	Reject H0	Ganger cause
Log(CPI)	Log(INF)	0.05	0.4815	Do not reject H0	No ganger cause
D1	Log(CPI)	0.05	0.5389	Do not reject H0	No ganger cause
Log(CPI)	D1	0.05	0.7547	Do not reject H0	No ganger cause
D2	Log(CPI)	0.05	0.6461	Do not reject H0	No ganger cause
Log(CPI)	D2	0.05	0.3147	Do not reject H0	No ganger cause
Log(INF)	Log(RER)	0.05	0.5473	Do not reject H0	No ganger cause
Log(RER)	Log(INF)	0.05	0.4028	Do not reject H0	No ganger cause
D1	Log(RER)	0.05	0.5327	Do not reject H0	No ganger cause
Log(RER)	D1	0.05	0.4995	Do not reject H0	No ganger cause
D2	Log(RER)	0.05	0.7485	Do not reject H0	No ganger cause
Log(RER)	D2	0.05	0.5330	Do not reject H0	No ganger cause
D1	Log(INF)	0.05	0.2923	Do not reject H0	No ganger cause
Log(INF)	D1	0.05	0.827	Do not reject H0	No ganger cause
D2	Log(INF)	0.05	0.1938	Do not reject H0	No ganger cause
Log(INF)	D2	0.05	0.0487	Reject H0	Ganger cause
D2	D1	0.05	0.4925	Do not reject H0	No ganger cause
D1	D2	0.05	0.2636	Do not reject H0	No ganger cause

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Source: Authors' calculation using E-views 9 software

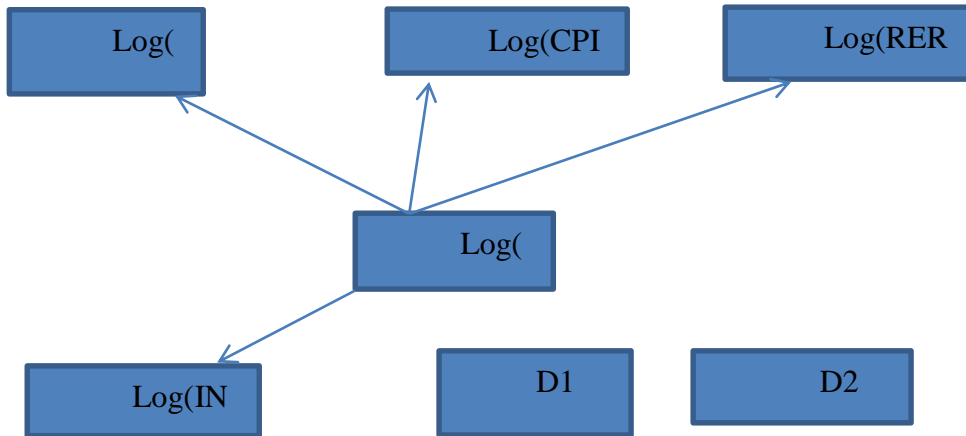


Figure 4. The Relationship between Each Variable for Granger Causality Test

(Source: own processing)

In the Given table 15, the Granger causality relation exists between  $\log(\text{SI})$ ,  $\log(\text{GDP})$ ,  $\log(\text{CPI})$ ,  $\log(\text{RER})$  and  $\log(\text{INF})$  does Granger cause  $\text{Log}(\text{GDP})$ ,  $\text{Log}(\text{CPI})$ ,  $\log(\text{RER})$  and  $\log(\text{INF})$  individually expect dummy variables D1 and D2 in this research as per Figure 4. In other words, none of the macroeconomic variables Granger causes the stock index display in this research.

At last, the analytical tests on normality test, unit root test, Johansen cointegration test and Granger Causality Test have been carried out in this-this research. All the estimated empirical results from the methodologies used in this research have been expressed in figure form and table form. The accurate and clear interpret of the results have been demonstrated in this thesis. The summary for whole research will be discussed in the next chapter.

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## 5 Empirical Estimation and Discussion

The OLS results show that Gross Domestic Product, Consumer Price Index and Inflation are significant in explaining stock market performance while the other performance variable Real Exchange Rate, Environmental and Political events and NRB policy changes events dummy shows the opposite results. The result of GDP, CPI and INF exhibits positive sign with the dependent variable. However, the result of the exchange rate, Environmental and Political events and NRB policy changes dummy show a negative sign with the stock market performance. In this research the reason of the effect in the stock market firstly the Nepalese stock exchange is overwhelmingly dominated by BFIs; there are no any trading companies. Secondly, Nepal has not opened the capital account so that there is no foreign portfolio investment in stock market. Thirdly, Nepal has been following the pegged exchange rate with India currency so that exchange rate may not be the important variable for the stock market. The result of the exchange rate that significant and negatively related to stock market performance is linked with the research of Kibria et al. (2014). The lower exchange rate will force the foreign investors to withdraw their investment and search for a different alternative. It will cause the aggregate demand in the domestic stock market to reduce and affect the stock prices. Moreover, the stock market was positively affected by inflation. This is further supported by Geske and Roll (1983) and Mukherjee and Naka (1995) in their study.

Though the dummy variables environmental and political dummy indicates that not stabilized politics, the economic disaster through earth quacks, blockades problem, etc. The second dummy policy changes dummy tightening of margin lending policy of Nepal Rastra Bank have negative implications for the NEPSE. The dummy variable, environmental & political events and policy events change dummy shows an insignificant and negative relationship with the stock market performance. This result is accord with the research carried by Worthington (2006).

In the next test order of the stationary of data, unit root test was conducted in this research, and the results revealed GDP, CPI, Real Exchange Rate, Inflation and both dummy variables were stationary at the first difference in both ADF Test and PP Test. The results of



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this research are consistent with Maghayereh (2003), which found that the exchange rate and inflation are stationary at first difference.

All the variables need be stationary before proceed to the Johansen co-integration test to decide whether there is a long run relationship between dependent variable and the selected independent variables. After ran out the test, it was discovered that there was a long-run relationship between the variables. These results are same with Abdelbaki (2013) and Ozean (2012) in which the inflation (CPI) and exchange rate have the long run relationship with stock market performance.

According to Granger causality test, the results show that there is a unidirectional causal relationship from Nepalese stock market performance to GDP, CPI, RER and INF respectively while there is no causality between Nepalese stock market performance on the dummy events years. The result of stock market performance does Granger causes exchange rate is consistent with the researches of Rahman et al. (2009).

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## 6 Conclusion

Overall, this research has examined analysis the performance of the Nepalese stock market, which has been passing through up and down in the recent year. The results declared that among six independent variables selected are found to be significant in the model. Moreover, the Nepalese stock market has been behaving as we expected hypothetically. According to the research GDP, consumer price index Inflation has a strong positive relationship, and the real exchange rate has a negative response. It shows that investor has been gradually taking the stock market as a hedge against inflation and invests in already stated market when there is ample liquidity available at a low rate of stock price. Moreover, the stock market performance has been found to be influenced by environmental, political changes similar to finding of Dangol (2008) and the NRB's policy. The positive outlook for political stability has a positive impact on the stock market index. Furthermore, the change in NRB's policy on lending against share collateral has a significant impact on the movement of the NEPSE. Some policy implications can draw from this study.

In this research has achieved the general objective of exploring the effect of macroeconomic factors, real exchange rate, environmental and political event and NRB policy events on Nepalese stock market show from 1994 to 2015 in an annual basis. All the results could provide useful information to policymakers, governments, investors, researchers and academicians in performing their responsibilities. Also, the limitations of this research are presented throughout this research and at the same time provided some recommendations to potential researchers for their future improvement. Few number of policy implication can draw from this study. First, Nepalese stock market has been quite responsive to macroeconomic development, especially on monetary sector development. Second, the main cause of the banking crisis was the bursting of the asset bubble in the share market in 2011, which is mainly dominated by Bank and Financial Institutions. Short of investment opportunities due to political instability, flow enormous amount of money in the real estate market prices of land and houses soared up. Market investors believed that prices would only go up, which caused artificial inflation of prices. When the market responded and stabilized forces were in action, prices came crashing down. Banks lost a significant amount of money in

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their housing loan and investment portfolio. Third, the political instability shares investors afraid to invest in the stock market. Hence, the government needs to stabilize to promote share market further which can play a major role in financial intermediation and resource mobilization through the capital market. Through earth quack and the blockade problem Nepal stock market face a big problem, Nepal need to sign a good treaty for the neighbor country to develop in the land lock country. Fourth, NRB's policy on lending against share collateral has been effective in influencing the share market. This indicates the significant role of NRB's policy in the share market. As our results advice that share market is also influenced by disaster, news and rumors, speculations, transparency should be increased in this market by making information related to listed companies easily accessible. NRB should develop the transparency and communication for the investor to enhance the stock market in order to clear rumors and gossips in the market.

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## 8 Appendix

**List of Major Political Events since 1999 August and likely Impact on Share Market**

S.N	Date	Event	Impact
1	1995	The Communist government dissolved.	Bad
2	1999	Communist party of Nepal (Maoist) revolution and more communist party reunion	Bad
3	June 2001	The Royal massacre	Bad
4	Feb. 2005	King Gyanendra dismissed PM Sher Bahadur Deuba and took up executive power	Bad
5	Oct. 2005	Ceasefire by the Maoists	Bad
6	Jan. 2006	Ceasefire withdrew by the Maoists	Bad
7	Apr. 2006	Restoration of Parliament and start of peace process	Good
8	Nov. 2006	Peace agreement between the	Good

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		government and Maoists; Maoists agreed to Lay down arms.	
9	Apr. 2007	Maoists joined interim government, a move that takes them into the political mainstream	Good
10	Jan. 2008	A series of bomb blasts kill and injure dozens in the southern Terai plains, Where activists have been demanding regional autonomy.	Bad
11	Apr. 2008	Former Maoist rebels win the largest bloc of seats in elections to the new Constituent Assembly (CA), but fail to achieve an outright majority.	Bad
12	Aug. 2008	Maoist leader Prachanda forms coalition government, with Nepali Congress going into opposition.	Good

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13	May 2009	Prime Minister Prachanda resigns in a row with President Yadav. Maoists leave government after other parties oppose integration of former rebel Fighters into the national army. Gurkha veterans with at least four years' service in the British army are given permission to settle in the UK.	Bad
14	Jun. 2010	PM Madhav Kumar Nepal quits under Maoist pressure.	Bad
15	May 2011	Constituent Assembly fails to meet the deadline for drawing up a new constitution.	Bad
16	Aug. 2011	PM Jhalnath Khanal resigns after government fails to reach a compromise with opposition on new constitution and fate of	Bad

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		<p>former Maoist fighters.</p> <p>Parliament elects the Maoist party's Baburam Bhattari as prime minister. He vows to forge a cross-party consensus on the new constitution and the Maoist fighters issue.</p>	
17	May 2012	<p>Prime Minister Bhattari dissolves parliament, calls elections for November after politicians miss a final deadline to agree on a new constitution. Mr. Bhattari remains in charge of a caretaker government</p>	. Bad
18	Nov. 2013	<p>The election for an assembly which will write a new constitution. Nepali Congress party wins most seats, Maoist party disputes results.</p>	Good
19	2014 February	<p>Sushil Koirala, the</p>	Good

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		leader of the Nepali Congress, the country's largest political party, is elected as prime minister after securing parliamentary support.	
20	2014 November	Nepal and India sign a \$1bn deal to build a hydropower plant on Nepal's Arun river to help resolve crippling energy shortages.	Good
21	2015 April	Major earthquake hits Nepal, killing thousands and causing huge destruction. An international rescue and relief effort gets under way in response.	Bad

Sources: - BBC News, South Asia: <http://www.bbc.com/news/world-south-asia-12499391>

### List of Major Policy Changes by NRB on Margin Lending

S.N	Date	Event	Possible Impact
1	Oct7, 2007	Margin lending limit reduced to 50 % of last 90 days average the price of shares; restriction on the	Bad

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		restructuring of margin loan; regulation requiring a maximum period of margin loan not to exceed 1 year.	
2	Jan 22, 2008	Margin lending limit not to exceed 50 % of the last 180 days average price of shares or 50 % of market price, whichever is minimum.	Bad
3	Jan 15, 2009	Regulation requiring making a margin call if the collateral is seen not sufficient to secure the loan.	Bad
4	Oct 30, 2009	Restructuring of the margin loan was allowed provided that the 50 % of principal and interest has been repaid.	Good
5	Feb 22, 2010	No need to make	Good



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		margin call if the price fall of the share is not more than 10%; About 75 % of margin loan amount was allowed to restructure	
6	Aug 10, 2010	Margin lending limit increased to 60% of the last 180 days the average price of shares or 50 % of market price, whichever is Minimum.	Good
7	Jul 14, 2011	BFI's were allowed to make self-decision on the limit of margin lending based on the last 180 days average price of shares or 50 % of market price, whichever is minimum; Reevaluating the shares and extending loan limit was restricted.	Good

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8	Jun 10, 2012	The loan could be extended with the guarantee from the broker instead of pledging original share certificates.	Good
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Source: Various NRB Circulars

## Ordinary Least Square

Dependent Variable: LOG(SI)

Method: Least Squares

Date: 03/26/16 Time: 22:46

Sample: 1994 2015

Included observations: 22

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.046131	2.992876	-0.683667	0.5046
LOG(GDP)	-2.012115	1.280170	-1.571756	0.1369
LOG(CPI)	3.683845	1.823665	2.020023	0.0616
LOG(RER)	-1.299118	1.121062	-1.158828	0.2646
LOG(INF)	0.367740	0.315585	1.165265	0.2621
D1	0.504776	0.148337	3.402912	0.0039
D2	0.070025	0.187907	0.372657	0.7146
R-squared	0.840692	Mean dependent var		5.869142
Adjusted R-squared	0.776969	S.D. dependent var		0.594395
S.E. of regression	0.280710	Akaike info criterion		0.550383
Sum squared resid	1.181972	Schwarz criterion		0.897533
Log likelihood	0.945790	Hannan-Quinn criter.		0.632161
F-statistic	13.19289	Durbin-Watson stat		1.850666
Prob(F-statistic)	0.000031			

# Economic analysis of Nepalese Stock Index

Heteroskedasticity Test: ARCH

F-statistic	2.114885	Prob. F(1,19)	0.1622
Obs*R-squared	2.103378	Prob. Chi-Square(1)	0.1470

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 03/26/16 Time: 23:33

Sample (adjusted): 1995 2015

Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.072557	0.018448	3.932989	0.0009
RESID^2(-1)	-0.313012	0.215238	-1.454264	0.1622
R-squared	0.100161	Mean dependent var		0.055968
Adjusted R-squared	0.052801	S.D. dependent var		0.068267
S.E. of regression	0.066441	Akaike info criterion		-2.494619
Sum squared resid	0.083873	Schwarz criterion		-2.395141
Log likelihood	28.19350	Hannan-Quinn criter.		-2.473030
F-statistic	2.114885	Durbin-Watson stat		1.946114
Prob(F-statistic)	0.162194			

# Economic analysis of Nepalese Stock Index

## Autocorrelation

Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.134923	Prob. F(2,13)	0.3513
Obs*R-squared	3.270277	Prob. Chi-Square(2)	0.1949

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 03/26/16 Time: 23:36

Sample: 1994 2015

Included observations: 22

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.175419	3.068336	0.383080	0.7079
LOG(GDP)	0.317872	1.294652	0.245527	0.8099
LOG(CPI)	-0.422626	1.849366	-0.228525	0.8228
LOG(RER)	0.027342	1.128276	0.024233	0.9810
LOG(INF)	-0.010069	0.315603	-0.031904	0.9750
D1	-0.050721	0.166954	-0.303805	0.7661
D2	0.007474	0.220137	0.033952	0.9734
RESID(-1)	0.162473	0.380174	0.427365	0.6761
RESID(-2)	-0.458587	0.308521	-1.486406	0.1610
R-squared	0.148649	Mean dependent var	-3.69E-15	
Adjusted R-squared	-0.375259	S.D. dependent var	0.237243	
S.E. of regression	0.278219	Akaike info criterion	0.571270	
Sum squared resid	1.006273	Schwarz criterion	1.017606	
Log likelihood	2.716028	Hannan-Quinn criter.	0.676413	
F-statistic	0.283731	Durbin-Watson stat	2.218767	
Prob(F-statistic)	0.959696			

## Unit root ADF test

Level

Null Hypothesis: LOG(SI) has a unit root

Exogenous: Constant

Lag Length: 4 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.977417	0.7363
Test critical values:		
1% level	-3.886751	
5% level	-3.052169	
10% level	-2.666593	

\*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 17

# Economic analysis of Nepalese Stock Index

Null Hypothesis: LOG(GDP) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
<b>Augmented Dickey-Fuller test statistic</b>	<b>0.094812</b>	<b>0.9574</b>
Test critical values:		
1% level	-3.788030	
5% level	-3.012363	
10% level	-2.646119	

\*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LOG(CPI) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
<b>Augmented Dickey-Fuller test statistic</b>	<b>0.538454</b>	<b>0.9839</b>
Test critical values:		
1% level	-3.788030	
5% level	-3.012363	
10% level	-2.646119	

Null Hypothesis: LOG(RER) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
<b>Augmented Dickey-Fuller test statistic</b>	<b>-0.955289</b>	<b>0.7493</b>
Test critical values:		
1% level	-3.788030	
5% level	-3.012363	
10% level	-2.646119	

\*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LOG(IN) has a unit root

Exogenous: Constant

Lag Length: 4 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
<b>Augmented Dickey-Fuller test statistic</b>	<b>-1.665180</b>	<b>0.4299</b>
Test critical values:		
1% level	-3.886751	
5% level	-3.052169	
10% level	-2.666593	

\*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 17

# Economic analysis of Nepalese Stock Index

Null Hypothesis: D1 has a unit root  
 Exogenous: Constant  
 Lag Length: 0 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.049353	0.0057
Test critical values:		
1% level	-3.788030	
5% level	-3.012363	
10% level	-2.646119	

\*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D2 has a unit root  
 Exogenous: Constant  
 Lag Length: 0 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.848190	0.0687
Test critical values:		
1% level	-3.788030	
5% level	-3.012363	
10% level	-2.646119	

1<sup>st</sup> difference

Null Hypothesis: D(DLOG(SI)) has a unit root  
 Exogenous: Constant  
 Lag Length: 4 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.690070	0.0026
Test critical values:		
1% level	-3.959148	
5% level	-3.081002	
10% level	-2.681330	

\*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 15

Null Hypothesis: D(LOG(GDP)) has a unit root  
 Exogenous: Constant  
 Lag Length: 0 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.366840	0.0030
Test critical values:		
1% level	-3.808546	
5% level	-3.020686	
10% level	-2.650413	

\*MacKinnon (1996) one-sided p-values.

# Economic analysis of Nepalese Stock Index

Null Hypothesis: D(LOG(CPI)) has a unit root  
 Exogenous: Constant  
 Lag Length: 0 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
<b>Augmented Dickey-Fuller test statistic</b>	<b>-3.058370</b>	<b>0.0465</b>
Test critical values: 1% level	-3.808546	
5% level	-3.020686	
10% level	-2.650413	

\*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LOG(RER)) has a unit root  
 Exogenous: Constant  
 Lag Length: 0 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
<b>Augmented Dickey-Fuller test statistic</b>	<b>-4.735757</b>	<b>0.0014</b>
Test critical values: 1% level	-3.808546	
5% level	-3.020686	
10% level	-2.650413	

\*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LOG(IN)) has a unit root  
 Exogenous: Constant  
 Lag Length: 1 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
<b>Augmented Dickey-Fuller test statistic</b>	<b>-5.277876</b>	<b>0.0005</b>
Test critical values: 1% level	-3.831511	
5% level	-3.029970	
10% level	-2.655194	

\*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 19

Null Hypothesis: D(D1) has a unit root  
 Exogenous: Constant  
 Lag Length: 0 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
<b>Augmented Dickey-Fuller test statistic</b>	<b>-5.152669</b>	<b>0.0006</b>
Test critical values: 1% level	-3.808546	
5% level	-3.020686	
10% level	-2.650413	

] \*MacKinnon (1996) one-sided p-values.

# Economic analysis of Nepalese Stock Index

Null Hypothesis: D(D2) has a unit root  
 Exogenous: Constant  
 Lag Length: 0 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
<b>Augmented Dickey-Fuller test statistic</b>	<b>-4.892461</b>	<b>0.0010</b>
Test critical values:		
1% level	-3.808546	
5% level	-3.020686	
10% level	-2.650413	

\*MacKinnon (1996) one-sided p-values.

## Phillip Perron Test

Level

Null Hypothesis: LOG(SI) has a unit root  
 Exogenous: Constant  
 Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
<b>Phillips-Perron test statistic</b>	<b>-0.726483</b>	<b>0.8189</b>
Test critical values:		
1% level	-3.788030	
5% level	-3.012363	
10% level	-2.646119	

\*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LOG(GDP) has a unit root  
 Exogenous: Constant  
 Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
<b>Phillips-Perron test statistic</b>	<b>0.061546</b>	<b>0.9544</b>
Test critical values:		
1% level	-3.788030	
5% level	-3.012363	
10% level	-2.646119	

\*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.004282
HAC corrected variance (Bartlett kernel)	0.004733

Null Hypothesis: LOG(CPI) has a unit root  
 Exogenous: Constant  
 Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
<b>Phillips-Perron test statistic</b>	<b>0.373792</b>	<b>0.9766</b>
Test critical values:		
1% level	-3.788030	
5% level	-3.012363	
10% level	-2.646119	

\*MacKinnon (1996) one-sided p-values.



# Economic analysis of Nepalese Stock Index

Null Hypothesis: LOG(RER) has a unit root

Exogenous: Constant

Bandwidth: 5 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-0.886814	0.7719
Test critical values:		
1% level	-3.788030	
5% level	-3.012363	
10% level	-2.646119	

\*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.005728
HAC corrected variance (Bartlett kernel)	0.005098

Null Hypothesis: LOG(IN) has a unit root

Exogenous: Constant

Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-0.926790	0.7589
Test critical values:		
1% level	-3.788030	
5% level	-3.012363	
10% level	-2.646119	

\*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D1 has a unit root

Exogenous: Constant

Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-4.044132	0.0057
Test critical values:		
1% level	-3.788030	
5% level	-3.012363	
10% level	-2.646119	

\*MacKinnon (1996) one-sided p-values.

# Economic analysis of Nepalese Stock Index

Null Hypothesis: D2 has a unit root  
 Exogenous: Constant  
 Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-2.804304	0.0746
Test critical values:		
1% level	-3.788030	
5% level	-3.012363	
10% level	-2.646119	

\*MacKinnon (1996) one-sided p-values.

1<sup>st</sup> difference

Null Hypothesis: D(DLOG(SI)) has a unit root  
 Exogenous: Constant  
 Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-2.445509	0.1435
Test critical values:		
1% level	-3.831511	
5% level	-3.029970	
10% level	-2.655194	

\*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 19

Null Hypothesis: D(LOG(GDP)) has a unit root  
 Exogenous: Constant  
 Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-4.399593	0.0028
Test critical values:		
1% level	-3.808546	
5% level	-3.020686	
10% level	-2.650413	

\*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LOG(CPI)) has a unit root  
 Exogenous: Constant  
 Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-3.091745	0.0435
Test critical values:		
1% level	-3.808546	
5% level	-3.020686	
10% level	-2.650413	

\*MacKinnon (1996) one-sided p-values.

# Economic analysis of Nepalese Stock Index

Null Hypothesis: D(LOG(RER)) has a unit root  
 Exogenous: Constant  
 Bandwidth: 5 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-4.749749	0.0013
Test critical values:		
1% level	-3.808546	
5% level	-3.020686	
10% level	-2.650413	

\*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LOG(IN)) has a unit root  
 Exogenous: Constant  
 Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-7.755229	0.0000
Test critical values:		
1% level	-3.808546	
5% level	-3.020686	
10% level	-2.650413	

\*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(D1) has a unit root  
 Exogenous: Constant  
 Bandwidth: 8 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-7.097924	0.0000
Test critical values:		
1% level	-3.808546	
5% level	-3.020686	
10% level	-2.650413	

\*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(D2) has a unit root  
 Exogenous: Constant  
 Bandwidth: 7 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-6.158117	0.0001
Test critical values:		
1% level	-3.808546	
5% level	-3.020686	
10% level	-2.650413	

\*MacKinnon (1996) one-sided p-values.

# Economic analysis of Nepalese Stock Index

## *Johansen Co-integration Test*

Date: 03/27/16 Time: 11:21  
 Sample (adjusted): 1996 2015  
 Included observations: 20 after adjustments  
 Trend assumption: Linear deterministic trend  
 Series: LOG(SI) LOG(GDP) LOG(CPI) LOG(RER) LOG(INF) D1  
 Lags interval (in first differences): 1 to 1

### Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.997652	232.0482	95.75366	0.0000
At most 1 *	0.910488	110.9622	69.81889	0.0000
At most 2 *	0.784402	62.69462	47.85613	0.0011
At most 3 *	0.640909	32.00782	29.79707	0.0274
At most 4	0.404751	11.52421	15.49471	0.1812
At most 5	0.055818	1.148718	3.841466	0.2838

Trace test indicates 4 cointegrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

### Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.997652	121.0860	40.07757	0.0000
At most 1 *	0.910488	48.26761	33.87687	0.0005
At most 2 *	0.784402	30.68680	27.58434	0.0193
At most 3	0.640909	20.48361	21.13162	0.0614
At most 4	0.404751	10.37549	14.26460	0.1884
At most 5	0.055818	1.148718	3.841466	0.2838

Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

# Economic analysis of Nepalese Stock Index

## Granger Causality Test

Pairwise Granger Causality Tests

Date: 03/27/16 Time: 11:42

Sample: 1994 2015

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LOG(GDP) does not Granger Cause LOG(SI)	20	6.99562	0.0071
LOG(SI) does not Granger Cause LOG(GDP)		2.69696	0.0999
LOG(CPI) does not Granger Cause LOG(SI)	20	6.51522	0.0092
LOG(SI) does not Granger Cause LOG(CPI)		0.64806	0.5371
LOG(RER) does not Granger Cause LOG(SI)	20	1.95288	0.1763
LOG(SI) does not Granger Cause LOG(RER)		0.49811	0.6174
LOG(INF) does not Granger Cause LOG(SI)	20	10.5264	0.0014
LOG(SI) does not Granger Cause LOG(INF)		1.00622	0.3890
D1 does not Granger Cause LOG(SI)	20	1.53761	0.2469
LOG(SI) does not Granger Cause D1		6.95931	0.0073
D2 does not Granger Cause LOG(SI)	20	1.13292	0.3482
LOG(SI) does not Granger Cause D2		5.21399	0.0191
LOG(CPI) does not Granger Cause LOG(GDP)	20	0.00496	0.9950
LOG(GDP) does not Granger Cause LOG(CPI)		8.96097	0.0028
LOG(RER) does not Granger Cause LOG(GDP)	20	0.28360	0.7570
LOG(GDP) does not Granger Cause LOG(RER)		1.68766	0.2182
LOG(INF) does not Granger Cause LOG(GDP)	20	2.89019	0.0868
LOG(GDP) does not Granger Cause LOG(INF)		1.84546	0.1921
D1 does not Granger Cause LOG(GDP)	20	0.74540	0.4913
LOG(GDP) does not Granger Cause D1		0.66261	0.5300
D2 does not Granger Cause LOG(GDP)	20	2.56886	0.1098
LOG(GDP) does not Granger Cause D2		1.03826	0.3782
LOG(RER) does not Granger Cause LOG(CPI)	20	8.71373	0.0031
LOG(CPI) does not Granger Cause LOG(RER)		2.10302	0.1566
LOG(INF) does not Granger Cause LOG(CPI)	20	3.76097	0.0474
LOG(CPI) does not Granger Cause LOG(INF)		0.76769	0.4815
D1 does not Granger Cause LOG(CPI)	20	0.64433	0.5389
LOG(CPI) does not Granger Cause D1		0.28678	0.7547
D2 does not Granger Cause LOG(CPI)	20	0.44978	0.6461
LOG(CPI) does not Granger Cause D2		1.24987	0.3147

## Economic analysis of Nepalese Stock Index

LOG(INF) does not Granger Cause LOG(RER)	20	0.62757	0.5473
LOG(RER) does not Granger Cause LOG(INF)		0.96668	0.4028
D1 does not Granger Cause LOG(RER)	20	0.65700	0.5327
LOG(RER) does not Granger Cause D1		0.72722	0.4995
D2 does not Granger Cause LOG(RER)	20	0.29533	0.7485
LOG(RER) does not Granger Cause D2		0.65635	0.5330
D1 does not Granger Cause LOG(INF)	20	1.33664	0.2923
LOG(INF) does not Granger Cause D1		0.19158	0.8276
D2 does not Granger Cause LOG(INF)	20	1.83410	0.1938
LOG(INF) does not Granger Cause D2		3.72120	0.0487
D2 does not Granger Cause D1	20	0.74274	0.4925
D1 does not Granger Cause D2		1.45910	0.2636