# ECONOMIC AND NON-ECONOMIC FACTORS AFFECTING STOCK PRICES IN NEPAL

**A Thesis**

**Submitted to the Department of Economics, Patan Multiple Campus,**
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**in Partial Fulfillment of the Requirements of the Degree of**

**MASTER OF ARTS**
**in**
**ECONOMICS**

**By**
**DIPENDRA KARKI**
**Roll No: 63/2069**
**Regd. No: 20844-93**
**Patan Multiple Campus**
**Lalitpur, Nepal**

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त्रिभुवन विश्वविद्यालय
TRIBHUVAN UNIVERSITY

# पाटन संयुक्त क्याम्पस
# PATAN MULTIPLE CAMPUS

स्थापना २०११ / Estd. 1954

Phone 5260294, 5260394, 5260911, 5261676

तमसोमा ज्योतिर्गमय

क्याम्पस प्रमुखको कार्यालय
Office of the Campus Chief
Ph.: 5260510

पत्र संख्या/Ref. No. .....

पाटन ढोका ललितपुर, नेपाल
Patan Dhoka, Lalitpur, Nepal

मिति / Date 2074-4-23

Patan Multiple Campus
Patan Dhoka, Lalitpur

## LETTER OF RECOMMENTADATION

This thesis entitled ECONOMIC AND NON-ECONOMIC FACTORS AFFECTING STOCK PRICES IN NEPAL has been prepared by Mr. DIPENDRA KARKI under my guidance and supervision. I, hereby, recommend it in partial fulfillment of the requirements for the Degree of MASTER OF ARTS in ECONOMICS for final examination.

R Bhattarai

.....

Ram Chandra Bhattarai, Ph.D.
Professor

Date: August 2017

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Ph.: 5260510

पत्र संख्या/Ref. No. .....

पाटन ढोका ललितपुर, नेपाल
Patan Dhoka, Lalitpur, Nepal

मिति / Date Aug 16, 2017

Patan Multiple Campus
Patan Dhoka, Lalitpur

## LETTER OF APPROVAL

We certify that this thesis entitled ECONOMIC AND NON-ECONOMIC FACTORS AFFECTING STOCK PRICES IN NEPAL submitted by Mr. DIPENDRA KARKI to the Department of Economics, Faculty of Humanities and Social Sciences, Patan Multiple Campus, Tribhuvan University, in partial fulfillment of the requirements for the Degree of MASTER OF ARTS in ECONOMICS has been found satisfactory in scope and quality. Therefore, we accept this thesis as a part of the said degree.

**Thesis Committee**

.....
Head of Department
Kiran Bahadur Pandey
Associate Professor

.....
External Examiner
Tara Prasad Bhusal
Associate Professor

.....
Thesis Supervisor
Ram Chandra Bhattarai, Ph.D.
Professor
Date: August 2017

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This study has been prepared for the partial fulfillment of the requirements for the degree of Master of Arts in Economics. It is my privilege to complete this study entitled *Economic and Non-economic Factors Affecting stock Prices in Nepal* for identifying the various factors that are responsible for determining the stock prices in the Nepalese stock market.

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Kathmandu, Nepal. Dipendra Karki

# ABSTRACT

This thesis empirically examines the economic and non-economic factors of the stock market performance in Nepal. It considers the annual data of four macroeconomic variables; real GDP, inflation, interest rate and broad money supply from 1994 to 2016 and attempts to reveal the relative influence of these variables on stock prices represented by 'NEPSE Index' of the Nepalese capital market. In pursuance of this, it analyzes the cointegrating relationship between stock prices and macroeconomic variables. This study also intends to find the impact of major political announcements, policy changes and catastrophic event on stock returns. For this purpose, it uses daily data of stock prices with total 2241 observations and the impact of major events is tested for different event windows using the event analysis methodology. Empirical results obtained from OLS estimations reveal that the performance of stock market is found to respond positively to real GDP, inflation and money supply, and negatively to interest rate. More importantly, cointegrating evidence cannot be found between macroeconomic variables and stock market index which suggests that stock price movements in Nepal are not explained by the macroeconomic variables. It supports random walk hypothesis in Nepali capital market. The major finding is that the stock market responds significantly to changes in political environment and the policy measures of the government. The data presents important evidence on the speed of adjustment of stock prices to new events that the market readjust itself very quickly i.e. effect of any events did not last for more than three to five days. The results provide a consistent conclusion regarding the signalling effect and existence of information content hypothesis in Nepalese stock market and there is a strong linkage between stock returns and major social, economic and political events. These findings help to design policies to stabilize or stimulate the share market in Nepal.

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| | |
|---|---|
| ADF | Augmented Dickey-Fuller |
| CV | Coefficient of Variation |
| DW | Durbin-Watson |
| EMH | Efficient Market Hypothesis |
| INF | Inflation |
| IR | Interest Rate |
| M2 | Broad Money Supply |
| NEPSE | Nepal Stock Exchange Limited |
| NI | NEPSE Index |
| NRB | Nepal Rastra Bank |
| OLS | Ordinary Least Square |
| RGDP | Real Gross Domestic Product |
| SEE | Standard Error of the Estimates |
| SR | Stock Returns |
| VIF | Variance Inflationary Factor |
| $\alpha$ | Alpha |
| $\beta$ | Beta |
| $\varepsilon$ | Epsilon |
| $\chi$ | Chi |

# CHAPTER I

# INTRODUCTION

## 1.1 Background of the Study

The stock market serves as a veritable tool in the mobilization and allocation of savings among competing uses which are critical to the growth and efficiency of the economy (Alile, 1984). Through mobilization of resources the stock market promotes economic growth by providing avenue to pool large and long term capital through issuing of shares and stocks and other equities for industries in dire need of finance to expand their business. Thus, the overall development of the economy is a function of how well the stock market performs and empirical evidences have proved that development of capital market is indispensable for economic growth (Avadhani, 1996). It is through this segment that the country's exposure to the outer world is most readily felt.

The relationship of economy and Stock price has always been a subject matter of controversial debate. The pricing implication has come into attention since the publication of seminal work of Markowitz (1952) – the mean-variance portfolio theory. Since then, the stock prices volatility has received a great attention from both academicians and practitioners as it can be used as a measure of risk in financial markets. Establishing the empirical link between volatility and macroeconomic variable has proven to be very challenging. Based on US data, Schwert (1989) concludes that there is volatility puzzle: "The puzzle highlighted by the results in this paper is that stock volatility is not more closely related to other measures of economic volatility." Several Subsequent studies however, have found association between macroeconomic uncertainty and volatility (Arnold & Vrugt, 2006 and Kearney & Daly, 1998). Some studies find strong evidence that stock volatility increases during economic recessions (Bernanke, 1983). It seems that pricing volatility does not follow any pattern and not affected by economic variable. In some cases, it is closely related with macroeconomic variables and in some cases macroeconomic variables have no impact upon volatility.

There is an on-going debate on whether the market risk factors explain better or there are some other anomalies influencing stock prices. Varying evidences of relationship between macroeconomic variables with stock prices were widely documented in the existing literature. Researchers were successful in finding a relationship between stock prices and the different macroeconomic indicators in countries like Lithuania (Pilinkus, 2009), Turkey (Kandir, 2008), and Jordan (Maghayreh, 2003). There is in fact a relationship between stock prices and certain macroeconomic indicators (Fama & Schwert, 1977), those studies were mostly conducted in developed economies. While in the context of less developed economies, like Asian markets macroeconomic factors can't be reliable indicators for stock market price movements because of the inability of stock markets to fully capture information about the change in macroeconomic fundamentals (Fung and Lie, 1990). The relevance of the studies conducted on the developed economies is yet to be seen in the context of smaller, developing and under-developed capital markets.

It is generally argued that if the value of corporate equity depends on the economic movement in the country, then uncertainty in macroeconomic environment would affect volatility in stock returns assuming constant discount rates (Liljeblom & Stenius, 1997). There are several reasons why macroeconomic volatility affects stock returns. One of them is the implication of risk management. Adjasi (2009) stated that the use of information on macroeconomic environment could help market analysts and other market participants manage better the risk of their portfolios. The study further argues that policymakers are also better placed to manage the economy and help develop stock markets more efficiently by managing macroeconomic fundamentals that affect stock market returns. However, there are no unanimous findings as to which macroeconomic variable or a set of variables consistently predict the common stock returns. As opposed to developed stock markets, this issue has been less addressed and less explored in the context of emerging and developing markets.

The importance of stock markets as financial channels for saving and investment is gaining significant role in Nepalese economy. In general, volatility in the Nepal Stock Market is less than the average volatility of other developing countries (K.C, 2009). The reason is mainly low volume of trading equities due to low demand. However, in recent years volatility has increased due to the increase in the

volume of trading triggered by the speculative motives of investors. As evidenced from macroeconomic indicators of Nepal as of mid-July 2016, the ratio of stock market capitalization to GDP is about 94 percent. Macroeconomic stability, therefore, has become an important condition for financial development and economic growth of the country. In addition, investment plans and financial sector returns are driven largely by macroeconomic variables and hence influence the volatility on the stock market returns. In the light of these facts associated with macroeconomic environment of the country, it is necessary to examine how far stock market in Nepal is being influenced by macroeconomic variables and how far the stock market index serve as the leading indicator of macroeconomic volatility. This study is also an attempt toward this direction using more recent data on selected macroeconomic variables.

Not only the macroeconomic and fundamental factors are the signals of stock volatility, there are more other pieces of information, which can make investors react to market immediately after the new public information. Some of the events are unpredictable by the financial market, such as political risks (Beaulieu, Cosset and Essaddam, 2006) and earthquake (Papadakis, 2006). Researchers have proposed several analyses to specify the effects of politics on stock market volatility. Politics is found to be associated with increased volatility through electoral uncertainty (Vuchelen, 2003 and Martinez & Santiso, 2003), and political instabilities and uncertainties (Bittlingmayer, 1998 and Robbani & Anantharaman, 2002). Politics creates uncertainty which creates confusion among investors and influences the market volatility.

Beaulieu, Cosset and Essaddam, (2006) dealt with the political risk and its impact on share price. The study clearly shows that stock market was directly influenced by the existing and forecasting political risk and uncertainty. Papadakis (2006) has concluded that the earthquake generated abnormal returns. It implies in the current study that event-announcement may create abnormal returns to shareholders. If the security prices reflect not only on the information that contains the past time series of stock prices but also all publicly available information; then the market is said to be in a semi-strong form of efficiency. Generally, in the semi-strong form of market efficiency, announcement of new information immediately influences the investors' psychology. Thus, the stock market immediately reacts to the announcement of any new event including mergers and acquisitions, announcement of

dividend and earning, major changes in policies, unanticipated political announcement, business expansion and macro-economic changes. There are various factors that affect stock market price behaviors; they bring out over-or under-reaction in the market.

The study of events and stock price behavior occupies an important place in the economy. This study mainly deals with unexpected political events, major policy changes, and catastrophic events which create political risks and uncertainties in economic activities in the country. The changes in governments, dissolution of the Constituent Assembly (CA), promulgation of new constitution, economic broader blockade activities and rebels by opposition parties, and announcement of election are the major considerable political events. Similarly, major policy changes by central bank regarding margin lending and minimum paid up capital requirements for Banks and financial institutions are the considerable policy events and the occurrence of devastating earthquake Nepal-2015 is the considerable catastrophic event of the study.

The investors perceive the different unanticipated events in different ways, viz., as good news, bad news and no effect-news. One of the major characteristics of a perfectly efficient market is that all available information is reflected in prices. However, empirical studies show that this extreme version of the market efficiency hypothesis is not valid. Recent tests focus on the degree of market efficiency evaluated by the speed of adjustment of stock prices to new information.

The relationship between the stock price and its determinants is important to study for many reasons. First, it helps policy makers understand the full effect of prevailing and upcoming policies and regulations. Second, if investors were aware of this relationship and fully understood it, then they will make more informed investment decisions thus reducing their exposure to risk. And third, knowing which force leads the other can help in reducing the shock factor because the public will be somewhat aware of what might happen in the economy or the financial market and thus will be able to take protective measures.

Economic liberalization and financial sector reforms in Nepal have guided in a change in the financial architecture of the economy. This leads to the number of banks and financial institutions come in to operation, widening the scope for a re-examination of the relationship between the stock market and the economic and non-economic variables in Nepal. This study is an endeavour in this direction.

## 1.2 Statement of the Problem

Stock market facilitates the situation of country's economy. Growth in stock market prices is normally considered as a good sign since it implies the investors are confident about the future prospect of the economy. It helps to promote investment in the economy. However, a rapid increase in the stock market index is always a matter of concern. If the increase in the index is not justified by the country's macroeconomic indicators, such a rise cannot be sustained and eventually the index will plummet endangering the economic and financial stability. Hence, it is essential that the policymakers keep eyes on the stock market development and macroeconomic indicators to take appropriate measures, if needs arise, to prevent the build-up of bubbles and collapse in the market. For this, it is necessary to understand the relationship between the stock market index and the financial and non-financial factors that influence it.

Nepalese stock market has passed through different stages. Major political changes occurred during this recent decade and the market has jumped to all time high 1881.45 points on July 31, 2016 from all-time low of 292.31 points on June 15, 2011. What factors are responsible for these changes in volatility? Every individual specially related with stock market in this or that way, tries to get answer to these questions. Graham (1973) pointed out that stocks do well or poorly in the future because the businesses behind them do well or poorly-nothing more, and nothing less. Indeed in some markets, prices exhibit common movements that are hard to explain by movements in fundamentals (Watanabe, 2008). If fundamentals are not influential, then what else is responsible for changing stock prices over time?

There are several studies which examined the movement in stock prices. Schwert (1989) correlated these changes to the volatility of macroeconomic variables. Similarly, many others attempted to relate changes in stock prices and economic variables, including Maghayreh (2003), Kandir (2008), and Alagidede and Panagiotidis (2010). The majorities of existing literature underlying theoretical constructs establish a link between macroeconomic volatility and stock market prices based on transmission mechanism between the key macroeconomic variables, namely, inflation, interest rate, money supply, GDP etc.

The studies on common stock pricing behaviour of small and emerging capital markets lacked unanimous conclusion. The volatility in different smalls markets are

explained by different variables (Chaudhary, 1996). Adjashi (2009) analyzed the impact of macroeconomic uncertainty and modeled various GARCH processes to measure the volatility in small market and concluded that it is the transmission of volatility shocks of the developed markets. Thus the behavior of stock market is volatile, and till now its causes are unclear.

The stock market volatility is also linked with information efficiency. The introduction to an efficient market hypothesis (Fama, 1970) and the event study methodology (Fama et al., 1969) were the first articles to examine financial market efficiency and the speed with which markets adjust to new information. Empirical studies since then show how the equity market reacts to unanticipated information and conclusions are not robust. Survey of Foster (1973) indicated that the equity market overreacts to new information, under reacts to earnings announcements and, given economic factors, is too volatile. Therefore, although academics generally agree that equity markets are reasonably efficient, the debate on market efficiency is kept alive by the discovery of market anomalies. In light of this, the study seeks to test market reaction to new event announcement.

The stock price can also be affected by the events and unanticipated information. Kramer and Hyclak (2002) examined the impact of strikes on capital market and found statistically significant negative effects of the announcement of a strike on the cumulative average stock market returns of struck firms. Concurrently, the announcement of a strike had significant positive effects on the cumulative abnormal returns (CAR) of non - struck competitors in the same industries. Friend and Puckett (1964) show that the announcement to increase dividends results greater positive abnormal returns when the market direction is normal or ‘down’ and volatility is high. They have also presented that that announcements to decrease dividends create significantly greater negative abnormal returns when market direction has been up and volatility high i.e., investors react more strongly to bad news when the market has been up and highly volatile. The previous studies (i. e. Barrett et al. (1987); Bittlingmayer (1998), Beaulieu et al. (2006)) revealed that the stock market reacted immediately for a short or long period after the announcement of new unanticipated information.

It is believed that a well-developed stock market is the proxy for all events that take place in the economy (Robbani & Anantharaman, 2002). For a stock market to be

efficient to that extent, the prices should be adjusted based on both economic and non-economic information that may be relevant. A government usually attempts to steer its economy. News about future economic policies can be derived from political events such as elections, the formation of new government, changes in the composition of government, etc. The changes in the outcome of elections and therefore in the composition of the government, will most likely result in policy changes. This should affect economic variables such as unemployment, economic growth, and inflation. The macro-economic results are not entirely the consequence of the economy itself but are also dependent on the long and short-term policy choices of the government. Therefore, political party differences in economic policy have the potential to move the economy along different time paths, which should manifest in different returns to stockholders (Li and Born, 2006). This suggests a link between common stock returns and political outcomes.

The major inference of almost all the studies concerning with the event window is either positive or negative abnormal returns. Good news announcement affects investors' confidence positively towards the stock market. It creates positive abnormal market returns to shareholders. On the contrary, announcements of bad news lead investors towards the future uncertainties. Therefore, investors' tend to lose their confidence in the stock market and it generates negative abnormal market return. However, the conclusions of the studies are not unanimous in most of the cases. Thus, this study aims to fill such a research gap by analyzing the dynamic relationship of macroeconomic variables with stock prices and the impact of different social, economic and political events in Nepalese context. To sum up, the study basically deals with following research issues:

- What is the direction and magnitude of causal relationship between stock market prices and macroeconomic variables including real GDP, inflation, interest rate and money supply?
- Is there any long-run equilibrium relationship between stock market prices and macro-economy of Nepal?
- Does Nepalese Stock market react immediately to any new events and unanticipated information?
- How long is the market reaction to new events and unanticipated important public information last?

## 1.3 Objectives of the Study

The objective of this study is to examine the stock market efficiency. The general objective is to analyze the equilibrium relationship between stock prices and macro-economy and assess the adjustment of stock prices to the social, economic and political events. However, the specific objectives are as follows.

i. To examine the direction and magnitude of causal relationship between stock market prices and macroeconomic variables.
ii. To analyze the existence of long run relationship between stock prices and macroeconomic variables.
iii. To evaluate the impact of major social, economic and political events on stock returns.
iv. To assess the time duration of market reaction to the social, economic and political events in the Nepalese stock market

## 1.4 Research Hypotheses

The aim of the study is to test the following hypothesis:

First Hypothesis

$H_1$: There is a significant and positive relationship with GDP and stock prices.

Second Hypothesis

$H_1$: Inflation has significantly positive relationship with stock prices.

Third Hypothesis

$H_1$: Interest rate has significant and negative relationship with stock prices.

Fourth Hypothesis

$H_1$: Money supply has significant and positive relationship with stock prices.

Fifth Hypothesis

$H_1$: There is a long-run relationship between stock prices and the economy.

Sixth Hypothesis

$H_1$: The major events of social, economic and political context impacts significantly in stock prices.

## 1.5 Significance of the Study

This study makes an academic contribution to the field of Nepalese capital market by addressing the lack of research on dynamic relationship between stock prices and economy incorporating the influences of major events and unanticipated public information (social, economic and political). Since, the Nepali capital market has witnessed a tremendous growth and remarkable changes in its institutional setup; this study is particularly significant towards framing the policy measures in its development. The study also has important practical significance as it can improve the performance of the portfolio. Understanding the relations between stock market prices and macro-economy and the impacts of new events, investors can buy more stock when the macroeconomic stage is beneficial to the stock market and vice versa.

## 1.6 Outline of the Study

The study report has been organized into five chapters. Chapter one is the introduction chapter that includes general background, statement of the problem, objectives of the study, research hypotheses and outline of the study. The chapter two consists of review of literatures related to studies in global context as well as the review of studies in Nepalese context. Chapter three deals with research methodology applied in the study. This chapter includes research design, nature and sources of data, selection of the events, statistical tools and models, methods of analysis and limitations of the study. Chapter four discusses the results from the analysis and presentation of data. Chapter five presents summary, conclusions and recommendations of the study. Finally, this thesis ends up with general recommendations based on the empirical results of data analysis and major findings of the study.

# CHAPTER II

# REVIEW OF LITERATURE

## 2.1 Introduction

This chapter provides theoretical background of the study and deals with review of empirical evidences associated with economic and non-economic factors affecting stock prices. It is divided into three sections. The first section presents a theoretical consideration of the study. Second section consists of an in-depth review of related studies in the context of both developed and emerging stock markets around the globe. It also includes brief reviews of empirical works conducted in the context of Nepal. And, finally the third section presents concluding remarks on the theoretical and empirical review of literatures.

## 2.2 Theoretical Concept

The modern study on the behavior of stock market prices can be traced back to 1930, when Fisher explained how the market rate of interest and inflation affected the stock prices (Fisher, 1930). Several extensions have been made on this model incorporating several macro-economic and other structural variables in determining the stock market prices. There are some models which describes about the stock valuation and its movements. Among them, Dow Theory, Random Walk theory and Efficient Market Hypothesis are important models.

### 2.2.1 Dow Theory

Dow Theory is considered as the pioneer work in technical analysis of stock pricing. Robert (1932) expounded and refined the original ideas into 3 basic tenets that served as the foundation of the Dow Theory. (a) *The Primary Trend is Inviolate:* While the secondary and minor trend of the market could possibly be manipulated by some traders, the primary trend was the result of long term economic cycles that could not be significantly affected by a few traders. (b) *The averages discount everything:* One meaning of discount as a very is to anticipate something that may have an impact on something being considered and making adjustments to it. Hence the word is being used to say that stock prices already reflect all that is known about it or anything related to it by all of the market participants trading the stock at a particular time. Stock prices are set by the equilibrium of supply and demand, and supply and demand is the result of all influences that may affect prices, including each individual trader's

knowledge of present conditions and expectations of the future. (c) *The Dow Theory is not infallible:* The forecasts can never be 100% accurate or even close to it because the stock market and stock prices are the result of many complex interactions. But by studying the market with an emotional detachment, one can anticipate market moves and make profits greater than loses.

This theory believed that the best way to make money in the market was to ride the primary trend. Secondary and minor trends were considered too unpredictable. Dow used confirmation of his two averages as a means to verify that a new primary trend was in place, since the primary trend is powered by the economic trend, which affects most business. The main criticism of the Dow Theory was that trends were lagging indicators and that by the time the primary trend was confirmed, the primary trend was already in place, and the investor lost part of that move. But on the other hand, the investor would not have lost if the trend reversal was only a secondary or minor trend. After the elapse of more than a century since Charles Dow's death, his basic idea still remain true. The easiest way to make money in the market is to follow the primary trend, for that is the easiest trend to see and to forecast. There may be traders who make a lot of money on shorter trends, but most of them probably do not make enough to just the amount of time they are spending watching the markets or the anxiety they feel as the markets twist and turn on a whim, and those who are most successful may be so because of luck.

### 2.2.2 Random Walk Theory

Malkiel (1973) stated that the past movement or direction of the price of a stock or overall market cannot be used to predict its future movement. It is the occurrence of an event determined by a series of random movements – in other words, events that cannot be predicted. For example, one might consider a drunken person's path of walking to be a random walk because the person is impaired and his walk would not follow any predictable path. Applying the random walk theory to stocks suggests that stock prices change randomly, making it impossible to predict stock prices. The random walk theory corresponds to the belief that the markets are efficient, and that it is not possible to beat or predict the market because stock prices reflect all available information and the occurrence of new information is seemingly random as well.

Malkiel took the results of random output on flipping coins by his students in a chart and to a chartist who seeks to predict the future movements by observing past patterns on the assumption that the history tends to repeat itself. The chartist told him that they needed to immediately buy the stock. When Malkeil told him it was based purely on flipping a coin, the chartist was very unhappy. Malkiel argued that the market and stock could be just random as flipping coin. In short, random walk says that stocks take a random and unpredictable path. The chance of a stock's future price going up is the same as it is going down. A follower of random walk believes that it is impossible to outperform the market without assuming additional risk.

This theory preaches that both technical analysis and fundamental analysis are largely a waste of time and are still unproven in outperforming the market. He constantly states that long terms buy and hold strategy is the best and that individuals should not attempt to time the markets. Attempts based on technical, fundamental, or any other analysis are futile. He backs this up with statistics showing that most mutual funds fail to beat benchmark averages like the S & P 500. While many still follow the preaching of Malkeil, others believe that the investing landscape is very different than it was when he wrote his book nearly 40 years ago. Today, everyone has easy and fast access to relevant news and stock quotes. Investing is no longer a game for the privileged.

### 2.2.3 Efficient Market Hypothesis (EMH)

Fama (1970) used the phrase "Efficient Market" to describe the market price that fully reflects all available information. The efficient-market hypothesis (EMH) asserts that financial markets are "informationally efficient". That is, one cannot consistently achieve returns in excess of average market returns on a risk-adjusted basis, given the information publicly available at the time the investment is made. It is important to note, however, that in the empirical work to date, the usual procedure has been to infer market efficiency from the observed independence of successive price changes. There has been very little actual testing of the speed of adjustment of prices to specific kinds of new information.

A generation ago, the efficient market hypothesis was widely accepted by academic financial economists. It was generally believed that securities markets were extremely efficient in reflecting information about individual stocks and about the stock market as a whole. The accepted view was that when information arises, the

news spreads very quickly and is incorporated into the prices of securities without delay. Thus, neither technical analysis nor even fundamental analysis help investors select “undervalued” stocks to achieve returns greater than those that could be obtained by holding a randomly selected portfolio of individual stocks with comparable risk.

Fama classifies the market efficiency into three levels on the basis of the information: The three major versions of the hypothesis are "weak", "semi-strong", and "strong". In *weak-form efficiency*, future prices cannot be predicted by analyzing prices from the past. Share prices exhibit no serial dependencies, meaning that there are no "patterns" to asset prices. This implies that future price movements are determined entirely by information not contained in the price series. Hence, prices must follow a random walk. Weak EMH claims that prices on traded assets already reflect all past publicly available information. In *semi-strong-form efficiency*, it is implied that share prices adjust to publicly available new information very rapidly and in an unbiased fashion, such that no excess returns can be earned by trading on that information. It implies that neither fundamental analysis nor technical analysis techniques will be able to reliably produce excess returns. In *strong-form efficiency*, share prices reflect all information, public and private, and no one can earn excess returns. If there are legal barriers to private information becoming public, as with insider trading laws, strong-form efficiency is impossible, except in the case where the laws are universally ignored. Strong EMH additionally claims that prices instantly reflect even hidden or "insider" information.

There is evidence for and against the weak and semi-strong EMHs, while there is powerful evidence against strong EMH. The market is efficient in a semi-strong form if the security prices reflect not only the information that contains the past time series of stock prices but also all publicly available information. This means that the stock price is adjusted rapidly and in an unbiased way to all-important public announcements in newspapers, annual reports, corporate forecasting and related notices. (Fama, 1970). The primary issue is that the prices reflect all available information in such a way that one can earn abnormal returns. The time for the adjustment for any new information is considered as a critical factor. By the start of the twenty-first century, the intellectual dominance of the efficient market hypothesis had become far less universal. Many financial economists and statisticians began to believe that stock prices are at least partially predictable.

## 2.3. Review of Empirical Evidences

This section provides a review of major empirical studies associated with macroeconomic influences on stock prices, stock market reaction to social, economic and political events and review of related Nepalese studies.

### 2.3.1 Macroeconomic Variables and Stock Prices

As regards ongoing debate on what works on stock market pricing, it has been recognized in the recent years that stock markets cannot persistently function in isolation from the macroeconomic conditions. Conceptually, as the return on a security is measured as the sum of its future dividend flows, discounted by a proper discount factor, variables that affect future dividend flows and the discount factor would also affect the stock returns. Thus macroeconomic variables that reflect the state of economy serve as the natural candidates for the common factors. Chen, Roll, and Ross (1986) identified four macroeconomic factors, namely changes in industrial production, changes in expected and unexpected inflation, changes in risk premium, and changes in term structure, as the fundamental macroeconomic forces in affecting stock market returns. The study demonstrated that the macroeconomic factors could significantly explain cross-section of stock returns. Similarly, Flannery and Protopapadakis (2002) found significant relationship between stock returns and macroeconomic variables such as inflation and money growth. Thus, these studies have formed a base for the long-run relationship and short-run dynamic interactions among macroeconomic variables and stock market prices.

The dynamic relationships between macroeconomic variables and stock market returns have been widely discussed and debated. The discussion basically centers on the use of the models which states that share prices can be written as expected discounted cash flows. Thus, the determinants of share prices are the required rate of return and expected cash flows (Elton & Gruber, 1991). Economic variables which impact future cash flows and required returns can therefore be expected to influence share prices.

Gross domestic product is one of the fundamental macroeconomic variables employed in the past studies to trace out macroeconomic influences on stock market prices. Gross domestic product (GDP) is used as a proxy of real aggregate economic activity in an economy. It is regarded as the value crated by productive sector of a nation. Stock returns are largely influenced by real and productive sector activity in a

country. Higher GDP represents economic prosperity of the country and stock returns are expected to influence positively with the increase in the GDP. The empirical studies associated with macroeconomic influences on stock returns have suggested mix evidences about GDP influence. For example, Flannery and Protopapadakis (2002) found no role of GDP to explain the common stock returns in USA. On the contrary, Ibrahim and Aziz (2003) found positive long-term relation between GDP and stock returns in Malaysia.

GDP is closely related to industrial production growth in an economy. Therefore, besides GDP, industrial production growth is also regarded as another proxy for real sector activity and indicates how overall industrial sector is growing in the country. The growth in industrial productivity is expected to lead to growth in stock market activities and hence the stock returns. McMillan (2005) tested how stock prices respond to the volatility of industrial production in the US market. The study reported a significant positive relation between the real sector activity (proxied by GDP and industrial production growth) and stock returns. The underlying fact behind such relationship is that an increase in the real sector raises the future cash flow that creates a higher future dividend. With the expectation of higher dividend, investors are always willing to buy shares of common stocks at higher prices. Studying a group of six European countries, Nasseh and Strauss (2000) also found similar results. Hence, studies have shown a positive relationship between stock prices and real sector activity (RGDP) on the domestic markets.

Aggregate money supply in the economy and the rate of inflation are another interrelated macroeconomic variables influencing stock market activity and hence the common stock returns. There are three dominant hypotheses, namely, tax effect, proxy effect, and the reverse causality, explaining the effects of inflation on stock market returns. The tax effect hypothesis argues that inflation introduces a corporate tax liability and reduces real after-tax earnings, thus reducing common stock returns. The proxy effect hypothesis explains that real activity is positively related to common stock returns, but negatively related to inflation through the money demand effect. As a result, there is a negative relation between stock returns and inflation. Similarly, reverse causality hypothesis states that future economic activity is correlated with increased domestic borrowing or increased supply of money. This simply means that an increase in domestic borrowing or issuance of money has inflationary effects that dampen real activity. In the end, stock market returns also fall due to fall in real

activity and the inflationary effect and hence the negative relation exists between stock market returns and the inflation. However, the empirical evidences on relationship between inflation and stock returns found that holding of stocks provides a good hedge (Ibrahim & Aziz, 2003, Alagidede & Panagiotidid, 2010, and many others). This study also assumes the positive relationship of inflation and money supply on stock prices.

Besides GDP, money supply and inflation, the interest rate risk is another important financial and economic factor affecting the value of common stocks. There are important reasons why the stock returns can be responsive to interest rate changes. The volatility transfer hypothesis suggests that a random shock can induce higher volatility in financial markets and because of infectivity effect which are the highest in more volatile markets, investors may look to invest in alternative financial assets. Thus, greater exposure to interest rate risk is likely to affect the stock returns. In deed, the stock prices and hence stock returns would differ according to their sensitivity to interest rates in the state of equilibrium. Mukherjee and Naka (1995) observed that changes in both short-and long-term government bond rates would affect the nominal risk-free rate and thus affect the discount rate resulting into a change in stock prices. Reily and Brown (2000), however, argued that cash flows from stocks could change along with interest rates and it would not be certain whether this change in cash flows would augment or offset the change in interest rates.

Though controversies exist about exact relationship between interest rates and stock market returns, this study hypothesizes a negative relationship between interest rates and stock prices basically for two reasons. First, interest rates can influence the level of corporate profits which in turn influence the price that investors are willing to pay for the stock through expectations of higher future dividends payment. Most companies finance their capital equipment and inventories through borrowings. A reduction in interest rates reduces the cost of borrowing and thus serves as an incentive for expansion. This will have a positive effect on future expected returns for the firm. Second, as considerable stocks investments are made with borrowed money, hence an increase in interest rates would make stock transactions more costly. Investors will require a higher rate of return before investing. This will reduce the demand for stock investment and thus lead to decline in stock prices.

**a. Review of Major Studies on Macroeconomic variables till 2000**

The major studies on macroeconomic influences on stock prices till the year 2000 are summarized along with their major findings.

Fisher (1930) conducted the study regarding the behavior of stock market prices and explained how the market rate of interest and inflation affected the stock prices. As the rate of inflation rises, the nominal rate of interest also goes up. Consequently, real rate of interest remained the same in the long run. Thus, it was concluded that there was a positive one-to-one relationship between rate of inflation and stock prices.

The analytical study on reaction of stock prices to the new information about inflation was conducted by Schwert (1981). The author extended the evidence on the relationship between stock returns and inflation by examining the daily returns from 1953-1978. The study revealed negative reaction of stock markets to the announcement of unexpected inflation in the CPI, although the magnitude of the reaction was small. It postulated that the stock markets did react to unexpected inflation around CPI announcement time, and the stock markets did not seem to react to unexpected inflation during the CPI sampled period, that is, several weeks before the announcement date.

With regard to risk premium for common stock returns associated with unemployment and inflation, Gertler and Grinols (1982) investigated the monthly returns on 712 securities listed on the New York Stock Exchange from January 1970 to January 1980. The study observed statistical relationship between expected security returns and the macroeconomic setting. The addition of unemployment and inflation improved the explanatory power of the regressions significantly. Further, each macroeconomic factor was statistically significant on average over the period. Particularly, the results indicated negative relationship of stock returns with inflation including market as a whole.

In an attempt to investigate the relation between common stock returns and inflation in twenty-six countries, Gultekin (1983) used monthly inflation rates for individual countries from January 1947 to December 1979. The inflation rates were calculated as the percentage changes in the consumer price indices reported in International Financial Statistics (IFS) published by the International Monetary Fund. The stock market returns were obtained from IFS report on stock market indices and Swiss-based investment service Capital International Perspective (CIP). Employing time series regressions, the study found no reliable positive relation between nominal stock returns and inflation rates for the period January 1947 to December 1979

because the regression coefficients were predominantly negative. The study also indicated no stable relation between stock returns and inflation over the period.

Chen, Roll and Ross (1986) found a long-term equilibrium relationship between stock prices and relevant macroeconomic variables, namely, term structure of interest rate, industrial production, inflation, among others, between 1953 and 1984 in the US stock market. The study revealed that industrial production and measure of unanticipated inflation could explain the expected stock returns significantly.

In an attempt to evaluate the relationship of stock returns with inflation and real activity in the context of Canada, Cozier and Rahman (1988) used quarterly data on these variables for the period 1958 to 1983. The evidence from the study showed an inverse relation between real stock returns and inflation. As the study noted, such a relation, if systematic, could signify non-neutrality, and would mean that common stocks could not be a good hedge against inflation. Similarly, it also carried out an investigation of the causal nature of the relation and found no evidence that inflation caused real stock returns. In particular, the causality tests suggested that real stock returns were exogenous with respect to inflation rates.

The relationship of stock volatility with respect to real and macroeconomic volatility was examined by Schwert (1989). Using the monthly standard deviation of stock returns on Standard and Poor's composite portfolio from January 1928 through December 1987, and daily estimates of returns from February 1885 through December 1927 on the Dow Jones composite portfolio, the study examined whether the financial assets volatility could predict macroeconomic volatility or vice versa. The macroeconomic variables used in the study were Producer's Price Index (PPI) inflation, monetary base growth and the industrial production growth. The study indicated a significant relationship between stock returns and PPI inflation during sub-period 1953-1987. For the rest of the period, the PPI were found to have no power to explain the financial assets return. Thus, study noted weak evidence that macroeconomic volatility could help predict stock and bond returns volatility.

The relationship between changes in financial investment opportunities and changes in the macroeconomic variables in context of US was studied by Chen (1991). The study pointed out that the market excess returns could be forecasted using macroeconomic variables such as lagged production growth rate, the term structure, the T-bill rate, the default spread and the dividend yield. The market excess return was observed negatively related to the economic growth variables such as T-bill rate,

lagged production growth rate, the default spread and term structure and positively related to expected future economic growth rate such as the market dividend price ratio and unexpected future GNP growth.

The empirical testing of the dynamic relationship between macroeconomic variables and the Japanese stock market was made by Mukherjee and Naka (1995). The study used six macroeconomic variables and employed a vector error correction to a model of seven equations. They found that a long-run equilibrium relationship exists between the Japanese stock market and the six macroeconomic variables such as exchange rate, money supply, inflation, industrial production, long-term government bond rate and call money rate.

Pethe and Karnik (2000) dealt with inter-relationships between stock prices and important macroeconomic variables, namely prime lending rate, exchange rate, narrow money supply, broad money supply, and index of industrial production in the context of Indian stock market. The results indicated that not a single pair of variables tested was cointegrated. The study also revealed a weak evidence of causality running from index of industrial production to stock market index. The study pointed that the changes in state of economy, as proxied by index of industrial production, could have a bearing on stock prices, but not the other round. There was no evidence to suggest that a revival of the stock market, in the sense of rising share prices, could be a leading indicator of the economy.

## b. Review of Major Studies on Macroeconomic Variables after 2000

The studies on macroeconomic influence on stock market returns after 2000 are summarized with their major findings.

Maysami and Koh (2000) concluded that changes in the macroeconomic variables can predict the stock market movements. As Maysami and Koh study for the case of the U.S., Singapore, and Canada, it could be inferred that the significant influence of the macroeconomic variables on the stock market index is rather empirically proven for the developed countries. Nonetheless, the empirical finding for the case of the developing economies is still a puzzle. Despite the existence of a unidirectional causality from economic activities to stock market, there are also a substantial number of studies that show a significant relationship, running from stock market to economic variables.

Geyser and Lowies (2001) examined the relationship between share prices and inflation within a sample of firms listed in Namibian and Johannesburg Stock Exchanges. Their findings revealed a strong positive correlation between inflation and stock prices of Namibian firms. In South Africa, companies belonging to the mining sector cannot be served as an inflation hedge, whereas stock prices of firms in other sectors are slightly positively correlated with inflation.

An investigation into the response of the NASDAQ Financial 100 index to macroeconomic news was carried out by Ewing (2002) using the data from January 1988 to September 2000. The macroeconomic variables used in the study were, monetary policy shock, real output, inflation and risk. The results indicated that monetary policy shocks reduced financial sector returns having significant initial impact that continued to affect returns for around 2 months. Unexpected changes in economic growth was found to have a positive effect but exhibited no persistence. Similarly, an inflation shock was associated with a negative and statistically significant initial impact which did last for up to 1 month after the time of shock.

Flannery and Protopapadakis (2002) evaluated the effect of macroeconomic variables on the daily returns to a broad equity market index over the 1980-1996 periods. The study included daily returns for the value-weighted NYSE, AMEX, NASDAQ market index obtained from CRSP. It reported the significant effect of consumer price index, PPI, and money supply on market value weighted returns. All three coefficients were significantly negative indicating that higher than anticipated inflation or money supply depressed equity values. The study also demonstrated the significant negative effect of real gross national product on volatility.

The relationship between stock prices and some macroeconomic factors was examined by Wongbangpo and Sharma (2002) in five ASEAN countries (Indonesia, Malaysia, Philippines, Singapore & Thailand). Results suggested that, in the long-run, stock prices are positively related to growth in output. In the short-run, stock prices are found to be functions of past and current values of macroeconomic variables.

Ibrahim and Aziz (2003) in an attempt to establish a dynamic linkage between stock prices and macroeconomic variables in the case of Malaysia, analyzed standard and well-accepted methods of co-integration and vector auto-regression. The study considered the interactions between the Malaysian equity market and four macroeconomic variables including real output, money supply, price level and exchange rate. The study used data from January 1977 to August 1997. The study

found a positive long-run relationship between stock prices and industrial production. This result was as per expectation and as such the study reasoned that real industrial production growth affect firm's expected future cash flow positively. It also reported a positive relationship between stock prices and inflation in context of Malaysia.

Maghayereh (2003) investigated the long run relationship between the Jordanian stock prices and selected macroeconomic variables, such as interest rates, inflation and industrial production, by using Johansen's co-integration analysis and monthly time series data over the period from January 1987 to December 2000. The results suggested a co-integration of stock price index with macroeconomic variables and provided a long run equilibrium relation with stock price index. Additionally, the study concluded that macroeconomic variables could be significant in predicting stock prices as such that stock price variability being fundamentally linked to economic variables.

The existence of long-term equilibrium relationship between stock prices and certain macroeconomic variables was examined by Adel (2004). The macroeconomic variables used in the study were real economic activity, money supply, inflation, and interest rate. The vector error correction model was used to determine the impact of these macroeconomic variables on Amman Stock Exchange (ASEX). The sample period consisted of 92 quarterly observations for each variable from March 1980 to December 2003. The study reported a reliably negative relation between stock prices and inflation; whereas the level of real economic activity affected the stock price positively. The results also showed that the money supply could have positive influence on stock prices. Among other, the study postulated that industrial production was one of the positive determinant factors of stock prices consistent to the findings of Chen, Roll and Rose (1986) and Mukherjee and Naka (1995).

In an attempt to examine the long-run equilibrium relationship between macroeconomic variables and the Singapore stock market index, Maysami, Howe and Hamzah (2004) used monthly time-series data. The study documented a significant positive relationship between inflation and Singapore stock returns. A possible explanation for the positive relationship, as study postulated, might be the government's active role in preventing prices escalation as the economy continued to improve after the 1997 crisis. The study also posited a significant positive relation between stock returns and real economic activity as proxied by the industrial production index as observed by Chen, Roll and Ross (1986).

Chen et al. (2005) used the yield spread to measure the term structure effect on the Taiwanese hotel stock returns. 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 for stock prices. This could be as suggested by Mukherjee and Naka (1995) that changes in both short and long term rates are expected to affect the discount rate in the similar way.

Gan, Lee, Yong and Zhang (2006) examined the relationship between the New Zealand Stock Exchange (NZSE) index and a set of macroeconomic variables during the period of January 1990 to January 2003 using time series data on inflation, long-term interest rate, short-term interest rate, real gross domestic product, and narrowly defined money supply. The co-integrated test indicated the existence of long run relationship between NZSE index and the macroeconomic variables. The study observed that New Zealand stock returns could be consistently determined by the interest rate, money supply and real GDP.

Coleman and Tettey (2008) examined the effect of macroeconomic variables on the performance of stock markets by using Ghana Stock Exchange as a case study. The study was based on time series data covering the period 1991-2005 and used co-integration and error correction techniques to ascertain both short-term and long-term relationships. The study revealed adverse effect of lending from deposit money banks on stock market performance and particularly found to serve as major hindrance to business growth in Ghana. Again, while inflation rate was found to have negative effect on stock market performance, the results indicated that it would take time for this to take effect due to the presence of a lag period and that investors would benefit from exchange-rate losses as a result of domestic currency depreciation.

Kandir (2008) investigated the role of macroeconomic factors in explaining Turkish stock prices. The macroeconomic variables used in the study were growth rate of industrial production index, change in consumer price index, growth rate of narrowly defined money supply, change in exchange rate, and interest rate. The study used data for all non-financial firms for the period from July 1997 through June 2005. Three portfolios were formed according to the rank of the firms by book-to-market equity, earnings yield, and leverage ratio. The study revealed significant effects of exchange rate and interest rate on stock returns. Similarly, inflation rates were found positively related to the stock prices. The study demonstrated a negative relation

between stock returns and interest rate meaning that investors tended to invest less in stocks when interest rate rise causing stock prices to fall.

The relationship between Chinese stock market indices and a set of macroeconomic variables was investigated by Liu and Shrestha (2008). The variables used in the study were; money supply, industrial production, inflation, exchange rate and interest rate. Using heteroscedastic cointegration analysis and monthly data covering January 1992 to December 2001, the results showed that the cointegration relationship did exist between stock prices and the macroeconomic variables in the highly speculative Chinese stock market. Detailed analysis indicated that the stock market performance was positively related to that of macro economy in the long-run. Particularly, the study demonstrated a positive relationship between stock prices and industrial production and money supply, and a negative relationship between stock prices and inflation, interest rate and exchange rate.

Adjasi (2009) analyzed the impact of macroeconomic uncertainty on stock price volatility in Ghana Stock Exchange (GSE). Data on stock market price index were obtained from the GSE, while macroeconomic variables - consumers price index (proxy for inflation), exchange rate, money supply, and interest rates were obtained from the International Monetary Fund's Statistical CD-ROMS. The study used volatility models to estimate the effect of macroeconomic volatility on stock returns due to the time-varying volatility nature of financial returns. Using autoregressive conditional heteroscedasticity (ARCH) model, the study found significant ARCH effect parameters for all variables except cocoa prices, inflation and oil prices. The asymmetric parameter showed the presence of a significant leverage effect for inflation and interest rate. The positive sign in the case of inflation indicated that a positive shock in inflation could increase volatility more than a negative shock. The study also reported the presence of a significant volatility persistence effect in the exchange rate, stock prices, money supply, and interest rates.

Pilinkus (2009) analyzed relationship between a group of macroeconomic variables and Lithuanian stock market index to investigate whether stock prices serve as a leading indicator for macroeconomic variables in Lithuanian economy or vice versa. The study employed Granger causality tests to estimate the relationship between Lithuanian stock market index and forty macroeconomic variables depicting the health of Lithuanian economy from December 1999 to March 2008. The study revealed that some macroeconomic variables, for example, GDP deflator, net export,

foreign direct investment, could lead stock market returns, while some variables such as GDP, material investment, construction volume index were led by the stock market index. Finally, other macroeconomic indices such as money supply, payment balance, and stock market returns were found to cause each other.

The study by Abu-Libdeh and Harasheh (2011) investigated the correlation and causality relationships between stock prices and some macroeconomic variables in Palestine. Two methodologies were used in order to determine the relationships. First they used a regression analysis for ten years' quarterly data (40 observations) taking quarterly market index as dependent variable and five macroeconomic variables (inflation, GDP, exchange rate, Libor rate and balance of trade) as the independent variables. Second, Granger causality test was conducted to assess the causality relationship. The results of the regression analysis as a whole indicated a significant relationship between the macroeconomic variables and stock prices. Moreover, the causality analysis negated any kind of causal relationships between each particular macroeconomic variable and stock prices.

The relationship between macroeconomic variables and the Nigerian capital market index was examined by Osamwonyi and Osagie (2012). The study considered the yearly data of several macroeconomic variables; interest rates, inflation, exchange rates, fiscal deficit, GDP and money supply from 1975 to 2005; and tried to reveal the relative influence of these variables on the 'All Share Index' of the Nigerian capital market. In pursuance of this, the Vector Error Correction Model (VECM) was used to study the short-run dynamics as well as long-run relationship between the stock market index and the selected macroeconomic variables. The major finding was that macroeconomic variables influence stock market index in Nigeria. It was recommended that the adoption of appropriate economic policies will be beneficial to the stock market and this in turn would result in needed growth in the capital market.

To sum up, many of these studies have documented that macroeconomic variables do influence stock market prices and hence the stock returns, though the results are not consistent. Some found that inflation has significant effect on stock market returns while others found that real sector activity proxied by GDP captures much of the variation. Though these findings are available in many developed foreign stock markets, the effect of macroeconomic indicators is yet inconclusive in Nepalese stock market. Hence, this study attempts to reexamine the association among these variables in predicting stock prices in the context of Nepal.

### 2.3.2 Review of Literature on Social, Economic and Political Events

It is a fact that event studies have a long history. Studies of the semi-strong form of the efficient markets hypothesis can be categorized as tests of the speed of adjustment of prices to new information. The principal research tool in this area is the event study. An event study averages the cumulative performance of stocks over time, from a specified number of time periods before an event to a specified number of periods after. Performance for each stock is measured after adjusting for market-wide movements in security prices (Dimson & Mussavian, 1998). In such cases, event studies provide evidence on the reaction of share prices to announcement of new unanticipated public information.

This section provides review of empirical works associated with the event studies on common stock returns. A brief overview of the past studies along with major findings is broken down into three sub-titles and discussed below.

#### a. Market Reaction to Major Political Events

The impact of political events on the stock market stresses uncertainty over the policies that the next government will pursue like elections by definition always open a period of political uncertainty, as the winner remains to be determined.

Bittlingmayer (1998) investigated stock volatility and output in a case marked by a clear exogenous political shock in Germany. The study was focused on the connection between political events and stock prices during and after the First World War. The study employed multiple regressions to analysis data. The study found that the increase in German volatility in the late 1800s and early and mid-1920s seems closely linked to the shift from ascendant empire to beleaguered republic. Thus, political uncertainty simultaneously effect to stock prices and output. In other words, it can conclude that there is influence of political outcomes on the business cycle and stock market. To sum up, when uncertainty is taken into account, stock prices discount investor's expectations concerning possible future corporate developments. In efficient markets, investors predict market in a rational way by making use of all available information, and prices react instantaneously to news. Perotti and Oijen (2001) also report that changes in political risk in general tend to have a strong effect on local stock market development and excess returns in emerging economies.

In the next study, examined the impact of strikes on capital market from 1982 to 1999 with 256 firms' strikes (pair sample struck firms and non-struck firms) by

Kramer and Hyclak (2002). The study revealed that statistically significant negative effects of the announcement of a strike on the cumulative average stock market returns of stuck firms. Concurrently, the announcement of a strike had significant positive effects on the cumulative abnormal returns (CAR) of non-struck competitors in the same industries.

Bilson et.al.(2002) investigated the relation between political risk and stock returns within the context of emerging markets in the Pacific-Basin. Their findings reveal that political risk is important in explaining return variation in individual emerging markets, particularly in the Pacific-Basin, but not in developed markets. Political risk is the threat that politics or political players will have a negative impact on a firm's asset values, costs, or revenues.

The study by Robbani and Anantharaman (2002) also showed that the financial markets do not ignore important political events. Stock market prices reacted properly only to those events that seem to have some long-term effects. The results also support the notion that emerging stock markets too are of semi strong form efficiency in the sense that they reflect not only relevant

Vuchelen (2003) investigated whether Belgian elections and the ideological composition of the government may affect the performance of the Brussels stock market. By using the multiple regressions model, the author reported that elections and new governments are events that supply information on future economic and financial policies. The results indicate that the ideological composition of the government is an important variable of stock market. The study suggests that the election and ideological composition of the government partners affect the common stock returns.

Martinez and Santiso (2003) provide the additional evidence on the political (*i.e.* elections) event. This article focuses on the interactions between politics and financial markets in emerging economies. More precisely, it examines how Wall Street reacts to major Latin American political events. The case study focuses on the 2002 Brazilian presidential elections. The specific case study of Brazil, analysed through the perceptions of Wall Street analysts and a historical and quantitative economic perspective, has shown that these ties are strong for emerging markets. In fact, the essential character of emerging markets lies precisely in this intricate link between political uncertainty and financial volatility what could be called the 'economic fog' of democratic uncertainty.

Li and Born (2006) analyses the relationship between the presidential election uncertainty and common stock returns in the United States, showing the stock returns on the pre- and post-election. Authors report that the mean daily common stock return rises in the roughly three-month period before a US presidential election when the outcome of the election is uncertain. Similarly, the study provides weak evidence that the presidential election cycle is associated with higher return variability when outcome is uncertain. However, volatility is virtually identical to non-election periods when the outcome is not in doubt. This evidence is consistent with the hypothesis that investors see a causal link between political uncertainty and common stock return generation. It indicates that political uncertainty is observed by and priced in the equity market. This link between politics and stock market is found in an unbiased framework consistent with the market efficiency hypothesis.

Beaulieu *et al.* (2006) examined the short run effect of the 30 October 1995 Quebec referendum on the common stock returns of Quebec 102 firms in Canada. The study used GARCH model to measure the stock price volatility. The study found that the referendum outcome did affect portfolio returns of Quebec firm portfolio. The effect of the referendum results on these stock returns is positive and statistically significant for all four portfolios. The reaction of stock market is larger for domestic firms than multi-national firms. The study revealed that political uncertainty could affect short-run stock returns of Quebec and Canadian firms when the uncertainty cannot be anticipated by financial market.

**b. Market Reaction to Major Policy Changes**

Since, stock prices anticipate and capitalize policy changes, the analysis of the effects of the political events on stock market could indicate the economic importance of expected changes in economic policy.

The effect of taxation on stock prices has investigated by Amoako-Adu (1983). The study employed the event study approach to assess the impact of capital gain taxes in Canada. The paper used monthly data to examine the impact of the introduction of capital gains taxes in 1971, as well as subsequent changes in 1977 on stock prices. The study found that changes in the relative taxation of dividends and capital gains had a differential impact on high and low dividend yield portfolios listed on the Toronto Stock Exchange (TSE) in Canada. There were significant increases in

the value of high-dividend stocks, while the effect of tax changes on the low-dividend stocks was trivial. The results show investors took the personal tax changes into consideration in pricing stocks.

McKenzie and Thompson (1995a) analysed the impact of the Canadian dividend tax increase in 1986. Authors employed an event study to investigate the differential impact of tax (*i.e.* dividend and capital gain tax) change on high and low dividend securities. The article focused on the companies that issue both preferred (high-dividend) stocks and common (low-dividend) stocks. The study finds that abnormal returns are negatively related to dividend yields, which provides support for the hypothesis that taxes affect stock prices. Similarly, McKenzie and Thompson (1995b), using event study methodology, tested the hypothesis that the 1985 capital gains exemption decreased the marginal effective tax rate on capital gains using two samples of stock market prices which controlled the industry and firm-level effects. Authors derived estimates of the impact of the exemption on the effective capital gains tax-rate, and on the user cost of capital. The results show that the capital gains exemption may have had a positive impact on high capital gain-stock relative to low capital gain-stocks.

Using existing estimates of the relationship between the user cost of capital and investment, the study found that, depending upon the sample, the exemption may have increased real investment as much as six per cent, or had no impact at all. It is, therefore, difficult to draw strong conclusions about the effect of the capital gain exemption on the cost of capital and investment. However, the studies by Amoako-Adu (1983) and McKenzie and Thompson (1995a, 1995b) results are consistent with the proposition that asset prices are established to reflect the prevailing tax treatment of stock returns.

**c. Market Reaction to Disaster**

A disaster is either a natural or man-made hazard which has come to fruition, resulting in an event of substantial extent causing significant physical damage or destruction, loss of life, or drastic change to the natural environment and economy. Hill and Schneeweis (1983) examined the effect on the stock return of public utility firms of Three Mile Island nuclear accident. Their study indicates that the impact of the accident on non-nuclear firms was less than that on nuclear based utilities.

Barrett *et al.* (1987) examined stock market reaction on total 78 fatal commercial aircraft crashes from January 1962 to December 1985. Using market model, the study found a significant decline in stock price on only one full trading day after the event. The market appears to assimilate the new information rapidly, even if the crash occurs in a remote geographic location.

The study by Shelor, Anderson, and Cross (1990) examined the effect of California earthquake on the stock value of firms in the real estate industry. The findings showed that the earthquake transmits important new information to the market that was reflected in statistically significant negative stock returns among those firms operating in the area hit by the earthquake. Real estate-related firms operating in other areas were generally unaffected by the earthquake.

Kalra, Henderson, and Raines (1993) investigated the market reaction in U.S. to the Chernobyl nuclear accident. According to this study, utility investors correctly interpreted that Chernobyl marked the start of a new era for nuclear power in U.S. and the stock market quickly recognized the consequences for utility stocks.

The study by Blose et al., 1996 conducted on the Challenger crash showed that on the day of explosion, there was a significant negative abnormal return on the stocks of NASA contractors, and any contagion effect was limited to narrow set of NASA contractors.

Angbazo and Ranga (1996) examined the impact of Hurricane and a subsequent change in the regulatory environment on the stock prices of 48 publicly-traded property-liability insurers. Angbazo found that Hurricane and the related regulations had industry-wide contagion effect since they significantly affected most insurers, regardless of whether these firms had any loss exposure in the hurricane affected places.

The results of the study by Bosch, Eckard and Singal (1998) showed the clear evidence that the stock market imposes value losses on firms upon the release of negative product safety information, including airlines involved in crashes. However, air crash studies to date have produced little or no evidence of impacts on other airlines, and the source of the crash airline's stock reaction remains in dispute.

Lamb (1998) examined the market efficiency around hurricanes. The observation indicate that the stock market showed an ability to discriminate by the magnitude of hurricane and by Property and Casualty firms based on their degree of loss exposure.

The evidence on the speed and accuracy of price discovery was provided by Maloney and Mulherein (2003) by studying stock return and trading volume surrounding the crash of the space shuttle Challenger. They showed that price discovery occurred without large trading profits and much of price discovery occurred during a trading halt of the firm responsible for faulty component.

Carter and Simkins (2004) investigated the reaction of airline stock prices after the September 11 attacks. Their study supports the hypothesis of rational pricing and suggests that the stock market differentiated among various airline firms.

Earthquake was an unanticipated and unpredictable event. Papadakis (2006) performed event analysis concerns the performance of the four stocks (*i.e.* PC producers- Dell computer, Gateway, Compaq and IBM) after Taiwan earthquake on September 21, 1999. The study found lower profitability after abrupt component price increases and decreased in share prices. It has indicated that stock market reacts immediately after the event.

To sum up, the major literature review during the early period of 19$^{th}$ and 20$^{th}$ century related to market efficiency. Overall, the researchers have come to common findings that the new unanticipated informations and major social, economic and political events affect the stock prices.

### 2.3.3 Review of Nepalese Studies

Though there are number of studies associated with macroeconomic volatility of stock returns and analysis on the impact of major events in context of US and other developed capital markets, there are few empirical works in the context of Nepal

The relative importance of dividends and retained earnings in determining market price of the share was first studied by Pradhan (2003). He used cross section data of 29 companies from 1994 to 1999 with the total of 93 observations. The result showed the customary strong dividend effect, and very weak retained earnings effect, indicating attractiveness of dividends among Nepalese investors.

In an attempt to examine the existence of causality relationship, G.C. and Neupane (2006) conducted the study entitled as "Stock Market and Economic Development: a Causality Test". It was based on the time series data for the year 1988 to 2005 using Granger causality test. The study found the empirical evidence of long-run integration and causality of macroeconomic variables and stock market indicators in Nepal. The causality was observed only in real terms but not in nominal variables. In econometric sense, it depicts that the stock market plays significant role in determining economic growth and vice versa. The paper highlighted the importance of stock market development for fostering economic development.

Baskota (2007) considered the NEPSE data during 1994 to 2006 and analyzed the effect of trading days, trading volumes, base money supply, interest rate, inflation and industrial production by means of regression analysis. The study concluded that there is no persistence of volatility in Nepalese Stock Market and stock price movements are not explained by macro-economic variables. Further, the study conducted event analysis for selected political incidents and concluded that the politics is not only the factor that explains the stock price movement in Nepal.

Dangol (2008) studied the reaction of Nepalese stock market to announcements of unanticipated political events and adjustment of stock prices using the event analysis methodology. His analysis covered the period from 2001 to 2006. He found that good-news (bad news) political events generate positive (negative) abnormal returns in the post-event period. The study documented important evidence on the speed of adjustment of stock prices to new political information, i.e., in as many as 2 to 3 days from the announcement date. This study found that the Nepalese stock market is inefficient at a semi-strong level, but there is a strong linkage between political uncertainty and common stock returns in Nepal.

The dynamic relationship among the market indexes and macroeconomic factors was studied by Bhattarai and Joshi (2009) in the context of Nepalese stock market. The study documented both short-run and long-run interdependence among stock index and some macroeconomic variables. The estimated results suggest unidirectional short-run (positive) causal relationship running from consumer price index (CPI) to stock index but reverse causality in the long run (from stock index to CPI), supporting the widely-held view that stock returns are a hedge against inflation. The multivariate results also confirmed absence of long-run causality but supported positive and unidirectional relationship flowing from money supply to stock index in the short run. Nevertheless, the multivariate results revealed long-run causality running from stock index to treasury bill rate but no short-run linkage. The variance decompositions results showed a strong relative exogeneity of stock index, while the impulse response graphs showed that the response of stock index to shocks in macroeconomic variables didn't persist for long period. The policy implication of the study was that monetary authority in Nepal would be able to influence the stock market only in the short run, but not in the long run, either directly through its intermediate target (money supply) and its impact on the inflation or indirectly through increased access to the financial services.

Shrestha and Subedi (2014) empirically examined the determinants of the stock market performance in Nepal using monthly data for the period of mid-August 2000 to mid-July 2014. The impact of major changes in politics and Nepal Rastra Bank's policy on lending against share collateral was also been assessed. Empirical results obtained from OLS estimations of behavioural equations revealed that the performance of stock market is found to respond positively to inflation and broad money growth, and negatively to interest rate. This suggests that, in Nepal, share investors seem to take equity as a hedge against inflation and consider stock as an alternative financial instrument. Further, availability of liquidity and the low interest rates stimulate the performance of the Nepalese stock market. More importantly, stock market performance has been found to be influenced by political changes similar to finding of Dangol (2008) and the NRB's policy. The positive outlook for political stability has positive impact on stock market index. Similarly change in NRB's policy on lending against share collateral has significant impact on the movement of stock market index. These findings help to design policies to stabilize or stimulate the share market in Nepal

## 2.4 Concluding Remarks

Markowitz (1952) laid down the basic foundation on pricing implication of common stock through the seminal work 'Portfolio Selection'. Many of the studies on the impact of some leading macroeconomic variables on stock prices concluded that one or other macroeconomic variables can predict stock market returns although the results vary among the studies. During 1970s, the notion of market efficiency emerged in the literature. Nowadays, the event analysis is more rigorously used in finance to test semi-strong form of market efficiency. The prior studies on event analysis revealed that the new information regarding the political uncertainty and others could generate market reaction instantly. That market reaction may last for a short or long period of time. An effect from market reaction to new information may be a positive (perceived as good-news) or negative (perceived as bad-news) return rather than normal.

The findings associated with the studies on macroeconomic influences on stock prices and analysis on the impact of major events on stock returns in the context of Nepal also vary across the studies as in the case of developed capital markets. Though much of literatures are available in developed and developing economies, there are only few studies of this type in the context of Nepal. To the best of my knowledge, such a comprehensive study incorporating economic and non-economic factors affecting stock prices has not been conducted yet in Nepal. Thus, this study is an attempt to identify the cointegrating evidence between macro-economy and stock market performance and to assess the impact of major social, economic and political events on stock prices with a different set of variables, events and data of more recent period.

# CHAPTER III

# RESEARCH METHODOLOGY

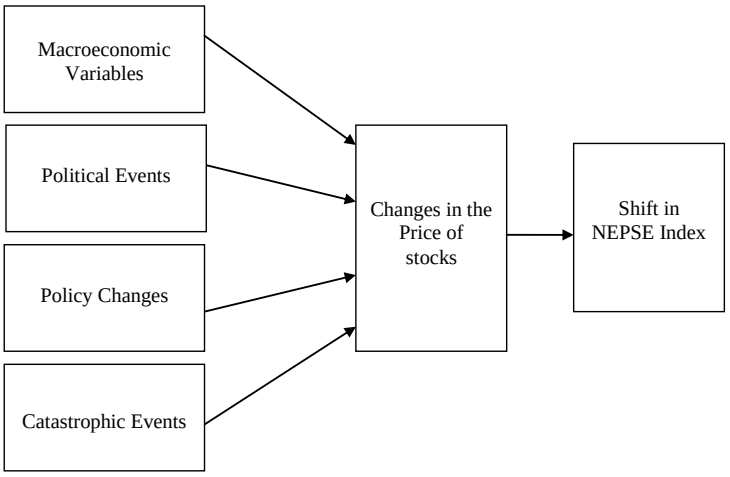
## 3.1 Introduction

Research methodology sets out overall plan associated with a study. It provides a basic framework on which the study is based. Before presenting the analysis and interpretation of data, it is necessary that research methodology be described first. In the absence of methodology, it is likely that the conclusions drawn may be misunderstood. This chapter therefore explains the methodology employed in this study. This chapter has been divided into six sections. Section one provides a conceptual framework and Section two provides a description of research design used in the study. Section three deals with nature and sources of data. Similarly, Section four describes method of analysis including the empirical models. Section five explains the variables and their measurement criteria. Finally, Section six presents model specification and diagnostic checking.

## 3.2 Conceptual Framework

Many researchers have related several variables in existing literature affecting stock prices. Economic and non-economic; social and political variables have been related with stock market variability. As regards to economic, the majorities of them basically focused on the several proxies of macro-economy like; real GDP, Inflation (INF), Interest Rate (IR), and Broad Money Supply (M2), whereas stock price is represented by the market index measured as NEPSE Index (NI). Based on the literature review the conceptual framework of the study is presented as following:

**Figure 3.1.**
**Conceptual Framework for Factors Influencing Stock Market Prices.**



### 3.3 Research Design

This study will adopt descriptive and causal comparative research designs to deal with the economic and non-economic factors influencing stock prices in the context of Nepal. The descriptive research design will be adopted for fact-finding and searching adequate information about factors affecting stock market prices. The causal comparative research design will be used to ascertain and understand the directions, magnitudes and forms of observed relationship among the used variables such as real GDP, inflation, interest rate, and money supply. The basic purpose of employing causal comparative research design in this study is to understand and examine whether it is possible to predict common stock returns on the basis of information about macroeconomic variables.

The axiom of knowledge, driven by research paradigms, can be explained by the branches of philosophy known as ontology, epistemology and methodology. Ontology is the way things are, the form and nature of reality. It is the study of the nature of existence. In philosophy, ontology is the most fundamental branch of metaphysics. It studies being or existence as well as the basic categories thereof trying to find out what entities and what types of entities exist. Epistemology is the theory of knowledge and knowing. It is about nature, origin, scope and variety of knowledge and concerned with the way of knowing. This study follows positivism research paradigm. From an ontological stand point, this paradigm assumes that there is universal single truth and reality is out there (Jennings, 2001).

### 3.4 Nature and Sources of Data

This study will be an empirical research based on secondary data. In order to identify the impact of macroeconomic variables on stock prices, secondary data set will be used. Based on the brief literature review, the stock market price is influenced by several macroeconomic factors and among them inflation, interest rate, narrow money supply (M1) and real GDP are found to be more important. The necessary annual data related to macroeconomic variables will be collected from Central Bureau of Statistics (CBS), NRB and database of IMF and World Bank, whereas stock market indices data are collected from Nepal Stock Exchange Ltd. (NEPSE). The study will use the time series data for the total period of 23 years from fiscal year 1994 to 2016. Similarly, the major events, social, economic and political announcement dates are collected from authorized websites of Nepal government, newspapers and online

portals. Based on the availability of data and their relevancy as guided by the literature and considering the feature of Nepalese stock market, the following data are taken to examine the economic and non-economic determinants of stock market index in Nepal as shown in Table 3.1.

**Table 3.1**
**Variables and their Description**

| Variable | Description | Unit |
|---|---|---|
| NI | NEPSE Index | |
| GDP | Annual real GDP at basic price (Base year = 2000/01) | Rs in million |
| Inflation | Annual growth | Percent |
| Interest Rate | Weighted average 91 days T -bills rate, Annualized | Percent |
| M1 | Narrow Money Supply | Rs in million |
| D1 | Political Event Dummy (takes value 1 if event happens, 0 otherwise) | |
| D2 | Policy Change Dummy (takes value 1 if margin lending is relaxed, 0 otherwise) | |
| D3 | Catastrophic Event Dummy (takes value 1 for devastating event, 0 otherwise) | |

*Note:* The detail of secondary data associated with stock prices and macroeconomic variables are provided in Appendix A and that of major events are shown in Appendix C.

### 3.4.1 Population and Sampling

The study will take the time series data of macroeconomic indicators and stock market prices for analysis purpose. Nepal Stock Exchange Ltd (NEPSE) established in 1993 is the only capital market of the country that opened its trading floor from 13 January, 1994. This study will attempt to cover the data since the inception of NEPSE to the recent period. The major social, economic and political events since the last decade 2008 A.D. have been analyzed in the event analysis section. During this period, Nepalese stock market passed through different stages. Major social, economic and political changes occurred during this period and the market has plunged to the all-time low of 292.31 points on June 15, 2011 from all time high 1881.45 points on July 31, 2016. Due to this scenario, the aforesaid sample period seems to be comprehensive and appropriate.

### 3.4.2 Selection of Events.

The Table 3.2 has presented the major social, economic and political events selected for the study. These events are the major significant socio-economic and political announcements leading up to the stock market certainty as well as uncertainty from 2064 BS (2008) to the end of 2073 BS (2017) for the study.The major event includes government changes, political announcements, monetary policy announcements, margin lending provisions by central bank, catastrophic earthquake

Nepal, election, and promulgation of new constitution. These events are divided into "good" and "bad" news. If announcement leads to future business certainty (uncertainty) then that announcement is perceived as "good" ("bad") news.

**Table 3.2**
**Selected Events and Political Announcements**

| Events | Date of Events | Picture of the Events | Possible Impact |
|---|---|---|---|
| 1st | 2064 Chaitra 28 (2008 April, 10) | Former Maoist rebels win the largest bloc of seats in elections to the new Constituent Assembly (CA). | Bad |
| 2nd | 2067 Shrawan 25 (Aug 10, 2010) | Margin lending limit increased to 60% | Good |
| 3rd | 2067 Poush 20 (Jan 14, 2011) | BFIs were allowed self decision on the limit of margin lending. | Good |
| 4th | 2069 Jestha 15 (2012 May 28) | The Constituent Assembly (CA) is dissolved after failing to produce a draft constitution. | Bad |
| 5th | 2070 Mangsir 4 (2013 Nov. 19) | Nepali Congress wins the second Constituent Assembly elections | Good |
| 6th | 2072 Baisakh 12 (2015 April 25) | A 7.8-magnitude earthquake strikes Kathmandu and its surrounding areas killing more than 8,000 people, causing mass devastation and leaving millions homeless. | Bad |
| 7th | 2072 Shrawan 4 (2015 July 23) | Announcement of monetary policy 2072/73 increasing paid up capital of Banks to 8 Arab and FIs with more than 2 folds | Good |
| 8th | 2072 Ashoj 4 (2015 Sept. 20) | Promulgation of a new constitution 2072 by president Dr. Ram Baran Yadav. | Good |
| 9th | 2072 Falgun 14 (2016 Feb. 23) | End a six-month border blockade by India in protest over the new constitution which they say is discriminatory. | Good |
| 10th | 2073 Falgun 9 (2017 Feb. 20) | Announcement of local level election across the country for 31 Baisakh, 2074 | Good |

The table 3.2 shows the major social, economic and political events that occurred during the period from 2064 B.S. to till the study period. The events are ranked simply on the first come first basis. The likely impact of the events on stock market is given in third column of the table. The major events of social, economic and political context as stated in table 3.2 are chosen for the present analysis because these events:

(1) Represent important announcements,

(2) Have had adequate prior studies in foreign countries,

(3) Occur frequently enough to produce adequate samples for testing,

(4) Can produce either significant positive or negative reactions, and

(5) Allow one to form a prior theoretical expectation of event results (*i.e.*, unanticipated political events good (bad) should be associated with positive (negative) abnormal returns).

### 3.5 Methods of Data Analysis

Zikmund (1997) suggested that the choice of the methods of statistical analysis depends on (a) the type of question to be answered, (b) the number of variables, and (c) the scale of measurement. Thus, based on these criterion descriptive statistics, correlational analysis, and time series econometric models will be applied as the methods of analysis. This study will attempt to identify and analyze the long-run relationship between stock market prices and macroeconomic variables. The methodology to examine the long-run equilibrium will be the cointegration test and Error Correction Model (ECM). The modeling strategy in this study will be based on the widely used Engle-Granger methodology (Engle & Granger, 1987).

First, the regression (OLS) equation will be estimated;

$$NI = \alpha + \beta_1 RGDP + \beta_2 INF + \beta_3 IR + \beta_4 M_2 + \varepsilon \quad \ldots.(1)$$

Where,

NI = NEPSE Index, RGDP = Real gross domestic product, INF = Inflation

IR = Interest rate, $M_2$ = Broad money supply, t = 1994-2016

$\alpha$ = Constant term, assume to be constant over time.

$\varepsilon$ = Stochastic error term with the conventional statistical properties and $\beta_1$, $\beta_2$, $\beta_3$ and $\beta_4$ are the respective parameters of the explanatory variables to be estimated.

#### 3.5.1 Long-Run Equilibrium Analysis:

Following are the steps involved to analyze the long-run equilibrium relationship between stock prices and macroeconomic variables:

***(i) Unit Root Test***

Running a regression of non-stationary variables may lead to spurious regression problem. To this end, the augmented Dickey-Fuller (ADF) test of stationarity shall be performed both on the levels and the first differences of the variables (Dickey & Fuller, 1981). A series in integrated of order $d$, $I(d)$ if it can be difference $d$ times to achieve stationarity.

$$\Delta y_t = \beta + \delta_t + \alpha\, y_{t-1} + \sum_{i=1}^{k} \varphi_i\, \Delta y_{t-i} + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(2)$$

Where, $y_t$ = the level of the variable under consideration, t= time term,

$\varepsilon_t$ = normally distributed error term with zero mean and constant variance.

***(ii) Cointegration Test***

Cointegration test is performed to identify the existence of a long-run relationship. According to Engle and Granger (1987), the stationarity of the residuals of the regression implies that the series are cointegrated.

$Y_t = \beta X_t + \varepsilon_t$ …… ……(3)

Where, both $Y_t$ and $X_t$ are non stationary variables and integrated of order 1 (i.e. $Y_t \sim I(1)$ and $X_t \sim I(1)$). In order for $Y_t$ and $X_t$ to be cointegrated, the necessary condition is that the estimated residuals from Eq. (3) should be stationary (i.e. $\varepsilon_t \sim I(0)$). The cointegration implies the existence of a long-run or equilibrium relationship among variables.

***(iii) Error Correction Model (ECM)***

The ECM helps to capture the rate of adjustment taking place among the various variables to restore long-run equilibrium in response to short-term disturbances. According to the Granger representation theorem (Granger, 1983; Engle & Granger, 1987), if a set of variables are cointegrated, then there exists a valid error-correction mechanism. Hence, a necessary and sufficient condition for cointegration is the existence of an error correction mechanism (ECM). If dependent variable NI is denoted as $y_t$ and the entire explanatory variables in equation (2) as $x_t$, there exist an error-correction representation of the form:

$$Z_t = y_t - \beta x_t$$

Given that;

$$\Delta y_t = \alpha_1 + \phi_1 (\beta' z_{t-1}) + \sum_{i=1}^{k} \varphi_j' \Delta z_{t-j} + \nu_t$$

$$\Delta x_t = \alpha_2 + \phi_2 (\beta' z_{t-1}) + \sum_{i=1}^{k} \lambda_j' \Delta z_{t-j} + \upsilon_t \quad \text{……(3)}$$

Where, $Z_t$ refers to deviation of a variable from its long-run path given by *I(1)* variables and $\nu_t$ and $\upsilon_t$ are well-behaved error terms and $|\phi_1| + |\phi_2| \neq 0$.

Conditional on finding cointegration between $Y_t$ and $X_t$ , the estimated residuals ($\beta$) from the first step long-run regression (2) may then be imposed in the error correction term ($Y_t - \beta X_t$) in the following equation.

$\Delta Y_t = \alpha_1 \Delta X_t + \alpha_2 (Y - \beta X)_{t-1} + \varepsilon_t$ …… ……(4)

Where, $\Delta$ represents first-differences and $\varepsilon_t$ is the error term. Note that the estimated coefficient $\alpha_2$ in the equation should have a negative sign and be statistically significant. Note also that, to avoid an explosive process, the coefficient should take a value between -1 and 0. According to the Granger Representation Theorem (GRT), negative and statistically significant $\alpha_2$ is a necessary condition for the variables in hand to be cointegrated.

### 3.5.2 Event Analysis

A measure of the event's economic impact can be assessed using security prices observed over a relative short time period (MacKinlay, 1997). The study determines whether there is an "abnormal" stock returns associated with an unanticipated event. From this determination, it can infer the significance of the event. This method has been used extensively in accounting and finance area, for example, Bosch and Hirchey (1989), MacKinlay (1997), Hovav and Arcy (2003). In event studies, the objective is to examine the market's response through the observation of stock prices around such events. In this connection, the significance of the abnormal return allows the author to infer that the event had a significant impact on the value of the firm. The inference of significance relies on the following assumptions as suggested by McWilliams and Siegel (1997):

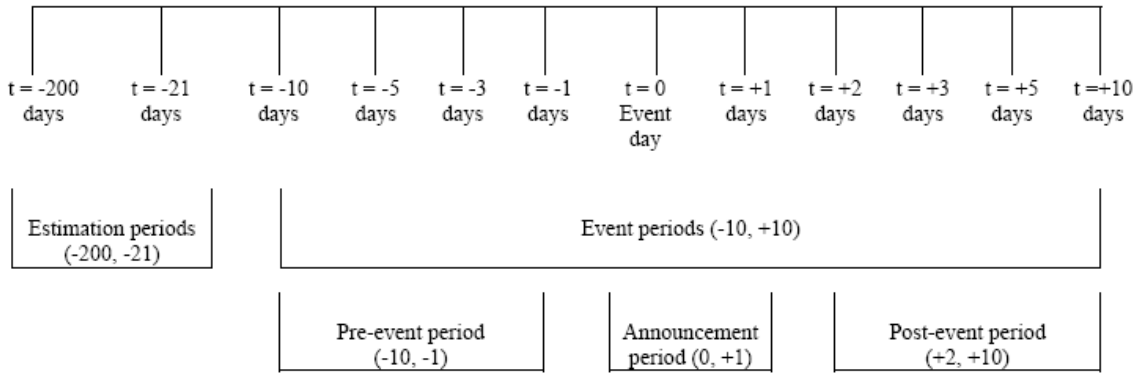
(1) The markets are efficient,

(2) The event is unanticipated, and

(3)There are no confounding effects during the event windows.

The study tests the market efficiency using major political events, policy changes and catastrophic event happening in the country and their impact on stock prices. For this purpose, the estimated period starts 200 days before the announcement date and ends of 21 days before the announcement date (or day t = - 200 to day t = - 21). The length of the estimation period use in this study is consistent with prior studies of capital market responses (Bosch & Hirchey, 1989, Hovav & Arcy, 2003). The study confined to six separate events periods for a 21 days around the event announcement (*i.e.* –10 days to +10 days) as suggested by Cheng and Leung (2006)**.** These six event periods, also shown in figure 3.2, are as under:

**Figure 3.2**
**The Parameter Estimation and Event Period**




*Note:* The figure shows the parameters of equation (i), estimation periods, event periods as pre-event period, announcement period and post-event period.

(1) Ten trading days prior to the information announcement, $t - 10$, to one day prior to the date of announcement day (*i.e.* day $t = -10$ to $t = -1$);

(2) Announcement day, $t = 0$, to ten trading days after the announcement, $t + 10$; (*i.e.* day $t = 0$ to $t = +10$),

(3) Two trading days after the announcement, $t + 2$, to ten trading days after the announcement, $t + 10$; (*i.e.* day $t = +2$ to $t = +10$),

(4) Ten trading days prior to the information announcement, $t - 10$, to ten days after the date of announcement day $t + 10$ (*i.e.* day t = -10 to t = +10);

(5) Five trading days prior to the information announcement, $t - 5$, to five days after the date of announcement day $t + 5$ (*i.e.* day $t = -5$ to $t = +5$); and

(6) Three days prior to the information announcement, $t - 3$, to three days after the date of announcement day $t + 3$ (*i.e.* day $t = -3$ to $t = +3$). Event day $t = 0$, is the date when government makes the announcement of new information.

***(i) Test of Homogeneity of Variance***

Three different variables; political events, policy changes and catastrophic events are measured by dummy variables. The event period is denoted by value "1" otherwise "0". This study used stock returns as the dependent variable as it tries to check whether stock returns are affected by political events, policy changes and catastrophic events or not. Nepse Index stock returns before and after the occurrences of events were collected and investigated. This study uses percentage stock returns to solve the problem of unit root making data stationary.

$$SR_t = (NI_t - NI_{t-1})/ NI_t \text{ ---------- (1)}$$

Where; $SR_t$ is the stock returns, $NI_t$ is the current day returns and $NI_{t-1}$ is the previous day returns

Fama (1991) titled studies which investigate the impact of publically available information on stock returns as an Event Study. This method compares the mean stock returns before and after the happening of an event or any publically available information. For this purpose Independent t-test has been used because it consists of two independent data groups i.e. before events data and after events data.

This study will check the impact considering six (6) different event windows as suggested by Cheng and Leung (2006). It also helps in finding out when does stock prices reflect the information in case there is an impact. All of the data groups (i.e. political, policy changes and catastrophic) will be separately analyzed for each of the six event windows. Also the same method was adopted for finding the impact considering favorable and unfavorable political events.

Levene's test was conducted to find whether the data would consider t-value for equal variances assumed or equal variances not assumed. The data is homoscedastic when there are equal variances and heteroscedastic when equal variances are not there. The events are considered to have significant impact on stock returns if there is no equal variance between the groups.

***(ii) Dummy Variable Regression Model***

The regression analysis (OLS) is the basic technique employed for fitting models of normal stock return as a function of general market performance during the event period. The method used to compute the abnormal return is based on dummy variable regression model, the most widely used method to assess the impact of events on market performance (Gujarati et.al., 2012):

$$SR_{it} = \alpha_i + \beta_i D_{it} + e_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots \text{(i)}$$

Where,

$SR_{it}$ = the stock return on event *i* on day *t*. = $[Price_{it} – Price_{it-1}]/ Price_{it-1}$

$D_{it}$ = the political event, policy changes and Catastrophic event dummy (takes value 1 if event happens, 0 otherwise)

$\alpha_i$ and $\beta_i$ = independent coefficients to be estimated.

$e_{it}$ = a random error term for stock return on event i on period *t*.

The model is estimated for each event and event windows considered in the study. The estimated period starts 200 days before the announcement date and ends of 21 days before the announcement date (or day t = - 200 to day t = -21).

***(iii) Estimation of Abnormal Returns***

The abnormal returns in the event periods are computed in comparison to the normal stock returns in the estimated period. This study uses running average method to calculate the expected returns [E ($R_{it}$)] and actual returns ($R_{it}$). The abnormal return will be calculated by the formula:

$$AB_{it} = R_{it} – E (R_{it})$$

Where, $AB_{it}$ = Abnormal return on event window ($W_i$)

To sum up, the event analysis in this study will be made in a sequential order. First, it attempts to identify whether there is a significant impact on stock returns for the given event or not. For this purpose, Levene's test is performed. Second, the study intends to find which event window is statistically significant to influence the stock returns within a given event. For this purpose, dummy variable regression method is executed. Finally, in the third method, the study desires to know what is the level of abnormal returns in the given event and event windows. For this purpose, estimation of abnormal returns is carried out by using running average method.

### 3.6 Description of the Variables

The definitions and justification of incorporating the key variables to be used in the above models have been explained below.

#### 3.6.1 Dependent Variables:

***a. NEPSE Index (NI)***

NEPSE Index (NI) is a market value weighted index composed of the shares of listed companies from different sectors in the Nepalese stock exchange. It gives the investor a general idea about the direction and performance of the market. Abu-Libdeh and Harasheh (2011) used stock indexes to investigate the correlation and causality relationships with some macroeconomic variables. Stock index is computed by dividing the total market value of all listed companies in the market for the current period over the total market value of companies included in the index for the previous period (1994). This index has been used in NEPSE since the trading session in 1994, where the average closing prices in that session were used as a reference point. While measuring the impact of macro-economy on stock prices, NEPSE Index will represent the stock prices in this study.

***b. Stock Returns (SR)***

The daily stock returns have been used as dependent variable in event analysis of the study. The stock returns have been defined as the rate of change in stock market index during period *'t'* over the period *'t-1'*. This study uses percentage stock return to measure the impact of different social, economic and political events on stock returns. This component of stock returns has been calculated daily using equation (3.6.1).

$$SR_t = \frac{NIt - NIt-1}{NIt} \times 100 \quad \text{---------- (3.6.1)}$$

Where;

$SR_t$ is the daily stock returns

$NI_t$ is the current day returns

$NI_{t-1}$ is the previous day returns

#### 3.6.2 Independent variables

The following commonly used macro-economic variables shall be used in this study as the independent variables:

***a. Real gross domestic product (RGDP)***

RGDP is used as a proxy of real aggregate economic activity in an economy. Higher RGDP represents economic prosperity of the country and stock returns are expected to influence positively. Gan, Lee, Yong and Zhang (2006), Abu-Libdeh and Harasheh (2011) and many others found positive significant positive relation between GDP and stock returns. The priori expected sign of this measure is positive.

***b. Inflation (INF)***

In literature inflation has been used as one of the macro-economic variables as predictor of stock prices. Ibrahim and Aziz (2003) and Alagidede and Panagiotidid (2010) found a positive long-run relationship between stock prices and inflation. The priori expected sign of this variable is positive.

***c. Interest rate (IR)***

The interest rate (IR) risk is another important financial and economic factor affecting the value of common stocks. The reduction in interest rates reduces the cost of borrowing and thus serves as an incentive for expansion. This will have a positive effect on future expected returns for the firm. Similarly, as considerable stocks investments are made with borrowed money, hence an increase in interest rates would make stock transactions more costly. Investors will require a higher rate of return before investing. This will reduce the demand for stock investment and thus lead to decline in stock prices. Kandir (2008) demonstrated a negative relationship between stock returns and interest rate. The priori expected sign of this measure is negative.

***d. Broad money supply (M2)***

The money supply can influence the stock prices in three ways, including the expected effect, investment combination effect and stock intrinsic value growth effect. All the three effect in general are positive, which means that stock market prices will increase when the money supply increases. Secondly, the stock market price can influence the money supply in two ways, including the wealth effect, transaction effect, asset portfolio effect and substitution effect. Among them the wealth effect, transaction effect, and asset portfolio effect has positive influence whereas substitution effect has negative influence. The broad money supply (M2) consists of currency held by public (C), demand deposits (DD) and Time Deposits (TD) held at the banking sectors. Symbolically,

$$M2 = C + DD + TD$$

The priori expected sign of this variable is positive.

### 3.7 Model Specification and Diagnostic Checking

This study is based on the prior literature reviews including Abu-Libdeh and Harasheh (2011) and many others in the context of macroeconomic influences on stock prices. Some of the macroeconomic variables used in the different models are omitted due to lack of those variables in Nepalese context. There may be chance of specification error in the proposed model due to addition and omission of some variables. Thus, a number of model specifications tests will be carried out to diagnosis the proposed model.

The simple OLS regression is conducted in the beginning as baseline comparision model. The normality, autocorrelation, multicollinearity and heteroscedasticity issues are taken into consideration. Durbin and Watson (1951), d-statistics test for Autocorrelation, LM test and VIF test for Multicollinearity are conducted. Adjusted $R^2$ is computed and compared to examine the impact of addition of the variables in the model.

Similarly Ramsey's RESET is examined to confirm the overall adequacy of model specification. BP test and White' General test are conducted in order to detect the problem of heteroscedasticity in the model. One of the assumptions of the regression models specified in above equations is that the random error terms ($\varepsilon_{it}$) are normally distributed with zero mean and equal variance. These random error terms are assumed to work as surrogates for all those variables that are omitted from the models but that collectively affect the dependent variable. Normality of residual will be tested using Jarque-Beta statistic.

# CHAPTER IV

# DATA PRESENTATION AND ANALYSIS

## 4.1 Introduction

This chapter provides systematic analysis and presentation of data to deal with various issues associated with stock prices in the context of Nepal. The statistical and econometric models described in chapter three were applied for the analysis purpose. It is divided into four sections. The first section deals with analysis of secondary data associated with macroeconomic variables including the explanation of corresponding results. The second section covers the event analysis and evaluates the impact of major political, social and economic events on stock returns. Finally, the third section discusses on the concluding remarks associated with findings from data analysis.

## 4.2 Analysis of Relationship between Macro-economy and Stock Prices

This section analyzes the secondary data associated with macro-economy and stock prices to observe the causal relationship between them. GDP is one of the important elements which creates the competitive business environment and will impact on stock prices. Similarly, other variables inflation interest rates, and money supply also impact on stock prices (represented by NEPSE index). The methods used for this purpose are descriptive statistics, correlational analysis, regression analysis and cointegration analysis to test the long run equilibrium, if any. A detail issue of findings from data analysis has been dealt in the respective sections.

### 4.2.1 Descriptive statistics

Descriptive statistics for the NEPSE index and macroeconomic variables over the sample period (1994-2016 A.D.) are reported in Table 4.1. It shows that the NEPSE index ranges from minimum 163.40 to maximum 1718.2 with a mean value of 480.93 over the sample period. The volatility in NEPSE index indicated by coefficient of variation has been noted at 0.796 during the period, which shows that the price index posses high volatility. The inflation during the period ranges from minimum 2.48 to maximum 11.61 with an average of 7.49 for the period. The coefficient of variation of the inflation is only 0.383. Similarly, interest rate varies within the range of 0.13 to 10.93 percent with the coefficient of variation of 0.686 during the period. The volatility with respect to real GDP and M2 are 0.252 and 0.332 respectively. The volatility with respect to real GDP is the minimum 0.252 than all other variables.

**Table 4.1**
**Descriptive Statistics of Macroeconomic Variables and Stock Index**

The table 4.1 shows the descriptive statistics of stock prices and macroeconomic variables over the study period from 1994 to 2016. The variables are stock prices measured as NEPSE index (NI), real gross domestic product (RGDP), inflation (INF), interest rate (IR) defined as the annualized weighted average 91 days T-bills rate, and broad money supply (M2).

| Statistics | NEPSE Index | RGDP (billion) | Inflation (INF) | Int. Rate (IR) | M2 |
|---|---|---|---|---|---|
| **Mean** | 480.93 | 4.85 | 7.49 | 4.25 | 16.65 |
| **Median** | 360.70 | 4.63 | 7.62 | 3.52 | 16.10 |
| **Std. Deviation** | 382.71 | 1.22 | 2.87 | 2.92 | 5.53 |
| **Coeff. of variation** | 0.796 | 0.252 | 0.383 | 0.686 | 0.332 |
| **Skewness** | 1.743 | 0.329 | -0.480 | 0.691 | -0.149 |
| **Kurtosis** | 2.784 | -1.089 | -0.921 | -0.158 | -0.345 |
| **Minimum** | 163.40 | 3.09 | 2.48 | 0.13 | 4.4 |
| **Maximum** | 1718.2 | 6.95 | 11.61 | 10.93 | 27.3 |
| **JB test** | 19.07 | 1.239 | 1.698 | 1.853 | 0.199 |
| ***p*- value** | 0.007 | 0.538 | 0.427 | 0.396 | 0.905 |

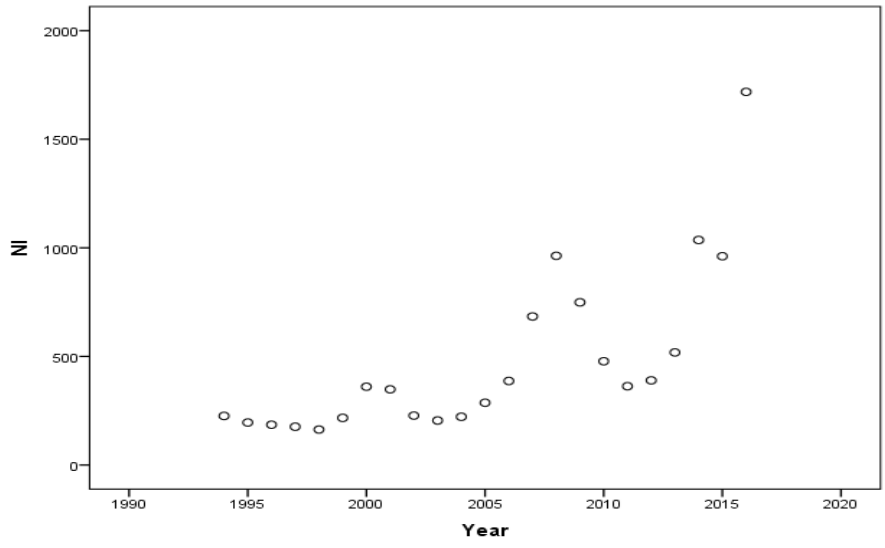
*Source:* Data on macroeconomic variables in Appendix A.

Jarque-Bera (JB) test of normality shows that distribution of macroeconomic time series data are normal in all cases. Real GDP (RGDP) has taken log values to smoothen the data. The *p*-values for *JB* statistics are greater than 10 percent in all cases except NI, which do not reject the normality hypothesis meaning that time series are normally distributed.

### 1.2.2 Volatility of Stock Returns

The returns of the stock do not remain constant all over the time. It has affected by several factors like economic and political factor. The figure 4.1 illustrates the volatility of stock returns from 19994 to 2016.

**Figure 4.1**
**Scatter Plot of NEPSE Index form 1994 to 2016**



The figure 4.1 clearly states that the returns which is proxied by NEPSE Index does not remain constant all over the time. It changes over time. It is observed that in 1995, NEPSE returns is low whereas in 2016 it seems to be high at a time.

### 4.2.3 Correlation Analysis

The correlation between the macroeconomic variables and stock market index has been presented in this section. Table 4.2 summarizes the correlation matrix with Pearson correlation coefficients in the lower left triangle and Spearman rank correlation coefficients in the upper right triangle that explain the direction and magnitude of relationship among different pairs of macroeconomic variables during the period 1994 to 2016 with NI.

Table 4.2 reports the bivariate Pearson's correlation coefficients and Spearman rank correlation coefficients between different set of macroeconomic variables used in the study. The correlation coefficients indicate that the stock market prices represented by NEPSE Index has positive relationships with real GDP, inflation, and M2 but has negative correlation with interest rate as expected above. The positive correlations observed between NEPSE index and real GDP, inflation, and M2 support the priori expectation (Ibrahim & Aziz, 2003). Although the correlation coefficients are not statistically significant, they are consistent with our priori expectation guided by the literatures. The negative relationship with interest rate, as hypothesized, indicates that the stock returns goes on decreasing when market interest rate increases. Investors will be reluctant to have borrowing at higher rate of interest and use it to stock investing. It validates the results by Chen (1991) among many others.

**Table 4.2**
**Pearson and Spearman Correlation Matrix**

| Variables | NI | l_RGDP | INF | IR | M2 |
|---|---|---|---|---|---|
| **NI** | **1** | *0.867**** | *0.331* | *-0.540**** | *0.348* |
| **l_RGDP** | 0.738*** | **1** | *0.353* | *-0.632**** | *0.156* |
| **INF** | 0.401 | 0.360 | **1** | *0.013* | *0.517*** |
| **IR** | -0.501** | -0.629*** | -0.067 | **1** | *-0.260* |
| **M2** | 0.406 | 0.208 | 0.543*** | -0.214 | **1** |

*Source*: Data on macroeconomic variables in Appendix A.

*Note:* Bi-variate Pearson correlation coefficients are in the lower left triangle and Spearman rank correlation coefficients are in upper right triangle. The variables included are macroeconomic varaibales and stock prices. NI is the market index of stock prices, l_RGDP is the log value of real GDP, INF is the inflation, IR is the interest rate (annual weigtage average of 91 day T-bills rate), and M2 is the growth rate of broad money supply. '**' sign indicates that correlation is significant at 5 percent level and '***' indicates that correlation is significant at 1 percent level.

Both the Pearson and Spearman correlation coefficients indicate the significant relationship between stock market index (NI) and real GDP (RGDP) and interest rate (IR). The statistical significance for the relationship between IR and NI (-0.540) is higher in Spearman rank correlation matrix where it is significant at 1% level compare to 5% level of significance in Pearson correlation matrix. The statistically significance of the result indicates that relationship between interest rate and NEPSE index is negative as it was hypothesized. This result approximately indicates that interest rate level in Nepal plays an important role to predict the stock market returns. The priori expected sign for the relationship of all variables with stock prices are maintained as prior studies by Ibrahim and Aziz (2003), and Maysami, Howe and Hamzah (2004). However, the money supply and inflation has limited ability to explain the variation in stock prices as they do not posses statistical significance. This result contradicts the findings by Bilson et al. (2001).

Similarly, the observed significant positive relationship between NEPSE and real GDP is consistent with priori expectation. This result is consistent with Adel (2004), Gan, Lee, Yong and Zhang (2006) and Pilinkus (2009), among others, who reported reliably positive relationship between stock market returns and real activity proxied by GDP, and inconsistent with earlier studies by Flannery and Protopapadakis (2002) who observed significant negative relationship between real GDP and stock market returns. This result again gives an approximate indication that development in real sector activity may contribute positively to the stock market.

The statistically significant positive correlation has been obtained in between money supply (M2) and inflation in both Pearson (0.543) and Spearman rank correlation matrix (0.517). This indicates that increasing the level of money supply increases the inflation subsequently. Similarly, The observed statistically significant negative relationship between interest rate and GDP on both Pearson (-0.501) and Spearman rank correlation coefficients (-0.632) may give a meaningful conclusion that decrease in interest rate attracts most investors toward real sector investment rather than bank deposit. However, statistical inferences about the causal relationship between different pairs of these macroeconomic variables cannot be drawn simply based on the correlation analysis. Hence, these issues have been further explored in the next several sections of this chapter.

### 4.2.4 Regression Analysis

The OLS Regressions results have been reported in Table 4.3. The model specifications I through V report the simple regression results, where stock prices represented by NEPSE index (NI) have been regressed on different macroeconomic variables individually. The full version of the model has been reported in specification V, where all the macroeconomic variables have been used as explanatory variables.

**Table 4.3**
**Estimated Relationship from Regression of Stock Prices (NI) on Macroeconomic Variables with Observations During the Period 1994 to 2016**
***Model:*** $NI_t = \alpha + \beta_{1t} RGDP_t + \beta_{2t} INF_t + \beta_{3t} IR_t + \beta 4_t M2_t + \varepsilon_t$

| | Dependent Variable : NEPSE Index (NI) | | | | | |
|---|---|---|---|---|---|---|
| **Model** | **I** | **II** | **III** | **IV** | **$IV_a$** | **V** |
| **Intercept** | -14122.2*** | 80.56 | 760.50*** | 13.83 | -11644.1** | -12741.8*** |
| | (-3.44) | (0.73) | (3.97) | (0.14) | (-2.59) | (-3.18) |
| **l_RGDP** | 1118.11*** | | | | 919.60** | 990.02*** |
| | (3.52) | | | | (2.67) | (3.23) |
| **INF** | | 53.45** | | | 23.35 | 3.99 |
| | | (2.22) | | | (1.42) | (0.29) |
| **IR** | | | -65.84** | | -14.19 | -4.72 |
| | | | (-2.32) | | (-0.64) | (-0.24) |
| **M2** | | | | 28.05** | | 16.98*** |
| | | | | (2.75) | | (4.46) |
| ***F*** | 12.38*** | 4.94** | 5.38** | 7.54** | 4,67** | 11.94*** |
| ***Adj. $R^2$*** | 0.523 | 0.121 | 0.216 | 0.125 | 0.505 | 0.526 |
| ***SEE*** | 264.27 | 358.84 | 338.90 | 358.04 | 269.25 | 263.53 |
| ***DW*** | | | | | 0.835 | 0.927 |

*Source:* Data on macroeconomic variables in Appendix A

*Note:* The regression results consist of various specifications of the models in the form of simple and multiple regressions. The reported values are intercepts and slope coefficients of respective explanatory variables with t-statistics in the parentheses. Dependent variable is the stock price represented by NEPSE Index (NI), and independent variables are Real Gross Domestic Product (RGDP), Inflation (INF), Interest Rate (IR), and Broad money supply (M2). The reported results also include the values of F-statistics (F), adjusted coefficient of determination (Adj. $R^2$), and standard error of estimates (SEE). The triple asterisk (***) sign indicates that result is significant at 1 percent level, and double asterisk (**) sign indicates that result is significant at 5 percent level.

The priori expected sign of all the variables RGDP (1118.11), INF (53.45), IR (-65.84), and M2 (28.05) holds true for each individual regression model and are statistically significant in their coefficients as well as in terms of model specification. This shows that the selected macroeconomic variables have significant impact on moving stock prices. In multiple regression model V, only two variables real GDP (RGDP) and broad money supply (M2) have maintain their statistical significance at

1% level. We could explain that 1% change in broad money supply changes the stock index by 16.98 points. The statistical significance of the regression coefficients RGDP and M2 implies that real GDP and the broad money supply (M2) among others are the important macroeconomic variables to determine the movement of stock prices.

The full model V also shows the statistical significance in terms of *F*-statistics (11.94) at 1% level of significance. The inability of the variables; inflation and interest rate to show statistical significance in the full model may be interpreted as the reason of other variables that subsume the effect of them. Though there is no encouraging growth of GDP in Nepal, the earlier studies have documented the positive contribution of GDP in moving stock prices. Similarly, this study also found statistically significant positive relationship of GDP with stock prices in full model, which is consistent with the findings of Chen, Roll and Ross (1986), Schwert (1989), and Gan, Lee, Yong and Zhang (2006). However, the result contradicts the findings of Bilson et al. (2001), Flannery and Protopapadakist (2002) and Baskota (2007).

The simple regression result shows the positive and a significant relationship between inflation and stock prices in line with priori expectation. This results support the findings of Geyser and Lowies (2001) and Maysami, Howe, and Hamzah (2004). With respect to interest rate effect, it is believed that a reduction in interest rates (IR) induces an injection of liquidity into the economy as such that this extra liquidity could be channeled to the stock market thus driving up the demand and prices of stocks; with the assumption that an increase in interest rate tends to decrease the prices of stock. The observed sign in the present study is negative and statistically significant in simple regression model III as presented in the table 4.3. which is in line with priori expectation. This results support the findings of several studies including; Thorbecke (1997), Smal and Jager (2001), and Kandir (2008).

Future economic activity is correlated with increased domestic borrowing or increased supply of money. This simply means that an increase in domestic borrowing or issuance of money has inflationary effects that dampen real activity. In the end, stock market prices also rise due to rise in the inflation. As expected, it has noted the positive and a significant relationship between broad money supply (M2) and stock prices. The statistically significant positive relationship between stock prices and money supply is consistent with the findings of Adel (2004) but contradicts the findings of Kandir (2008), who found no significant relation of money supply, and oil price index on stock returns.

### 4.2.5 Test for Long-Run Equilibrium

One of the major objectives of this study is to examine the long-run equilibrium between stock prices and macroeconomic variables. The empirical studies associated with macroeconomic influences on common stock prices have documented a causal relationship between stock prices and macroeconomic variables. For example, Jefferis and Okeahalam (2000) examined the effect of macroeconomic variables and found that stock prices have positive long-run relationship with real GDP. Therefore, it is a matter of interest to explore whether macroeconomic variables such as real GDP, inflation, interest rate, and money supply could capture the variation in stock market prices. The methodology employed to test long-run equilibrium in this study is the cointegration test and the modeling strategy adopted is based on the widely used Engle-Granger methodology (Engle & Granger, 1987). The steps involved for cointegration test are described as follows:

**a. Stationarity/Unit Root test**

**Table 4.4**
**Augmented Dickey-Fuller Test for Unit Roots of the Variables**

| Variables | With Constant and no Trend | | With Constant and Trend | |
|---|---|---|---|---|
| | Level ($\tau$) | First Difference | Level ($\tau$) | First Difference |
| NI | 0.699 | -3.709*** | -0.803 | -3.735** |
| | (0.989) | (0.004) | (0.950) | (0.020) |
| l_RGDP | -0.834 | -3.695*** | -2.114 | -3.549* |
| | (0.789) | (0.004) | (0.510) | (0.059) |
| INF | -2.656 | -6.822*** | -3.084 | -6.690*** |
| | (0.098) | (0.000) | (0.134) | (0.000) |
| IR | -1.831 | -4.199*** | -2.539 | -4.078** |
| | (0.356) | (0.004) | (0.308) | (0.021) |
| M2 | -3.103 | -5.302*** | -3.193 | -5.168*** |
| | (0.041) | (0.000) | (0.111) | (0.002) |
| Critical Values | | | | |
| 1% | -2.66 | | -3.75 | |
| 5% | -1.95 | | -3.00 | |
| 10% | -1.60 | | -2.62 | |

*Note*: The Table 4.4 shows the unit root tests of the macroeconomic variables for the period of 1994 to 2016 using Augmented Dickey Fuller criteria. The variables are NEPSE Index (NI), real gross domestic product (RGDP), rate of inflation (INF), interest rate (IR) defined as the annualized weighted average of 91 days treasury bills rate and the growth rate of broad money supply (M2). As the plot of the data suggests, model without constant and no trend is avoided. Probabilities are in parentheses. ***, **, and * denote rejection of the unit root hypothesis at 1%, 5%, and 10% respectively. Tests for unit roots have been carried out on Gretl software.

First step is to determine whether the variables used are stationary or non-stationary. Many macroeconomic time series contain unit roots dominated by stochastic trends as developed by Nelson and Plosser (1982). Knowing that unit root tests are sensitive to the presence of deterministic regressors, tests for each variable then is performed on both levels and first differences. Table 4.4 reports the results of Augumented Dickey Fuller (ADF) test for the model without constant and no trend, and with constant and no trend.

According to Table 4.4, investigating the stationary of variables using ADF test shows that none of the variables were stationary at the level and become stationary after first order difference. Hence it is concluded that the variables are integrated of order one I*(1)*. This result is consistent to the finding of Nelson and Plosser (1982) that most of macroeconomic variables are non-stationary at level, but they are stationary after first differencing.

**b. Cointegration test**

Testing for Cointegration (long-run equilibrium) entails testing the order of integration of the error term in the relationship. For the purpose of this study therefore, testing for Cointegration implies testing for stationarity in the residuals of the regression equation. In order to estimate the long-run relationship between variables using the Engle-Granger integration technique, first, it is to find the optimal order of the VAR model using lag determining criteria.

**Table 4.5**

**Number of Optimal Lag Using Schwarz-Bayesian Criteria**

| Number of Lags | Schwarz-Bayesian Criteria (BIC) |
|---|---|
| 3 | 14.017 |
| 2 | 14.536 |
| 1 | 14.395* |

* indicates amount of optimal lag

According to the above Table 4.5, it can be claimed that optimal lag of the VAR model regarding the Schwarz –Bayesian criteria is one.

The test for Cointegration has been conducted using the residuals based method of Engle and Granger (1987). According to Engle and Granger, if the residuals obtained from the above static regression are stationary, it implies that the

variables are cointegrated. Hence, there is a tendency for the variables to move together in the long-run even though the variable may wander or drift individually apart. The results obtained using the Engle and Granger (1987) Cointegration test is presented in Table 4.6.

**Table 4.6**
**Cointegrating Regression: OLS Estimates of the Long-run Model**

| Dependent variable | Independent variables | Coefficient | *t* - Statistics | Probability |
|---|---|---|---|---|
| NI | Const | 72390.5 | 1.407 | 0.177 |
| | l_GDP | -5771.45 | -1.413 | 0.175 |
| | INF | -20.93 | -0.725 | 0.478 |
| | IR | 5.759 | 0.222 | 0.827 |
| | M2 | 31.339 | 2.122 | 0.048** |
| | Time | 256.597 | 1.660 | 0.115 |
| | $R^2$ | 0.666 | | |
| | Adj. $R^2$ | 0.568 | | |
| | S.D. dep. var | 382.71 | | |
| | Durbin-Watson | 1.131 | | |
| | S.E. of Regression | 251.546 | | |

*Stationarity Test of Residual*

| Test variable | Null Hypothesis | Test statistics (τ) | p-value | Null hypothesis | Result |
|---|---|---|---|---|---|
| û | Residual is not stationary | -2.207 | 0.957 | Could not be rejected | Residual is not stationary |

The result in Table 4.6 indicates that unit root hypothesis of no stationarity (null hypothesis of no cointegration) could not be rejected for the residuals (û) since p-value is 0.957. This shows that there is no evidence for the existence of cointegrating relationship among the variables used and therefore do not maintain long-run equilibrium. This concludes that there is no cointegration and long-run equilibrium between included macroeconomic variables and stock prices in the context of Nepal. This result contradicts the findings by Chen, Roll and Ross (1986), Maysami and Koh (2000), Ibrahim and Aziz (2003), Abu-Libdeh and Harasheh (2011), Osamyoni and Osagie (2012), among others. It also contradicts the findings by G.C., and Neupane (2006) and Bhattarai and Joshi (2009) in Nepalese context. However, this result is consistent with the findings by Bilson et al. (2001), Kandir(2008) and also supports the findings by Baskota (2007) in Nepalese context.

**c. Error Correction Model (ECM)**

The necessary and sufficient condition of cointegration is existence of ECM which indicates the speed of adjustment if the variables are cointegrated. When there is no cointegration, there does not exist ECM. We do not need to test for ECM further. If require otherwise to test for ECM, the residual from OLS regression shall be included in the ordinary least square regression of the variables whose first differences are considered. The lag value of order 1 is taken for the independent variables used to run the model. The ECM describes the short-run dynamics consistent with the long-run relationship. The estimated coefficient of error correction term measures the speed of adjustment to restore equilibrium in the dynamic model. The results though not significant, shows the expected negative sign for the residual (i.e Residual ($\hat{u}_{t-1}$) = -0.341) which is the necessary condition for error correction model. The full model and results of the ECM are presented in appendix D.

To sum up, the study does not find long run-equilibrium relationship between macro-economy and stock prices. The results support the random walk hypothesis in Nepalese context. Only the evidence from macroeconomic perspective may not be sufficient to come to the conclusion that none of the factors affect stock prices in Nepal. If the macroeconomic variables could not explain the variation in stock prices then what else are responsible to move stock prices in Nepal.

Another objective of this study is to test the impact of social, economic and major political events on stock prices in Nepal. Very often the prior studies of event analysis conducted even in developed economies found the significant impact towards influencing the stock prices.

### 4.3 Analysis of Major Events on Stock Returns

The results from the data analysis obtained by applying the tests defined in third chapter are presented in this chapter. This section deals with social, economic and political events and their effect on stock returns.

#### 4.3.1 Description of Event Study

The current study is dealing with the Nepalese stock market's reaction to the unanticipated social, economic and political events. The major events and announcement of unanticipated information assumedly generate abnormal returns in the case of the semi-strong form of market efficiency. Such abnormal returns may be positive (negative) depending upon the good (bad) news of the political event. The sample event numbers, number of good news and bad news are presented in table 4.7.

**Table 4.7**
**Description of the Events**

| Events | Date of Events | Events Details | Good News | Bad News |
|---|---|---|---|---|
| 1st | 2064 Chaitra 28 (2008 April 10) | Former Maoist rebels win the largest bloc of seats in elections to the new Constituent Assembly (CA). | 0 | 1 |
| 2nd | 2067 Shrawan 25 (Aug 10, 2010) | Margin lending limit increased to 60% | 1 | 0 |
| 3rd | 2067 Poush 20 (Jan 14, 2011) | BFIs were allowed self decision on the limit of margin lending. | 1 | 0 |
| 4th | 2069 Jestha 15 (2012 May 28) | The Constituent Assembly (CA) is dissolved after failing to produce a draft constitution. | 0 | 1 |
| 5th | 2070 Mangsir 4 (2013 Nov. 19) | Nepali Congress wins the second Constituent Assembly elections | 1 | 0 |
| 6th | 2072 Baisakh 12 (2015 April 25) | A 7.8-magnitude earthquake strikes Kathmandu and its surrounding areas killing more than 8,000 people, causing mass devastation and leaving millions homeless. | 0 | 1 |
| 7th | 2072 Shrawan 4 (2015 July 23) | Announcement of monetary policy 2072/73 increasing paid up capital of Banks to 8 Arab and FIs with more than 2 folds | 1 | 0 |
| 8th | 2072 Ashoj 4 (2015 Sept. 20) | Promulgation of a new constitution 2072 by president Dr. Ram Baran Yadav. | 1 | 0 |
| 9th | 2072 Falgun 14 (2016 Feb. 23) | End a six-month border blockade by India in protest over the new constitution which they say is discriminatory. | 1 | 0 |
| 10th | 2073 Falgun 9 (2017 Feb. 20) | Announcement of local level election across the country for 31 Baisakh, 2074 | 1 | 0 |
| | | **Total** | **7** | **3** |

During the fiscal year 2008/09 to 2016/17 of 10 years period, total of 10 major social, economic and political events were identified. These events are categorized into 3 groups; political events, policy changes and catastrophic event. Based on the nature of the events, there are 6 political events including event1, event4, event5,

event8, event 9 and event 10. Similarly, 3 policy changes consists event2, event3 and event7 and the only 1 catastrophic event is event6.

Further, these events are partitioned into good news and bad news announcements on the basis of the future certainties/uncertainties to the stock market. The winning election by Maoist party (event-1), dissolution of Constituent Assembly (event-2), and Nepal Earthquake-2015 (event-6) are treated as bad-news events. These events are bound to introduce substantial uncertainty about the future course of the firm business and the share market, and therefore, involve substantial risks. Thus, a negative value effect might be expected from the bad-news announcements. Similarly, increasing limit of margin lending (event-2 and 3), Nepali congress form government (event-5), announcement to increase paid up capital by monetary policy (event-7), promulgation of a new constitution 2072 (event-8), end of blockade (event 9) and announcement of election (event-10) are classified under good-news announcements. These announcements are bound to introduce substantial certainty about the future course of the firm business and the share market, and therefore involve lesser risk. Thus, a positive value effect might be expected from the good news announcements.

These observations are classified as 70 – 30 percent to good and bad news respectively. The 2008/09 – 2016/17 study period is of interest not only because it uses most recent political events and security return data, it includes the most popular political events such as - the most violent Maoist rebel come to mainstream of the politics via election, promulgation of a new constitution, local level election-the first time of the history in federal system. Further, during this period the stock market has gone up to the all time high 1881.45 points on 31 July, 2016 from all time low of 292.31 points on 15 June, 2011.

The daily stock returns data consisted of 2240 observations from May 31, 2007 to March o7, 2017 that covers all the events and their subsequent impacts on stock returns. Table 4.8 provides the descriptive statistics of the data being used.

**Table 4.8**
**Descriptive Statistics of Daily Stock Returns**

| Observations | Mean | St. Deviation | Minimum | Maximum | Skewness | Kurtosis |
|---|---|---|---|---|---|---|
| 2240 | 0.0323 | 1.339 | -7.4957 | 5.6462 | 0.097 | 3.443 |
| Jarque Bera | (JB) Test | 1109.67 | | | | |
| | P-value | 0.000 | | | | |

The mean value for percentage returns was 0.0323 with a minimum value of -7.4957 and maximum of 5.6462. The disparity in the minimum and maximum values for the data shows the wide range in stock returns on different days. The standard deviation is 1.339 which means that the data has some deviations from the average value. Also Kurtosis of 3.443 suggested the data to be slightly leptokurtic. The data has a skewness of 0.097, which is close to zero suggesting the data to be normal. The normality of data has been also supported by JB test.

### 4.3.2 Test of Homogeneity of Variance

Levene's test was conducted to find whether the data would consider t-value for equal variances assumed or equal variances not assumed. It is an inferential statistic used to assess the equality of variances for a variable calculated for two or more groups. The statistical procedures assume that variances of the populations from which different samples are drawn are equal. The data is homoscedastic when there are equal variances and heteroscedastic when equal variances are not there. A value less than .05 means that the variability in two conditions is not the same. That the scores in one condition vary much more than the scores in other second condition. Scientifically, when $p < 0.05$ then it means that the event that we considered for testing has significant impact on stock returns.

**i) Impact of Political Events**

***a. Analysis of impact due to overall sample of political events***

All political events of the study are included to assess the impact on stock returns during the period as per event window suggested by Cheng and Lung (2006). The equal variances (test of homogeneity) on two groups; Political event and stock returns are tested using Levene's test.

**Description of the Political Events**

| Events | Date of Events | Events Details |
|---|---|---|
| 1st | 2064 Chaitra 28 (2008 April 10) | Former Maoist rebels win the largest bloc of seats in elections to the new Constituent Assembly (CA). |
| 4th | 2069 Jestha 15 (2012 May 28) | The Constituent Assembly (CA) is dissolved after failing to produce a draft constitution. |
| 5th | 2070 Mangsir 4 (2013 Nov. 19) | Nepali Congress wins the second Constituent Assembly elections |
| 8th | 2072 Ashoj 4 (2015 Sept. 20) | Promulgation of a new constitution 2072 by president Dr. Ram Baran Yadav. |
| 9th | 2072 Falgun 14 (2016 Feb. 23) | End a six-month border blockade by India in protest over the new constitution which they say is discriminatory. |
| 10th | 2073 Falgun 9 (2017 Feb. 20) | Announcement of local level election across the country for 31 Baisakh, 2074 |

Table 4.9 provides the empirical results for the tests observing the impact of all political events.

**Table 4.9**
**Empirical Results for Political Events**

| Test | Levene's test value | P-value |
|---|---|---|
| Window 1 (-10, -1) | 7.291*** | 0.007 |
| Window 2 (0, +10) | 12.168*** | 0.001 |
| Window 3 (+2, +10) | 0.659 | 0.417 |
| Window 4 (-10, +10) | 20.240*** | 0.000 |
| Window 5 (-5, +5) | 24.204*** | 0.000 |
| Window 6 (-3, +3) | 34.352*** | 0.000 |

*Note:* Test of homogeneity of variance on stock returns at all political events including events 1, 4, 5, 8, 9, and 10 and the different event windows

In this case except for event window 3, P-value is less than 0.05 for Levene's test statistics. This means that there are remarkable differences on the variances of two groups. The event causes the significant impact on the movement of stock prices. It is further noted that, the post event impact is not statistically significant. We can explain this issue that the stock market adjusts the information at its earliest. Pre-event effects are all significant. This means there is information content hypothesis regarding signalling effect in Nepalese stock market. The results are consistent with the prior study by Li and Born (2006).

***b. Analysis of impact due to favourable political events***

Political events that are considered good news for the stock market performance are included to assess their impact in this section. Events 5, 8, 9, and 10 are hypothesized as good news events in this study. The test of equal variances has been conducted in between the stock returns in these events and the different event window period.

**Favourable Political Events**

| Events | Date of Events | Events Details |
|---|---|---|
| 5th | 2070 Mangsir 4 (2013 Nov. 19) | Nepali Congress wins the second Constituent Assembly elections |
| 8th | 2072 Ashoj 4 (2015 Sept. 20) | Promulgation of a new constitution 2072 by president Dr. Ram Baran Yadav. |
| 9th | 2072 Falgun 14 (2016 Feb. 23) | End a six-month border blockade by India in protest over the new constitution which they say is discriminatory. |
| 10th | 2073 Falgun 9 (2017 Feb. 20) | Announcement of local level election across the country for 31 Baisakh, 2074 |

Table 4.10 summarizes the impact of favourable political events on stock returns.

**Table 4.10**
**Empirical Results for Favourable Political Events**

| Test | Levene's test value | P-value |
|---|---|---|
| Window 1 (-10, -1) | 0.671 | 0.413 |
| Window 2 (0, +10) | 1.519 | 0.218 |
| Window 3 (+2, +10) | 0.072 | 0.788 |
| Window 4 (-10, +10) | 0.112 | 0.738 |
| Window 5 (-5, +5) | 1.195 | 0.274 |
| Window 6 (-3, +3) | 3.205* | 0.074 |

*Note:* Test of homogeneity of variance on stock returns at favourable political events including events 5, 8, 9, and 10 and different event windows

The above results show that is no significant impact of good political events on stock returns. This means the good news travels slowly without making remarkable impact within window period. However, the very weak impact is observed in between short window period (-3, +3). This gives evidence on the speed of adjustment of stock prices to good political events as many as 3 days from the announcement date.

***c. Analysis of impact due to unfavourable political events***

Political events that are considered bad news for the stock market performance are included to assess their impact in this section. Events 1 and 4 are hypothesized as bad news events in this study. The test of equal variances has been conducted in between the stock returns in these events and the different event window period.

**Unfavourable Political Events**

| Events | Date of Events | Events Details |
|---|---|---|
| 1st | 2064 Chaitra 28 (2008 April 10) | Former Maoist rebels win the largest bloc of seats in elections to the new Constituent Assembly (CA). |
| 4th | 2069 Jestha 15 (2012 May 28) | The Constituent Assembly (CA) is dissolved after failing to produce a draft constitution. |

Table 4.11 summarizes the impact of unfavourable political events on stock returns.

**Table 4.11**
**Empirical Results for Unfavourable Political Events**

| Test | Levene's test value | P-value |
|---|---|---|
| Window 1 (-10, -1) | 31.471*** | 0.000 |
| Window 2 (0, +10) | 17.196*** | 0.000 |
| Window 3 (+2, +10) | 3.058* | 0.080 |
| Window 4 (-10, +10) | 53.901*** | 0.000 |
| Window 5 (-5, +5) | 52.662*** | 0.000 |
| Window 6 (-3, +3) | 64.733*** | 0.000 |

*Note:* Test of homogeneity of variance on stock returns at unfavourable political events including events 1 and 4 and different event windows

The results indicated that the unfavourable political events have very significant impact on Nepali stock markets. The pre-event impacts are more powerful than the post-event. It also found signalling effect supporting information content hypothesis (Fama, 1970) in regards to stock returns and political announcements.

**ii) Impact of Policy Changes Events**

Three events of policy changes in regards to increasing limits of margin lending and paid up capital of Banks and financials are considered in this section. All these policy events including events 2, 3 and 7 are hypothesized to have favourable impact on stock returns.

**Description of Policy Changes Events**

| Events | Date of Events | Events Details |
|---|---|---|
| 2nd | 2067 Shrawan 25 (Aug 10, 2010) | Margin lending limit increased to 60% |
| 3rd | 2067 Poush 20 (Jan 14, 2011) | BFIs were allowed self decision on the limit of margin lending. |
| 7th | 2072 Shrawan 4 (2015 July 23) | Announcement of monetary policy 2072/73 increasing paid up capital of Banks to 8 Arab and FIs with more than 2 folds |

Their impact was estimated on different event windows as suggested by Cheng and Lung (2006). The equal variances (test of homogeneity) on two groups are tested using Levene's test. Table 4.12 provides the empirical results for the tests observing the impact of policy measures on stock returns.

**Table 4.12**
**Empirical Results for Policy Changes Events**

| Test | Levene's test value | P-value |
|---|---|---|
| Window 1 (-10, -1) | 6.680*** | 0.010 |
| Window 2 (0, +10) | 7.677*** | 0.006 |
| Window 3 (+2, +10) | 3.143* | 0.076 |
| Window 4 (-10, +10) | 11.979*** | 0.001 |
| Window 5 (-5, +5) | 8.255*** | 0.004 |
| Window 6 (-3, +3) | 6.210** | 0.013 |

*Note:* Test of homogeneity of variance on stock returns at all policy events including events 2, 3, and 7 and different event windows

As like previous results, the policy changes events also impact significantly on stock returns. Their influences are statistically stronger on the pre-event period and gets weaker on post event period. These results indicated the information signalling effect and supports information content hypothesis in Nepali stock market. It indicates that the Nepalese stock market is inefficient at a semi-strong level.

**iii) Impact of Catastrophic Event**

The only one event i.e event 6, Nepal earthquake-2015 is considered as a catastrophic event for this study. It is assumed to have negative impacts on stock returns as bad news for market performance.

**Description of the Catastrophic Event**

| Events | Date of Events | Events Details |
|---|---|---|
| 6th | 2072 Baisakh 12 (2015 April 25) | A 7.8-magnitude earthquake strikes Kathmandu and its surrounding areas killing more than 8,000 people, causing mass devastation and leaving millions homeless. |

The impact of this event was estimated on six event windows. For this purpose, the equal variances (test of homogeneity) on two groups are tested using Levene's test. Table 4.13 summarizes the impact of catastrophic events on stock returns.

**Table 4.13**
**Empirical Results for Catastrophic Event**

| Test | Levene's test value | P-value |
|---|---|---|
| Window 1 (-10, -1) | 0.671 | 0.413 |
| Window 2 (0, +10) | 1.519 | 0.218 |
| Window 3 (+2, +10) | 0.072 | 0.788 |
| Window 4 (-10, +10) | 0.112 | 0.738 |
| Window 5 (-5, +5) | 1.195 | 0.274 |
| Window 6 (-3, +3) | 3.205* | 0.074 |

*Note:* Test of Homogeneity of Variance on stock returns at catastrophic event 6 and different event windows

The catastrophic event doesn't seem to have significant impact on stock returns. Only event window 6 shows the weak influence on market returns. This means the impact is very short and is adjusted with in maximum 3 days of the event happening. Levene's values for rest of all five event windows are insignificant i.e greater than 5%. This means that the data considered is homoscedastic. Thus P-values for "equal variances assumed" would be interpreted.

### 4.3.3 Dummy Variable Regression Results

In this section the one to one impact of each event on stock returns has been analysed using dummy variables for the different event windows. Table 4.14 summarizes the results of regressing using dummy variables for each event.

**Table 4.14**
**Dependent variable: Stock Returns (SR)**

| Model | Intercept | W1 (-10, -1) | W2 (0, +10) | W3 (+2, +10) | W5 (-5, +5) | W6 (-3, +3) | *F* |
|---|---|---|---|---|---|---|---|
| **Event1** | 0.129<br>(0.787) | -0.361<br>(-0.797) | -4.550***<br>(-8.444) | 5.032***<br>(10.30) | 0.904**<br>(2.160) | 0.875***<br>(3.346) | 36.133*** |
| **Event2** | -0.170*<br>(-1.666) | 0.106<br>(0.851) | 0.233<br>(1.307) | -0.082<br>(-0.998) | 0.138<br>(1.612) | -0.332***<br>(-3.534) | 8.754*** |
| **Event3** | -0.128<br>(-1.392) | -0.054<br>(-0.264) | -0.207<br>(-0.937) | -0.042<br>(-0.949) | 0.061<br>(0.242) | -0.393**<br>(2.545) | 3.756*** |
| **Event4** | 0.037<br>(0.283) | 0.789<br>(0.912) | -4.861***<br>(-3.425) | 7.457***<br>(10.77) | -1.150<br>(-1.419) | 0.793<br>(0.541) | 368.474*** |
| **Event5** | 0.040<br>(0.627) | 0.099<br>(1.182) | 3.967***<br>(10.92) | -4.969***<br>(-12.80) | 0.857***<br>(3.146) | -0.485<br>(-1.575) | 47.596*** |
| **Event6** | 0.016<br>(0.167) | 0.147<br>(0.991) | -2.834***<br>(-17.41) | 0.706***<br>(13.66) | -0.424***<br>(-3.518) | 0.020<br>(0.234) | 1135.06*** |
| **Event7** | -0.055<br>(-0.529) | 0.202*<br>(1.817) | 4.016***<br>(21.50) | -5.647***<br>(-26.97) | -0.068<br>(-0.824) | 0.505***<br>(4.987) | 239.899*** |
| **Event8** | 0.116<br>(1.065) | -0.117<br>(-0.836) | -0.746<br>(-0.776) | -0.424<br>(-0.460) | 1.053***<br>(10.45) | -0.998***<br>(-4.073) | 77.408*** |
| **Event9** | 0.130<br>(1.186) | -0.023<br>(-0.116) | -1.155***<br>(-5.809) | 0.611***<br>(14.28) | 0.202<br>(1.184) | 0.358**<br>(2.548) | 93.462*** |
| **Event10** | -0.026<br>(-0.236) | -1.71***<br>(-3.887) | -4.452***<br>(-8.031) | -0.378***<br>(-4.244) | 2.592***<br>(4.417) | 1.482***<br>(3.479) | 69.823*** |

The results show the significant impact of major social, economic and political events on stock returns in Nepal. The highest significance in majorities are observed in event window (-3, +3) followed by (-5, +5), and (0, +10). Further, very weak evidences are observed for window period (-10, -1). It indicates that the early signalling far off event date is weaker but starts stronger from 5 days prior and lasts up to 5 days after the event. Among all, the longest impact on market performance was observed for event 10 i.e. announcement of local election for the first time in federal system of Nepal. It has statistically significant influences from 10 days prior to 10 days after the event; which is the total length of the event considered for the study.

In general, the market attempts to adjust the influences of new social, economic and political events in as many as 3 to 5 days from the announcement date. Thus, the major finding of this result is that the Nepalese stock market is inefficient at a semi-strong level and there is a strong linkage between major social, economic and political uncertainty and stock returns.

### 4.3.4 Estimation of Abnormal Returns in Event Windows

The primary hypothesis addressed in this section is whether or not, the unanticipated political information, policy changes and catastrophic events on stock market received any abnormal returns. The abnormal returns of stocks in each event category over the 6 event window are given in table 4.15.

**Table 4.15**
**Averages of Daily Abnormal Stock Returns**

| Event | Estimated period | Event Windows: Abnormal Returns in Percent | | | | | |
|---|---|---|---|---|---|---|---|
| | **(-200, -21)** | **(-10, -1)** | **(0, +10)** | **(+2, +10)** | **(-10, +10)** | **(-5, +5)** | **(-3, +3)** |
| E1:Political | **0.1739** | 0.4826 | -0.1403 | 0.4157 | 0.1563 | 0.3823 | 0.5906 |
| E2:Policy | **-0.1835** | -0.094 | -0.5074 | -0.5911 | -0.3105 | -0.2624 | -0.2083 |
| E3:Policy | **-0.1460** | -0.0336 | 0.0910 | 0.0848 | 0.0316 | 0.1326 | 0.1723 |
| E4:Political | **0.0412** | 0.4889 | -1.0900 | -0.1810 | -0.3382 | -0.8913 | -0.6289 |
| E5:Political | **0.0233** | 0.4229 | 1.4612 | 0.8126 | 0.9668 | 0.9374 | 1.3027 |
| E6:Catastrophic | **0.0235** | -0.0430 | -0.0946 | 0.6004 | -0.0700 | -0.7995 | -1.7429 |
| E7:Policy | **-0.0710** | 0.2647 | 0.6791 | -0.1473 | 0.4818 | 0.7445 | 1.1502 |
| E8:Political | **0.1200** | 0.2265 | -0.3720 | -0.3270 | -0.0870 | 0.0837 | -0.4264 |
| E9:Political | **0.1211** | 0.3162 | 0.1876 | 0.3324 | 0.2488 | 0.2221 | 0.1957 |
| E10:Political | **0.0121** | 0.0082 | -0.1874 | -0.1392 | -0.0942 | 0.3149 | 0.6643 |
| **Average** | **0.01146** | **0.20394** | **0.00272** | **0.08603** | **0.09854** | **0.08643** | **0.10693** |

The cumulative running averages of stock returns for each event on each event windows have been estimated. The results show that the highest abnormal return (0.20394) was observed for the pre-event period (-10, -1) followed by event period (-3, +3) compared to the normal average expected return (0.01146). This gives further evidence of strong signalling effect in Nepalese stock market. The price of the stock was already risen up due to leakage of the information in the market which is the basic reason that the pre-event (-10,-1) abnormal return is the highest among all. Further, the market continues to provide abnormal returns in closer to the event days having window (-3, +3).

This result further supports our previous evidence that the market attempts to adjust the influences of new social, economic and political events in as many as 3 to 5 days from the announcement date. Thus, from the above results, the conclusion can be drawn that the Nepalese stock market is inefficient at a semi-strong level and there is a strong linkage between major social, economic and political uncertainty and stock returns.

### 4.4 Model Specification and Diagnostic Checking

To ensure the robustness of the estimation process, model specification and diagnostic checking was conducted.

**i. Model Specification Test**

This study is based on the model proposed by different prior studies conducted in developed economies. There may be chance of specification error in the model due to addition and omission of some variables. Thus, a test is conducted to ensure the appropriate specification of the models. The given values of *F*-statistics (*F*=11.94 and p-value 0.0001 < 1%) in full model V of table 4.3confirmed that the overall specification of the model is significant. The RESET test further confirmed that the fitted model is valid and there is no specification biased.

**Ramsey's regression specification error test (RESET) Test:**

H0: Model is properly specified

Test statistic: F = 2.917, with p-value = P(F(2,16) > 2.917) = 0.083

Since, the F test is significant and p-value doesn't reject the null hypothesis at 5% level of significance, it could be claimed that model is not mis-specified.

**ii. Autocorrelation Test**

**Breusch-Godfrey (LM) test for autocorrelation**

H0: There is no serial autocorrelation

Test statistic: LMF = 2.364553, p-value = P(F(2,16) > 2.36455) = 0.126

Since, p value of given statistics (0.126) is greater than 0.05, it couldn't reject the null hypothesis. Hence, the model is free from serial autocorrelation.

**iii. Multicollinearity Test**

The diagnostic check has been conducted using variance inflationary factor (VIF) of explanatory variables to detect the multicollinearity problem, if any. The values of VIF associated with several specifications of the model are reported in Appendix E. The result shows that VIF of explanatory variables across all the models are significantly lower than 10. Therefore, there is no evidence of Multicollinearity.

**iv. Hetersokedasticity Test**

**White's test for heteroskedasticity**

H0: Heteroscedasticity not present

Test statistic: $\chi^2 = 16.342$, p-value = P($\chi^2$ (14) > 16.341885) = 0.292945

Since p-value > 0.05, it could not reject the null hypothesis. That means there is no heteroscedasticy.

## 4.5 Concluding Remarks

The results documented in this study find the priori expected sign of relationship between stock prices and macroeconomic variables including real GDP, inflation, interest rate, and broad money supply. Their correlation coefficients as well as estimated regression coefficients are found statistically significant to predict stock prices. However, the study couldn't show long run- equilibrium relationship between macro-economy and stock prices. The major finding of the study is that there is no cointegrating relationship between macroeconomic variables and stock prices. This result contradicts the prior finding by Ibrahim and Aziz (2003), Bhattarai and Joshi (2009) and many others. However, this result is consistent with the findings by Kandir(2008) and also supports the findings by Baskota (2007) in Nepalese context. In general, the results support the random walk hypothesis in Nepalese context.

Only the evidence from macroeconomic perspective may not be sufficient to make conclusion on pricing behaviour of common stock. So, this study also analyzed the impact of social, economic and major political events on stock prices in Nepal. These non- economic factors are found significant on influencing stock returns in many developed economies.

The results of such events analysis found the significant impact of major social, economic and political events on stock market performance in Nepal. The highest abnormal return was observed for the pre-event period (-10, -1) followed by event period (-3, +3) and the highest significance of the events in majorities are observed in event window (-3, +3) followed by (-5, +5). This gives evidence of strong signalling effect in Nepalese stock market. The exemplary evidence of signalling effect has been illustrated in appendix G for the event of announcing local election by the government on dated 20 February, 2017. In general, the market attempts to adjust the influences of new social, economic and political events in as many as 3 to 5 days from the announcement date. Thus, the major finding of this result is that the Nepalese stock market is inefficient at a semi-strong level and there is a strong linkage between major social, economic and political uncertainty and stock returns.

# CHAPTER V

# SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

## 5.1 Summary

The behavior of stock pricing has always been a subject matter of controversial debate. The studies on pricing implication of common stocks began since the publication of seminal work of Markowitz (1952) - the mean-variance portfolio theory. Much attention have been paid in past in this regard to explore what determines common stock prices in the context of developed capital markets. The past studies suggested that not only the fundamentals and macroeconomic variables are sufficient to explain the pricing movements of common stock rather other social, economic and political events are also equally important. If the stock prices reflect the announcement of public information instantaneously and without bias, the market should be classified as a semi-strong form of efficiency (Fama, 1970). However, little efforts have been made to explore these issues in the context of Nepalese stock market which has been experiencing more volatility than ever in the past. Unfavorable political environment, monopoly market structure, very less practice of financial analysis among investors, immature and uncompetitive broker services, poor regulation and governance structure, and unbalanced structure of market are some of the major characteristics of Nepalese stock market. As a result, there exists an anomaly as to what affects stock prices in Nepal.

This study was basically concentrated on two aspects of pricing implications. First, the influence of macroeconomic variables on stock prices was analyzed. Second, the event analysis was performed to assess the impact of major social, economic and political events on stock returns. This study relied on the use of secondary sources of data. The results indicated that macroeconomic variables; real GDP, inflation and money supply have positive relationship with stock prices whereas interest rate relates negatively. It has also attempted to analyze the cointegrating relationship between stock returns and macroeconomic variables to identify whether there is short or long-run equilibrium between macroeconomic variables and stock prices in Nepal. The model includes time series analysis of cointegration test using Engle and Granger integration technique. The study revealed that that there is no cointegration exists between macroeconomic variables and stock prices in Nepal.

This study has also made a sincere effort to examine the existence of semi-strong form of efficiency in Nepalese stock market. For this objective, it has examined the market reaction that would follow immediately to the announcement of new unanticipated significant social, economic and political events in the context of Nepalese stock market. The present study seeks to enquire into the common stock return before and after announcement of new important information, i.e., political, policy changes and catastrophic events. Empirical tests were performed to ascertain whether the stock abnormal returns are positive or negative after the announcement of public information. The positive abnormal returns are considered as good news to stock market, while bad news creates negative abnormal returns. This study also assessed the time duration of market reaction to announcement of new unanticipated public information (social, economic, and political) and evaluates the effect on stock returns.

The event studies were carried on sequential order. First, it has performed Levene's test to identify whether there is a significant impact on stock returns for the given event or not. Second, dummy variable regression method was executed to find which event window is statistically significant to influence the stock returns within a given event. Finally, estimation of abnormal returns was carried out by using running average method to know the level of abnormal returns in the given event and event windows

The study found the significant impact of major social, economic and political events on stock market performance in Nepal. The highest abnormal return was observed for the pre-event period (-10, -1) followed by event period (-3, +3) and the highest significance of the events in majorities were observed in event window (-3, +3) followed by (-5, +5). These results provided the evidence of strong signalling effect in Nepalese stock market. In general, the market attempts to adjust the influences of new social, economic and political events in as many as 3 to 5 days from the announcement date. Thus, the major finding of this result is that the Nepalese stock market is inefficient at a semi-strong level and there is a strong linkage between major social, economic and political uncertainty and stock returns.

Based on the analysis of the data and interpretation, the major findings of the study have been summarized as follows:

### 5.2 Major Findings

i. The correlation coefficients indicated that the stock market prices (NI) has positive relationships with real GDP, inflation and Money supply but has negative correlation (-0.501) with interest rate as expected. It indicated that the stock returns goes on decreasing when market interest rate increases. Investors will be reluctant to have borrowing at higher rate of interest and use it to stock investing. It validates the results by Chen (1991) among many others.

ii. The statistical significance of the regression coefficients RGDP (990.02) and M2 (16.98) implies that real GDP and the broad money supply (M2) among others are the important macroeconomic variables to determine the movement of stock prices. This result is consistent with the findings of Chen, Roll and Ross (1986), Schwert (1989), and Gan, Lee, Yong and Zhang (2006).

iii. In cointegrating regression the p-value of residual was observed to be 0.957, which rejected the cointegrating relationship among the variables used and therefore do not maintain long-run equilibrium. This result contradicts the findings by Chen, Roll and Ross (1986), Maysami and Koh (2000), Ibrahim and Aziz (2003), Abu-Libdeh and Harasheh (2011), Osamyoni and Osagie (2012), among others. It also contradicts the findings by G.C., and Neupane (2006) and Bhattarai and Joshi (2009) in Nepalese context. However, this result is consistent with the findings by Bilson et al. (2001), Kandir(2008) and also supports the findings by Baskota (2007) in Nepalese context.

iv. The political events were found to cause significant impact on the movement of stock prices as p-values were less than 0.05. The post event impact was not statistically significant. It showed that the stock market adjusts the information at its earliest. Pre-event effects were all significant. This means there is information content hypothesis regarding signalling effect in Nepalese stock market. The results are consistent with the prior study by Li and Born (2006). Moreover, the results showed that the favourable political events have weak influences compare to the unfavourable events. This result documented the fact that in Nepalese stock market the good news travels slowly compare to the bad news.

v. The impacts of policy changes were statistically stronger on the pre-event period and gets weaker on post event period. These results also indicated the information signalling effect in Nepali stock market. It supported that the Nepalese stock market is inefficient at a semi-strong level.

vi. The catastrophic event didn't seem to have significant impact on stock returns. Only event window 6 shows the weak influence on market returns. This means that the impacts were happened to be very short and was adjusted with in maximum 3 days of the event happening.

vii. The dummy variable regression model for event analysis found the significant impact of major social, economic and political events on stock market performance in Nepal. The highest significance of the events in majorities were observed in event window (-3, +3) followed by (-5, +5). Weak evidences were observed for (-10, -1). It indicated that the early signaling closer to the event period were more effective which generally lasted from 5 days prior to the event 5 days after the event.

viii. The cumulative running averages of stock returns found that the highest abnormal return (0.20394) was observed for the pre-event period (-10, -1) followed by event period (-3, +3) compared to the normal average expected return (0.01146). This further supported the evidence of strong signaling effect in Nepalese stock market

The summary of the results has been illustrated as below:

**Table 5.1**
**Summary of Results**

| Hypothesis | Independent variable | Dependent variable | Hypothesized relationship | Finding |
|---|---|---|---|---|
| First Hypothesis | Real GDP | Market index | Positive | Supported |
| Second Hypothesis | Inflation | Market index | Positive | Supported |
| Third Hypothesis | Interest rate | Market index | Negative | Supported |
| Fourth Hypothesis | Broad money supply | Market index | Positive | Supported |
| Fifth Hypothesis | Macroeconomic variables | Market index | Long-run | Contradicted |
| Sixth Hypothesis | Social. Economic, political events | Stock returns | Impact | supported |

## 5.3 Conclusions

This study examines the economic and non-economic factors of stock market performance in Nepal, which has been passing through up and down in recent years. Since stock market tends to be highly sensitive and volatile, this study analyzes the impact of macroeconomic variables and other major social and political events on stock returns.

The major conclusion of this study is that macroeconomic variables and stock prices are not cointegrated. This shows that the stock prices movements in Nepal are not explained by the macroeconomic variables. In general, the finding of this study supports the random walk hypothesis (Malkiel, 1989) in Nepalese context. This result contradicts the findings by Chen, Roll and Ross (1986), Maysami and Koh (2000), Ibrahim and Aziz (2003), Abu-Libdeh and Harasheh (2011), Osamyoni and Osagie (2012), and many others. It also contradicts the findings by G.C., and Neupane (2006) and Bhattarai and Joshi (2009) in Nepalese context. However, this result is consistent with the findings by Bilson et al. (2001), and Kandir(2008) and also supports the findings by Baskota (2007) in Nepalese context.

The results indicated the important role of social, economic and political events on influencing the stock market performance in Nepal. It provides evidences of strong signalling effect in Nepalese stock market. This result is consistent with the findings of Li and Born (2006) and provided a consistent conclusion regarding the existence of information content hypothesis in the Nepalese stock market (Dangol, 2008). In general, the market attempts to adjust the influences of new social, economic and political events in as many as 3 to 5 days from the event date. Thus, the important finding of this result is that the Nepalese stock market is inefficient at a semi-strong level and there is a strong linkage between stock returns and major social, economic and political events.

### 5.4 Recommendations

Based on the findings of this study, the following major recommendations have been proposed:

i. Common stocks are believed to be highly risky than the other types of securities and asset investments. Moreover, at the same time, it has also given high rate of return than the other type's assets. The study reveals that the major social, economic and political events have significant influences on determining stock returns in Nepalese context. Therefore, investors are recommended to examine such factors before making stock investment choice in the context of Nepal.

ii. The emerging capital markets are characterized by less frequent transactions termed as thin trading. In such markets the relationship between stock prices and explanatory variables is expected to be non-linear. However, this study has assumed linear relationship between them. In order to incorporate these issues, the future studies are suggested to apply non-linear models to test the predictive power of explanatory variables.

iii. To evaluate the impact of macro-economy on stock prices, this study has used few macroeconomic variables. Inclusion of some other variables, for example, unemployment rate (Gertler & Grinols, 1982), national saving and investment (Ewing, 2002), industrial production and money supply (Liu & Shrestha, 2008) may provide an important insight into the dynamic relationship of stock prices and economic development. Therefore, future studies are recommended to include these variables as well.

iv. The study revealed that the positive abnormal returns (statistically significant) have appeared on 3 to 5 days ahead of the policy or political announcement. It may have resulted from the leakages of the new information (i.e. insider or private information). Hence, in order to make the Nepalese stock market more competitive and reliable, the regulatory agencies should control such leakages.

In conclusion, the need to understand the possible economic and non-economic factors that could predict the stock prices movement in Nepal is vital because the increased efficiency in stock market will consequently boost Nepalese economy.

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# APPENDICES

## Appendix A

### Data on Macroeconomic Variables

*This table shows the used data of stock market prices and selected macroeconomic variables over the study period from 1994 to 2016. The variables are stock prices proxied by NEPSE Index (NI), real gross domestic product (RGDP) , rate of inflation (INF), interest rate (IR) defined as the annualized weighted average 91 days treasury bills rate and the growth rate of broad money supply (M2).*

| Year | Nepse Index (NI) | Stock Returns (SR) | Inflation Rate % (INF) | Interest Rate %(IR) | Real GDP (RGDP) in million | Broad Money Supply (M2) % growth |
|---|---|---|---|---|---|---|
| 1994 | 226.00 | 55.75 | 8.35 | 6.50 | 309115.0 | 19.6 |
| 1995 | 195.50 | -15.60 | 7.62 | 7.35 | 318407.0 | 16.1 |
| 1996 | 185.60 | -5.33 | 9.22 | 10.93 | 336681.0 | 14.4 |
| 1997 | 176.30 | -5.28 | 4.01 | 10.22 | 353586.0 | 11.9 |
| 1998 | 163.40 | -7.89 | 11.24 | 3.52 | 365592.0 | 21.9 |
| 1999 | 216.90 | 24.67 | 7.45 | 2.33 | 382348.0 | 20.8 |
| 2000 | 360.70 | 39.87 | 2.48 | 4.66 | 405746.0 | 21.8 |
| 2001 | 348.40 | -3.53 | 2.69 | 4.96 | 413428.0 | 15.2 |
| 2002 | 227.50 | -53.14 | 3.03 | 4.71 | 414092.0 | 4.4 |
| 2003 | 204.90 | -11.03 | 5.71 | 3.48 | 429699.0 | 9.8 |
| 2004 | 222.00 | 7.70 | 2.84 | 2.93 | 448654.0 | 12.8 |
| 2005 | 286.67 | 22.56 | 6.84 | 2.46 | 463165.0 | 8.3 |
| 2006 | 386.86 | 25.90 | 7.56 | 2.84 | 480435.0 | 15.6 |
| 2007 | 683.95 | 43.44 | 6.10 | 2.42 | 493651.0 | 14.0 |
| 2008 | 963.36 | 29.00 | 10.91 | 4.22 | 522260.0 | 25.2 |
| 2009 | 749.10 | -28.60 | 11.61 | 5.83 | 542652.0 | 27.3 |
| 2010 | 477.73 | -56.80 | 9.98 | 6.50 | 565759.0 | 14.1 |
| 2011 | 362.85 | -31.66 | 9.55 | 7.41 | 587335.0 | 12.2 |
| 2012 | 389.74 | 6.90 | 9.45 | 1.31 | 614637.00 | 22.7 |
| 2013 | 518.33 | 24.81 | 9.04 | 1.74 | 637771.00 | 16.4 |
| 2014 | 1036.11 | 49.97 | 9.00 | 0.13 | 674227.00 | 19.1 |
| 2015 | 961.23 | -7.79 | 7.20 | 0.43 | 689848.00 | 19.9 |
| 2016 | 1718.15 | 44.05 | 10.40 | 0.79 | 695191.00 | 19.5 |

# Appendix B

## Descriptive Statistics of Macroeconomic Variables

*This table shows the descriptive statistics of stock market prices and selected macroeconomic variables over the study period from 1994 to 2016. The variables are stock prices proxied by NEPSE Index (NI), real gross domestic product (RGDP) , rate of inflation (INF), interest rate (IR) defined as the annualized weighted average 91 days treasury bills rate and the growth rate of broad money supply (M2).*

| Statistics | NEPSE Index | RGDP (billion) | Inflation (INF) | Int. Rate (IR) | M2 |
|---|---|---|---|---|---|
| **Mean** | 480.93 | 4.85 | 7.49 | 4.25 | 16.65 |
| **Median** | 360.70 | 4.63 | 7.62 | 3.52 | 16.10 |
| **Std. Deviation** | 382.71 | 1.22 | 2.87 | 2.92 | 5.53 |
| **Coeff. of variation** | 0.796 | 0.252 | 0.383 | 0.686 | 0.332 |
| **Skewness** | 1.743 | 0.329 | -0.480 | 0.691 | -0.149 |
| **Kurtosis** | 2.784 | -1.089 | -0.921 | -0.158 | -0.345 |
| **Minimum** | 163.40 | 3.09 | 2.48 | 0.13 | 4.4 |
| **Maximum** | 1718.2 | 6.95 | 11.61 | 10.93 | 27.3 |
| **JB test** | 19.07 | 1.239 | 1.698 | 1.853 | 0.199 |
| ***p*- value** | 0.007 | 0.538 | 0.427 | 0.396 | 0.905 |

# Appendix C

## Selected Events and Political Announcements

*The table shows the major social, economic and political events that occurred during the period from 2064 B.S. to till the study period. The events are ranked simply on the first come first basis. The likely impact of the events on stock market is given in third column of the table. The events are for the period of 2008 to 2017 A.D.*

| Events | Date of Events | Picture of the Events | Possible impact |
|---|---|---|---|
| 1st | 2064 Chaitra 28 (2008 April 10) | Former Maoist rebels win the largest bloc of seats in elections to the new Constituent Assembly (CA). | Bad |
| 2nd | 2067 Shrawan 25 (Aug 10, 2010) | Margin lending limit increased to 60% | Good |
| 3rd | 2067 Poush 20 (Jan 14, 2011) | BFIs were allowed self decision on the limit of margin lending. | Good |
| 4th | 2069 Jestha 15 (2012 May 28) | The Constituent Assembly (CA) is dissolved after failing to produce a draft constitution. | Bad |
| 5th | 2070 Mangsir 4 (2013 Nov. 19) | Nepali Congress wins the second Constituent Assembly elections | Good |
| 6th | 2072 Baisakh 12 (2015 April 25) | A 7.8-magnitude earthquake strikes Kathmandu and its surrounding areas killing more than 8,000 people, causing mass devastation and leaving millions homeless. | Bad |
| 7th | 2072 Shrawan 4 (2015 July 23) | Announcement of monetary policy 2072/73 increasing paid up capital of Banks to 8 Arab and FIs with more than 2 folds | Good |
| 8th | 2072 Ashoj 4 (2015 Sept. 20) | Promulgation of a new constitution 2072 by president Dr. Ram Baran Yadav. | Good |
| 9th | 2072 Falgun 14 (2016 Feb. 23) | End a six-month border blockade by India in protest over the new constitution which they say is discriminatory. | Good |
| 10th | 2073 Falgun 9 (2017 Feb. 20) | Announcement of local level election across the country for 31 Baisakh, 2074 | Good |

## Appendix D

### Error Correction Model (ECM) for Stock Prices in Nepal

*This table shows the error correction model and its results for stock market prices and selected macroeconomic variables over the study period from 1994 to 2016. The variables are first differences of stock prices proxied by NEPSE Index (NI), real gross domestic product (RGDP) , rate of inflation (INF), interest rate (IR) defined as the annualized weighted average 91 days treasury bills rate and the growth rate of broad money supply (M2).*

| Dependent variable | Independent variables | Coefficient | *t* - Statistics | Probability |
|---|---|---|---|---|
| $\Delta NI_t$ | Const | -387.644 | 1.668 | 0.116 |
| | $\Delta l\_GDP_{t-1}$ | -8580.90 | -1.743 | 0.101 |
| | $\Delta INF_{t-1}$ | -27.214 | -1.776 | 0.096* |
| | $\Delta IR_{t-1}$ | 11.323 | 0.481 | 0.638 |
| | $M2_{t-1}$ | 12.837 | 1.430 | 0.173 |
| | Residual ($\hat{u}_{t-1}$) | -0.341 | -1.367 | 0.192 |
| | $R^2$ | 0.240 | | |
| | Adj. $R^2$ | 0.013 | | |
| | F-statistics | 3.334** | | |
| | P-value (F) | 0.031 | | |
| | Durbin-Watson | 1.319 | | |
| | S.E. of Regression | 236.754 | | |

*Note*: ***, **, and * indicate that estimates are significant at 1%, 5%, and 10% respectively.

## Appendix E

### Variance Inflation Factors (VIF) test for OLS Model Specifications from I to V

*This table shows the values of variance inflationary factors (VIF) to diagnose the problems of multicollinearity associated with model specifications I through V in table 4.3.*

| Specification | Explanatory Variables | VIF |
|---|---|---|
| **I** | *l_GDP* | 1.000 |
| **II** | *INF* | 1.000 |
| **III** | *IR* | 1.000 |
| **IV** | *M2* | 1.000 |
| **V** | *l_GDP* | 2.043 |
| | *INF* | 1.741 |
| | *IR* | 1.870 |
| | *M2* | 1.525 |

## Appendix F

### Heteroskedasticity Test: White test for OLS Model Specifications V

*This table shows the test statistics of f and $\chi^2$ to diagnose the problems of heteroskedasticity associated with model specifications V in table 4.3.*

| | | | |
|---|---|---|---|
| F-statistic | 1.402532 | Prob. F(14,8) | 0.3226 |
| Obs*R-squared | 16.34189 | Prob. Chi-Square(14) | 0.2929 |

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 08/10/17 Time: 17:17
Sample: 1994 2016
Included observations: 23

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 1.13E+08 | 2.57E+08 | 0.441966 | 0.6702 |
| LOG(RGDP)^2 | 425889.4 | 1383238. | 0.307893 | 0.7660 |
| LOG(RGDP)*INF | 232242.8 | 133525.3 | 1.739317 | 0.1202 |
| LOG(RGDP)*IR | -7048.579 | 181445.0 | -0.038847 | 0.9700 |
| LOG(RGDP)*M2 | 53112.80 | 104754.2 | 0.507023 | 0.6258 |
| LOG(RGDP) | -14257401 | 37670367 | -0.378478 | 0.7149 |
| INF^2 | 9170.143 | 6122.149 | 1.497863 | 0.1725 |
| INF*IR | 5077.632 | 8247.363 | 0.615667 | 0.5552 |
| INF*M2 | -2216.789 | 3978.972 | -0.557126 | 0.5927 |
| INF | -3095229. | 1767346. | -1.751343 | 0.1180 |
| IR^2 | -728.6550 | 8427.620 | -0.086460 | 0.9332 |
| IR*M2 | -2990.157 | 5025.708 | -0.594972 | 0.5683 |
| IR | 61531.68 | 2453713. | 0.025077 | 0.9806 |
| M2^2 | -1017.618 | 1309.601 | -0.777044 | 0.4595 |
| M2 | -645054.7 | 1343344. | -0.480186 | 0.6440 |

| | | | |
|---|---|---|---|
| R-squared | 0.710517 | Mean dependent var | 54348.82 |
| Adjusted R-squared | 0.203921 | S.D. dependent var | 128081.6 |
| S.E. of regression | 114278.5 | Akaike info criterion | 26.37896 |
| Sum squared resid | 1.04E+11 | Schwarz criterion | 27.11950 |
| Log likelihood | -288.3580 | Hannan-Quinn criter. | 26.56520 |
| F-statistic | 1.402532 | Durbin-Watson stat | 1.659322 |
| Prob(F-statistic) | 0.322561 | | |

## Appendix G

### Illustration of Signaling Effect in Nepalese Stock Market

| Signalling Effect | Date | Stock Index | Stock Returns |
|---|---|---|---|
| The stock index goes on rising daily during the pre-event of announcing local election by the government on dated 2/20/2017 as part of the early signalling effect that the investors anticipate the news earlier. After the announcement, the market index goes on decreasing from the event date to the post event for continue 5 days. Thereby, the market readjusted the influences of the news. Gives evidence of information signalling. | 2/14/2017 | 1,275 | - |
| | 2/15/2017 | 1,317 | 3.1891 |
| | 2/16/2017 | 1,344 | 2.0089 |
| | 2/19/2017 | 1,369 | 1.8262 |
| | 2/20/2017 | 1,365 | -0.2930 |
| | 2/21/2017 | 1,358 | -0.5155 |
| | 2/22/2017 | 1,344 | -1.0417 |
| | 2/23/2017 | 1,337 | -0.5236 |
| | 2/26/2017 | 1,313 | -1.8279 |
| | 2/28/2017 | 1,299 | -1.0778 |