EFFECTS OF MACROECONOMIC VARIABLES ON STOCK MARKET OF NEPAL

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DECLARATION

I, SWASTI DHUNGANA, author of this proposed thesis, declare that this thesis entitled EFFECTS OF MACROECONOMIC VARIABLES ON STOCK MARKET OF NEPAL submitted to Central Department of Economics is my own original work unless otherwise indicated or acknowledged in the thesis. The thesis does not contain materials which has been accepted or submitted for any other degree at the University or other institution. All sources of information have been specifically acknowledged by reference to the author or institution(s).

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LETTER OF RECOMMENDATION

This thesis entitled EFFECTS OF MACROECONOMIC VARIABLES ON STOCK MARKET OF NEPAL has been prepared by SWASTI DHUNGANA under my guidance and supervision. I, hereby, recommend it in partial fulfilment of the requirements for the Degree of MASTER OF ARTS in ECONOMICS for final examination.

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APPROVAL LETTER

We certify that this thesis entitled EFFECTS OF MACROECONOMIC VARIABLES ON STOCK MARKET OF NEPAL submitted by SWASTI DHUNGANA to the Central Department of Economics, Faculty of Humanities and Social Sciences, Tribhuvan University, in partial fulfilment of the requirements for the Degree of MASTER OF ARTS in ECONOMICS has been found satisfactory in scope and quality. Thus, we accept this thesis as a part of the said degree.

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ABBREVIATIONS

ADF	-	Augmented Dickey Fuller Test
AIC	-	Akaike Information Criterion
ARDL	-	Auto-Regressive Distributive Lag
CUSUM	-	Cumulative Sums
ECM	-	Error Correction Model
EX	-	Exchange Rate
FY	-	Fiscal Year
M2	-	Broad Money Supply
NEPSE	-	Nepal Stock Exchange
NIx	-	Nepse Index
NRB	-	Nepal Rastra Bank
QEB	-	Quarterly Economic Bulletin
RGDP	-	Real Gross Domestic Product
SEBON	-	Security Board of Nepal
SIC	-	Schwarz Information Criterion
WB	-	World Bank

CHAPTER I
INTRODUCTION

1.1 Background of the Study

The stock market is treated as a part of securities market where the stock trade is organized and performed. Stock market plays a crucial role in the financial market of a country. It enables the governments and industries to raise long term and additional capital for financing new and old projects. The stock market is to be sensitive to various macro-economic factors such as real GDP, broad money supply, exchange rate etc. Many factors can be signal to stock market participants to expect a higher and lower return when investing in stock. One of these factors are macro-economic variables which affect the developments of stock market.

Securities markets can be divided into two parts: the primary and the secondary markets. In the primary market the securities are sold at the time of their initial issuance. On the other hand, the secondary market can be viewed as a 'used' securities market. It is the capital market where previously issued securities have been traded through stock exchange. In this regard, stock market is a major component of securities market (Boehme & Colak, 2012). A stock market is the center of a network of transactions where buyers and sellers of securities meet at a specified price (Bologa & Cavallo, 2002). It plays a key role in the mobilization of capital in emerging and developed countries, leading to the growth of industry and commerce, as a consequence of liberalized and globalized policies adopted by most emerging and developed governments. Many factors can be a signal to stock market participants to expect a higher or lower return when investing in stock market and one of these factors are macroeconomic variables (Talla, 2013).

The stock market has a fundamental part in raising capital for both private and government entities in order to support growth in their projects. Savers are attracted into the stock market by the opportunities available for returns in terms of value increase and bonuses. There has been a great interest of the relation regarding the macro-economic variables and the stock market both in the theoretical and empirical literature. There are various empirical research that examines the influence of macroeconomic factors on the stock market. These studies are based on the asset

valuation model which argues that macroeconomic factors can affect stock price in two distinct ways. Firstly, they can change expected cash flows of the firm and by this means change firm's stock price. Secondly, they can change the discount rate or required rate of return used by the market participants.

The existence of macroeconomic influence on the stock market suggests that stock price can be predicted using the publicly available information on macroeconomic variables. The occurrence of which contradicts with Fama's (1970) Efficient Market Hypothesis (EMH). According to him "A capital market is efficient if all the information in some information set is "fully reflected" in security prices". Fama distinguished three versions of the efficient markets based on this set of information reflected in security prices:

(i**) The Weak Form of the Efficient Market Hypothesis**: It refers to the information based on historical series of prices, which is just the past price (or returns).

(ii) The Semi-Strong Form of the Efficient Market Hypothesis: It refers to the publicly available information based on speed of price adjustment to other obviously available information such as statement of stock openings, new security issues, annual reports etc.

(iii) The Strong Form of the Efficient Market Hypothesis: It refers to private information based on all information of market participants or any investor or groups.

On the other hand, macroeconomic indicators are treated as statistical indicators which are used for assessment of general state of country economy during a given period of time. Macroeconomic variables affect stock market in various ways. Examples of such variables and its influences comprise of broad money supply, exchange rate and real GDP among others in this study.

Money supply is one of the basic parameters in an economy. Stock prices tend to move higher when the money supply is high in an economy. Plenty of money circulating in the economy makes more money available to invest in stocks and also makes alternative investment instruments. Broad money is more inclusive in calculating total money supply of an economy .Money supply affects the investment in stock market indirectly

and economic growth directly. So, the broad money supply is consider as one of the independent variable to define the stock index of Nepal.

Remittance is one of the major sources of earning for large population in Nepal. Their earning is affected by the change in exchange rate. If the Nepalese currency is devaluated against the US dollar the remittance amount in Nepalese equivalent currency will increase. This will also increase the amount available for saving and investment. In the adverse scenario, the available fund will be lower and affect the amount available for saving and investment. So, it is assumed that exchange rate is also one independent variable to define the stock index of Nepal.

When it costs more for firms to borrow money, they borrow and invest less, RGDP growth slows. Changes in information about the future course of RGDP may cause prices to change in the stock market. This explanation suggests that while stock prices are used to predict future economic activity, the actual causality is from future GDP growth in current stock prices.

The history of securities market began with the floatation of shares by Biratnagar Jute Mills Ltd. and Nepal Bank Ltd. in 1937.The Nepal Stock Exchange (NEPSE) is the only Stock Exchange of Nepal. NEPSE is established under the company act, operating under Securities Exchange Act, 1983.NEPSE is the only organized exchanged to carry out secondary market operation of corporate securities in Nepal .The basic objective of NEPSE is to impart free marketability and liquidity to the government and corporate securities by facilitating transactions in its trading floor through market intermediaries such as brokers and market makers. Despite having more than two-decade long history the Nepalese stock market is yet to develop substantially. There is some progress in last few years that has helped to transform the market from manual trading system to automated trading system. The financial ecosystem is still incomplete because of the lack of various market Participants and financial alternative instruments to equity share. The number of listed companies has been gradually increasing, it was 79 in 1995 which has reached to 209 on 2019. The market capitalization has increased from Rs.12, 963 million to Rs.1, 568,593 million from 1995 to 2019. The Nepse Index which represent the all listed company in the stock exchange seems to be volatile with various factor. The index is constructed on the base of 100 and has surged the year-end high of 1718.15

on 2016 whereas the year-end minimum is 163.35 in 1998. (SEBON, 2016; SEBON, 2017; SEBON, 2018).

On the basis of above discussion, this study analyzes relationship between three macroeconomic variables and the Nepalese stock market index. The objective of this study is to investigate the trend effect and relationship between macroeconomic variables and stock market of Nepal.

1.2 Statement of the Problem

The inclination for macroeconomic indicators to affect stock markets is without dispute since finance theory had laid bare the chain between macroeconomic indicators and stock market indices. So, it is very necessary to understand the relationship between the stock market index and the macroeconomic factors that influence it. Nepalese stock market has passed through different stages. Major political changes during this recent decade and the market has jumped to all time high. 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. Though there is no unanimous conclusion, the majorities of existing literature establish a connection between macroeconomic volatility and stock market prices based on transmission mechanism between the key macroeconomic variables, namely, broad money supply, exchange rate and real GDP. However, the research questions of the study are given below:

a. How is the trend of selected macroeconomic variables and stock market index in Nepal?
b. How are the effects of selected macroeconomic variables on NEPSE index in Nepal?

1.3 Objectives of the study

The general objective of the study is to examine the linkage and effect between the stock market index (NEPSE index) and selected three macroeconomic variables, namely, broad money supply, exchange rate and real GDP. However, the specific objective of the study is:

a) To present the trend of macroeconomic variables and stock market index of Nepal.
b) To examine the effects of selected macro-economic variables on NEPSE Index of Nepal.

1.4 Hypothesis of the Study

To test whether the relationship exist between stock market index and macroeconomic variables in Nepal, three macroeconomic variables, namely, broad money supply, exchange rate and real GDP are carried for hypothesis testing.

H_0: There is no significant effect between macroeconomic variables (broad money supply, exchange rate, real GDP) and stock market in Nepal.

H_1: There is significant effect between macroeconomic variables (broad money supply, exchange rate, real GDP) and stock market in Nepal.

1.5 Significance of the study

The study is conducted to understand the effects of various macroeconomic variables on the stock market index. The significance of this study therefore is to enhance the understanding of stated macroeconomic variables on stock returns in developing economies, particularly in Nepal. From an empirical standpoint, this study may facilitate investor confidence and stimulate investor decisions. Theoretically, the study is aimed at contributing to existing literature on broad money supply, exchange rate and their effect on stock returns in Nepal.

The study will be helpful to the government, SEBON, NEPSE, researcher and the students who are intend to find out the effects of macroeconomic variables on stock market index of Nepal.

1.6 Limitations of the study

a) Selection of only three macroeconomic variables to show the effect of stock market index may only give limited findings and results.

b) The use of mathematical tools and methods for this study may not draw the same conclusion compare to the old research.

c) The study period covered is only 26 years from 1995 to 2020.

1.7 Organization of the study

The study is divided into five chapters. The first chapter is the introduction which includes background of the study, statement of the problem along with the research questions, objectives of the study, hypothesis of the study, significance of the study, limitations and organization of the study.

The second chapter of the study is review of literature which illustrates theoretical and empirical studies. The empirical review is again divided into two parts. They are international context and Nepalese context and the last part of the chapter is Research gap along with additional contribution.

The third chapter deals with research methodology which comprom

ises of conceptual framework, research design, nature and source of data, study period covered, tools and methods of data collection, data organization and processing, model specification, variable specification, hypothesis testing and research matrix.

The fourth chapter is the presentation and analysis of data which is the body part of the study. Finally, the last chapter deals with the major findings, conclusion and recommendations of the study.

CHAPTER II
REVIEW OF LITERATURE

2.1 Theoretical Concept

Different theoretical frameworks have been employed by many researchers to link changes in macroeconomic variables with stock market returns. These theories are discussed in this section as they relate the macroeconomic variables to stock market return.

2.1.1 Markowitz Efficient Frontier

Harry M. Markowitz is credited with introducing new concepts of risk measurement and their application to the selection of portfolios. He started with the idea of risk aversion of average investors and their desire to maximize the expected return with the least risk.

Markowitz model is thus a theoretical framework for analysis of risk and return and their inter-relationships. He used the statistical analysis for measurement of risk and mathematical programming for selection of assets in a portfolio in an efficient manner. His framework led to the concept of efficient portfolios. An efficient portfolio is expected to yield the highest return for a given level of risk or lowest risk for a given level of return.

Markowitz generated a number of portfolios within a given amount of money or wealth and given preferences of investors for risk and return. Individuals vary widely in their risk tolerance and asset preferences. Their means, expenditures and investment requirements vary from individual to individual. Given the preferences, the portfolio selection is not a simple choice of any one security or securities, but a right combination of securities.

Thus, as per the Modern Portfolio Theory, expected returns, the variance of these returns and covariance of the returns of the securities within the portfolio are to be considered for the choice of a portfolio. A portfolio is said to be efficient, if it is expected to yield the highest return possible for the lowest risk or a given level of risk.

A set of efficient portfolios can be generated by using the above process of combining various securities whose combined risk is lowest for a given level of return for the same amount of investment, that the investor is capable of.

2.1.2 Capital Structure Theorem

Merton Miller and Franco Modigliani conceptualized and developed this theorem, and published it in an article, "The Cost of Capital, Corporation Finance and the Theory of Investment," which appeared in the American Economic Review in the late 1950s. The Modigliani-Miller theorem (M&M) states that the market value of a company is correctly calculated as the present value of its future earnings and its underlying asssets and is independent of its capital structure.

At its most basic level, the theorem argues that, with certain assumptions in place, it is irrelevant whether a company finances its growth by borrowing, by issuing stock shares, or by reinvesting its profits. Companies have only three ways to raise money to finance their operations and fuel their growth and expansion. They can borrow money by issuing bonds or obtaining loans; they can re-invest their profits in their operations, or they can issue new stock shares to investors.

2.1.3 Capital Assets Pricing Model

The capital asset pricing model (CAPM) is an idealized portrayal of how financial markets price securities and thereby determine expected returns on capital investments. The model provides a methodology for quantifying risk and translating that risk into estimates of expected return on equity.

A principal advantage of CAPM is the objective nature of the estimated costs of equity that the model can yield. CAPM cannot be used in isolation because it necessarily simplifies the world of financial markets. But financial managers can use it to supplement other techniques and their own judgment in their attempts to develop realistic and useful cost of equity calculations.

Although its application continues to spark vigorous debate, modern financial theory is now applied as a matter of course to investment management. And increasingly, problems in corporate finance are also benefiting from the same techniques. CAPM, a theoretical representation of the behavior of financial markets, can be employed in estimating a company’s cost of equity capital. Despite limitations, the model can be a useful addition to the financial manager’s analytical tool kit.

2.1.4 The Efficient Market Hypothesis

This hypothesis is also known as random walk theory. The efficient market hypothesis assumes that market prices should incorporate all available information at any point in time. The term "efficient market" was first used by Eugene Fama (1970) who said that: "In an efficient market, on the average, competition will cause the full effects of new information on intrinsic values to be reflected instantaneously in actual prices". Fama defined an efficient market as "a market where prices always reflect all available information". The efficient market hypothesis suggests that the main factor behind price changes is the arrival of new information. However, there are different kinds of information that affect security values. Consequently, the efficient market hypothesis is stated in three variations namely: the weak form hypothesis, semi strong form hypothesis and the strong form hypothesis depending on what the term "available information" means. This paper focuses on the semi strong hypothesis since it is the most convenient for our study. As a matter of fact, the semi strong hypothesis states that all publicly available information is already incorporated into current prices; that is the asset prices reflect all available public information. The semi strong hypothesis is used to investigate the positive or negative relationship between stock return and macroeconomic variables since it postulates that economic factors are fully reflected in

the price of stocks. Hence, information is public and there is no way to make profit using information that everybody else knows. So the existence of market analysts is required to be able to understand the implication of vast financial information as well as to comprehend processes in product and input market.

2.1.5 The Arbitrage Pricing Theory

The theory was developed by Ross (1976), the Arbitrage Pricing Theory (ATP) is another way of linking macroeconomic variables to stock market return. It is an extension of the Capital Asset Pricing Model (CAPM) which is based on the mean variance framework by the assumption of the process generating security. In other words, CAPM is based on one factor meaning that there is only one independent variable which is the risk premium of the market. There are similar assumptions between CAPM and APT namely: the assumption of homogenous expectations, perfectly competitive markets and frictionless capital markets. However, Ross (1976) proposes a multifactor approach to explaining asset pricing through the arbitrage

pricing theory (APT). According to him, the primary influences on stock returns are some economic forces such as (1) unanticipated shifts in risk premiums; (2) changes in the expected level of industrial production; (3) unanticipated inflation and (4) unanticipated movements in the shape of the term structure of interest rate. These factors are denoted with factor specific coefficients that measure the sensitivity of the assets to each factor. APT is a different approach to determining asset prices and it derives its basis from the law of one price. As a matter of fact, in an efficient market, two items that are the same cannot sell at different prices; otherwise an arbitrage opportunity would exits.

2.2 Empirical Review

2.2.1 International Context

Yue Xu (2011) studied vector autoregressive (VAR) model and investigated the relationship between stock prices and exchange rate in Sweden using monthly data from March 2001 to March 2011. The study found that there is no co-integrating relationship between stock price and exchange rate, and also shows a negative correlation between the two variables.

Hossein, Ahmad and Lai (2011) observed that there is both long term and short term linkages between macroeconomic variables and stock market index in China and India. In the long run, impact of money supply in Indian stock market is negative, but, in China, it is positive. The effect of increases in inflation on these stock indices is positive in both countries. In the short run, the contemporaneous impact of money supply on current Chinese stock market indices is positive but for India is negative. However, all these impacts are insignificant. On the other hand, the contemporaneous effect of inflation on current Chinese stock index (SSE) is positive and significant.

Kuwornu (2012) examines the effect of macroeconomic fundamentals on the Ghanaian stock market returns using monthly data from January 1992 to December, 2008. Macroeconomic variables used in this study are 91 day Treasury bill rate (proxy for interest rate), consumer price index (proxy for inflation) and exchange rate. The study used the Johansen Multivariate Co-integration Procedure. He found that co-integration exists between them and indicating long run relationship.

Eita (2012) investigated macroeconomic determinants of stock market price in Namibia using a vector error correction model (VECM) econometric model and revealed that Namibian stock market prices are highly determined by economic activity, interest rates, inflation, money supply and exchange rates. The researcher used quarterly data covering the period 1998 to 2009. The researcher found that if stock market prices move away from equilibrium, money supply and interest rates would not adjust quickly to correct the disequilibrium and bring the system back to equilibrium. The exchange rate, income and inflation have positive relation with stock price.

Humpe and Macmillan (2007) examined under the framework of a standard discounted value model whether a number of macroeconomic variables influence stock prices in the USA and Japan. A co-integration analysis is used in order to model the long term relationship between macroeconomic variables such as industrial production, the consumer price index, money supply, long term interest rates and stock prices in Japan and the USA. This study found the data are consistent with a single co-integrating vector for the USA, where stock prices are positively related to industrial production and inversely associated to both the CPI and a long term interest rate. It also finds an insignificant (although positive) relationship between stock prices of USA and the money supply. However, for the Japanese data it finds two co-integrating vectors i.e. stock prices & industrial production. Where, stock price are positively subjective by industrial production and negatively by the money supply along with the industrial production is negatively subjective by the CPI and a long term interest rate. These contrasting results may be due to the fall in the Japanese economy during the 1990s and consequent liquidity trap.

Gay (2008) argues that the relationship between share prices and macroeconomic variables is well acknowledged for the United States and other major economies, however, what is the relationship between share prices and economic activity in emerging economies, is less researched. The goal of this study was to investigate the time series relationship between stock market index prices and the macroeconomic variables such as exchange rate and oil price for Brazil, Russia, India, and China (BRIC) using the Box-Jenkins ARIMA model. Although no significant relationship was found between particular exchange rate and oil price on the stock market index prices of either BRIC country due to other domestic and international macroeconomic factors on stock

market returns, deserving further research. This study also found no significant relationship between present and past stock market returns, signifying the markets of Brazil, Russia, India, and China show evidence of the weak-form of market efficiency.

Arnold and Vrugt (2006) examine empirical evidence on the link between stock market volatility and macroeconomic uncertainty. The findings that US stock market volatility is significantly related to the dispersion in economic forecasts from survey of professional forecaster (SPF) survey participants over the period from 1969 to 1996. This link between stock market volatility and macroeconomic uncertainty is much stronger than that between stock market volatility and the time-series measures of macroeconomic volatility, but disappears after 1996.

Pilinkus (2009) examined the relationships between a group of macroeconomic variables and the Lithuanian stock market index, i.e. OMX Vilnius index. The study revealed a group of macroeconomic variables may offer as a leading indicator for stock returns in Lithuania. Granger causality tests have been employed to estimate the relationship on the basis of data from December 1999 to March 2008. The research signifies that some macroeconomic variables (e.g., GDP deflator, net export, FDI etc.) guide Lithuanian stock market returns, some macroeconomic variables (e.g., GDP, material investment, construction volume index, etc.) are led by the OMXV index and, finally, some macroeconomic indices (e.g., money supply, BOP, etc.) and the stock market returns Granger cause each other.

Pethe and Karnik (2000) studied the interrelationship between selected macro-economic variables and stock market behaviour. It was concluded by them that the evidence regarding effect between macro variables and stock indexes is not sufficient and therefore the long-term relationship between stock prices and exchange rates, prime loan rates, narrow supply of capital, wide flow of money and the industrial production index are not consistent.

Darat and Mukherjee (1987) found in BRICS nations returns of stock do influenced by the macroeconomic determinants there by explaining the rapport. He used VAR Model where lag values of explanatory variables were considered in the study.

Uddin and Alam (2007) examine the linear relationship between share price and interest rate as well as share price and changes of interest rate. In addition, the also explore the

association between changes of share price and interest rate and lastly changes of share price and changes of interest rate in Bangladesh. They find for all of the cases that Interest Rate has significant negative relationship with Share Price and Changes of Interest Rate has significant negative relationship with Changes of Share Price.

Bhattacharya et. al. (2001) analyze the causal relationship between the stock Market and three macroeconomic variables in India`s case using the Granger non-causality. These macroeconomic variables are: exchange rate, foreign exchange reserves and trade balance. The results suggest that there is no causal linkage between stock prices and the three variables under consideration.

2.2.2 Nepalese Context

Pradhan and KC (2010) concluded that Nepalese Stock Market might not be termed as "weakly efficient" in pricing shares where market efficiency is defined as all historical information in security prices. The main factors affecting share prices perceived by the respondents were dividends, retained earnings, bonds share and right issue. The results indicated that the random walk hypothesis is true for less frequently traded stocks and is consistent with the prices of less frequently traded stocks in the context of Nepalese stock market.

Shrestha and Subedi (2014) examined the determinants of the stock market performance in Nepal using monthly data for the period of mid –August 2000 to mid-July 2014. Their suggestion was 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 rate stimulate the performance of the Nepalese stock market. Stock market has been found to respond significantly to changes in political environment and the policy of Nepal Rastra Bank.

Phuyal (2016) studied on the relationship between macroeconomic variable and long term market movements in Nepalese capital market from January 2003 to December 2012 using vector auto regression (VAR) as well as vector error correction model (VECM) to examine the relation of these variables and found that the Nepali stock market had a long run equilibrium relationship with a set of macroeconomic variables, like inflation rate, interest rate, and remittance flow with short term disequilibrium corrected by 1.79%on monthly basis.

Devkota and Dhungana (2019) examined the relationship between stock market index and four macroeconomic variables in Nepal. The researcher used time series data of 24 years from 1994 to 2018.The study employed ARDL bound test approach and claimed that there is a long run association between macro-economic variables and stock market in Nepal. They further claimed that money supply has positive and interest rate have negative impact while gold price and exchange rate has no such impacts on stock market in Nepal. The study concluded that in the lack of derivatives instruments in the market, stock market in Nepal is volatile and there are no alternative instruments for the investors in the market.

Panta (2020) examined Macroeconomic Determinants of Stock Market Prices in Nepal using time series data 1994-2019. Study uses ARDL model through simple linear transformation with dependent variable as NEPSE index and independent variables are real GDP, Money supply, interest rate, inflation and exchange rate. The study found that Nepalese stock market is highly determined by macroeconomic variables in long run.

Soti (2015) observed in the relationship between Nepalese stock market and macroeconomic variables taking the monthly data from January 2005 to December 2014. The researcher used ADF and ARDL model. This study concludes that there is a long run relationship between NEPSE index and Consumer Price Index (CPI), money supply and interest rate variables despite some short term fluctuations.

Joshi (2009) examined the dynamic relationship among the stock market and macroeconomic factors represented by nominal domestic variables (inflation, money supply and interest rate), real economic activity (gross domestic product) and foreign variable (exchange rate) for a stock market of Nepal. This study has also used Johansen and Juselius (1990) method of multivariate co-integration for the period Mid-July 1995 to Mid-June 2006. This study has acknowledged dynamic relationship among stock index and macroeconomic variables. Similarly the presence of co-integration and causality of the study suggests that Nepalese stock market is not efficient in the short run and also in the long run.

Gaire (2017) established a long-run relationship between the NEPSE index, short term interest rate and gold prices in Nepal. The study was conducted for the period of Jan-

2006 to Jan-2016 and employed unit root tests and co-integration test. The unilateral causality between the NEPSE index and short-term interest rate is discovered by the study. Finally, the study concluded that stock price of Nepal is very sensitive to short-term interest rate.

Karki (2018) asserted that the macroeconomic variables could not explain the variation in stock price in the long-run. But the empirical result obtained by the study revealed that there is positive and significant relationship between stock market price and GDP, inflation and money supply but negative with interest rate.

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.

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 service.

2.3 Research Gap and Additional Contribution

A significant number of studies on the relationship between macro-economic variables and stock price has been conducted. It is notable that there is a lack of a consensus on the effects of macroeconomic factors on stock market performance. Literature review reveals that the effect of the macroeconomic variables on stock market performance differs from country to country and is therefore not consistent. Further, such studies have not been carried out in sufficient numbers in Nepalese stock market. Thus, similar study can be extended to fill this gap. Moreover, using these selected variables, the study can be carried out at the NEPSE with very much recent data and employing different methodology and other economic models that may better describe the performance of stock market in Nepalese context and helps to make clear the confusion in the past literatures.

CHAPTER III
RESEARCH METHODOLOGY

3.1 Research Design

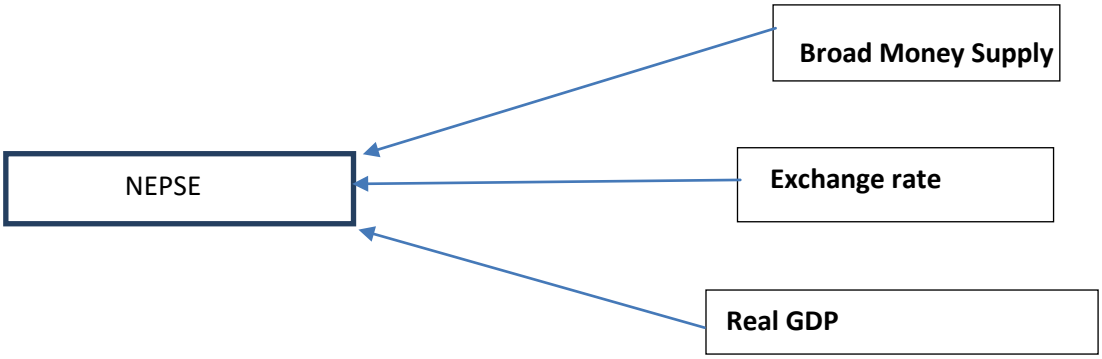
The descriptive statistics including mean, median, standard deviation etc. of the variables are calculated and presented in table. The study analyzed the trend of Nepse Index and three macroeconomic variables by using table and graphs. Similarly, the study used econometric research design as per the need of fulfilling the objective of this paper. The Augmented Dickey Fuller (ADF) test has employed to test the stationary of the variables, VAR lag order selection criteria, regression equation based on Autoregressive Distributed Lag (ARDL) model, F-Bound test for checking the co-integration and long –run relation, heteroscedasticity test to check the validity of the model has been used. Similarly, ECM is conducted to check the co-integration error correction of the model.

3.2 Conceptual Framework

After the review of above previous related study in the review of literature chapter and established theory, the study focuses on three variables of macro-economy like; broad money supply, exchange rate and real GDP whereas stock price is represented by the market index measured as NEPSE Index in Nepal. The study concluded to design and adopt the following frameworks to examine the relationship among the Nepse Index, broad money supply, exchange rate and real GDP in Nepal and used secondary annual time series data from 1995 to 2020, sourced from Central Bank of Nepal (NRB).

Figure 3.2

Conceptual Framework



Dependent Variable:

The study considers Nepalese Stock Exchange (NEPSE) Index as a dependent variable. Nepal stock exchange is the only stock exchange of Nepal, which is continuously Functioning from 1994. The return on individual stock could be affected by various variables that has been mentioned above as independent variable and Nepse Index is treated as dependent variable to those factors. The annual year end data of Nepse index has been considered for the study.

Independent Variables:

The study will be taking three macro-economic variables as independent variables. They are:

i) Broad Money Supply: Broad money supply is the sum of currency held by people in their hands / pocket (c), demand deposits (DD) and time deposits (TD) of people with the banking and financial institutions (BFIs) i.e. M2 = C + DD + TD. Stock prices tend to move higher when the money supply in an economy is high. Money supply affects the investment in stock market indirectly and economic growth directly. To measure the broad money supply, the proxy of board money (M2) published by central bank of Nepal is taken as data for the study.

ii) Exchange Rate: Remittance is one of the major sources of earning for large population in Nepal. If the Nepalese currency is devaluated against the US dollar the remittance amount in Nepalese equivalent currency will increase. This will also increase the amount available for saving and investment. In adverse scenario, the available fund will be lower and affect the amount available for saving and investment. So, it is assumed that exchange rate is also one independent variable to define the stock index of Nepal. To measure the exchange rate, the equivalent USD rate with Nepalese currency has been taken, the equivalent exchange rate is published daily by the Central Bank of Nepal and the year-end rate has been taken for the study.

iii) Real GDP: Real GDP is the value of the final goods and services produced in the economy during a given period. The stock prices and future RGDP growth are related. It is assumed that changes in information about the future course of RGDP cause prices to change in the stock market today and the changes in stock prices will reduce firm's asset positions and affect the cost of their borrowing. To measure the real GDP, the proxy of RGDP published by central bank of Nepal is taken as data for the study.

3.3 Nature and Source of Data

This study is fully based on secondary data. The necessary annual data related to macroeconomic variables is collected from Central Bureau of Statistics (CBS), and Nepal Rastra Bank (NRB), whereas stock market indices data is collected from Security Board of Nepal (SEBON).The study is based on time series data and the data is taken to examine the response of stock market to macroeconomic dynamics in Nepal.

Table 3.1

Source of Data

Variables Description	Unit	Sources
Nepse Index	In million	SEBON
Money Supply	In million	NRB
Exchange Rate	US dollar	QEB, NRB
Real GDP	In million	NRB

This study is fully based on secondary time series data. The study covers sample period of 26 years from 1994 to 2020. The fiscal year 1994 is taken as the starting year for the required data for the present study because Nepalese stock market started transaction only that fiscal year. Stock market price/Nepse index (NIx), real GDP (RGDP), broad money supply (MS) and exchange rate (EX) are the major variables under study. The data for stock market price is taken from Nepal Stock Exchange and it is overall index. RGDP as measures of economic activity is obtained from Nepal Rastra Bank (NRB). Money supply is represented by broad money (MS) and obtained from Nepal Rastra Bank (NRB) and EXR (Nepalese currency with the US dollar) are also taken from NRB.

3.4 Study Period Covered

The study intends to develop the relationship between macro-economic variables and the stock market of Nepal. The study is based on the statistical data of the selected macro-economic variables and NEPSE index for the period of 26 years from 1995 to 2020 on an annual basis. Thus, the study will be dealing with the time series data on an annual basis starting from the year 1994 which was the establishment year of NEPSE.

3.5 Data Organization and Processing

Data will be managed as per the need of the study. Presentation and the analysis of the available data is the major task of the study. All the nominal data taken are transformed into log form by taking natural log, besides, after the test of stationary of the variables, the data will be further transformed into different form of the data.

3.6 Model Specification

The functional relationship between macroeconomic variables and Nepalese stock market can be presented as:

$$\mathbf{NIxt = f\ (M2,\ EX)}$$

Converting the functional relationship into linear form;

$$\mathbf{NIxt = \beta_0 + \beta_1\ M2_t + \beta_2\ EX_t + U_t}$$

Taking natural log on both sides:

$$\mathbf{ln\ NIxt = \beta_0 + \beta_1\ lnM2_t + \beta_2\ lnEX_t + U_t}$$

Where,

NIx t= NEPSE Index

M2t = Broad money supply

EX_t =Exchange rate

B_0 = Constant term

β_1.. β_2 are the respective parameters of the explanatory variables .

U_t = Stochastic error term with the conventional statistical properties

3.7 Tools and Method of Data Analysis

The study used both descriptive and analytical approach of data analysis. Under descriptive analysis of the data, different graphs, tables and figures are used to analyze trend of Nepse Index and different macroeconomic variables in Nepal. Similarly under analytical analysis, various econometric tools such as ADF unit root test to check whether the data is stationary or not, VAR lag order selection criteria, regression equation based on Autoregressive Distributed Lag (ARDL) model F-Bound test for co-integration, heteroscedasticity test is conducted to check the validity of the model. Similarly, ECM is conducted to check the co-integration error correction of the model. Finally, CUSUM plot is observed to monitor the stability of the model to find the relationship between Nepse Index and macroeconomic variables in Nepal.

a) Unit Root Test

This empirical analysis is based on time series data, assumes that the underlying time series should be stationary. Time series data is said to be stationary if it's mean. Variance and covariance do not vary over time. But it is now a well-known fact that most of the macroeconomics time series are non-stationary (Dickey & Fuller, 1979) (Gujarati, 1995) If we apply the regression model in non-stationary data it gives a spurious relationship which makes hypothetical test results unreliable. Hence, to avoid a spurious relationship, detecting the stationary or non- stationary of time series is crucial. There are several methods to tests stationary such as graphical analysis, the Correlogram test, and unit root test. However, this study only discusses the unit root test using the Augmented Dickey Fuller test.

Augmented Dickey Fuller Test (ADF) This test was developed by Dickey and Fuller in 1970 and named after them as Dickey Fuller test. The Augmented Dickey- Fuller Test as follows:

The equation for no intercept and no trend is,

$$\Delta Yt = \gamma i Yt-1 + \sum ci\ ki=1\ \Delta Y_{t-i} + e_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots.. (a)$$

The equation for only intercept and no trend is,

$$\Delta Yt = \beta_0 + \gamma i Y_{t-1} + \sum ci\ k\ i=1\ \Delta Y_{t-i} + e_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots.. (b)$$

The equation for both intercept and trend is,

$$\Delta Yt = \beta_0 + \gamma i Y_{t-1} + \alpha t + \sum ci\ ki=1\ \Delta Y_{t-i} + e_t \ldots\ldots\ldots\ldots\ldots\ldots (c)$$

Where ΔY_t = First difference. If the series is stationary without any differencing, it is said to be I (0) or integrated with order 0. Similarly, if the series is stationary after a first difference is said to be I (1) or integrated of order

b) ARDL Model

Prior to apply co-integration analysis, the lag order is determined through the Akaike Information Criterion (AIC) since, the study use annual data maximum of one lag has been used. While evaluating the calculated AIC figure with different lags, it can be observed that at lag one the AIC criterion is significant. Furthermore, in this study the AIC criterion has been selected for lag selection. The use of bound testing technique is based on the three validations. First, Pesaran, Shin & Smith (2001), advocated the use of the ARDL model for the estimation of level relationships because the model suggests that once the order of the ARDL has been recognized, the relationship can be estimated by OLS. Second, the bounds test allows a mixture of I (1) and I (0) variables as repressors, that is, the order of integration of appropriate variables may not necessarily be the same. Therefore, the ARDL technique has the advantage of not requiring a specific identification of the order of the underlying data. Third, this technique is suitable for small or finite sample size (Pesaran et al., 2001). Based on our model, ARDL bound testing will be as:

$$\Delta ln\ ndxt = \beta_0 \sum_{i=0}^{q} \beta_{1i}\, \Delta lndx_{t-i} + \sum_{i=0}^{q} \beta_{2i}\, \Delta lnex_{t-i} + \beta_3 lnndx_{t-1} + \beta_4 lnm2_{t-1} + \beta_5 lnex_{t-1} + \mu_t$$

Where Δ the first difference operator, q is is the optimum lag length, □1 --- □2 are short run dynamics of the model and □3 --- □5 are long run elasticity. □t is the error term. As per the result of the bound test, if the value of calculate F statistics, is greater than the upper bound I (1), the null hypothesis should be rejected. If the calculated value of F statistics is greater than the upper bound, there exists co-integration and the study. It is further preceded for error correction version of the above equation.

3.8 Variable Specification

The study focused on basic four variables, namely, Nepse Index, broad money supply, real GDP and exchange rate of Nepalese Rupee with US dollar, among the various macro-economic variables. These variables are briefly described below;

Dependent Variable:

The study considers Nepalese Stock Exchange (NEPSE) Index as a dependent variable. Nepal stock exchange is the only stock exchange of Nepal, which is continuously Functioning from 1993. It compromises of 209 listed company as of May 2019. The Nepse Index is the main index that consist all the listed entities and is calculated on the basis of weighted average of market capitalization of all company. So the fluctuation of individual stock affects the index on same direction, hence the return on all stock listed in the stock exchange is reflected by the stock index. The return on individual stock could be affected by various variables that has been mentioned above as independent variable and Nepse Index is treated as dependent variable to those factors. The annual year end data of Nepse index has been considered for the study.

NEPSE index is calculated by:

> NEPSE index = (Total market capitalization of current period /Total market capitalization of base period)

Independent Variables:

The study will be taking three macro-economic variables as independent variables. They are:

i) Broad Money Supply: Broad money supply is the sum of currency held by people in their hands / pocket (c), demand deposits (DD) and time deposits (TD) of people with the banking and financial institutions (BFIs) i.e. M2 = C + DD + TD. Money supply data is recorded and published by the central bank of the country. Stock prices tend to move higher when the money supply in an economy is high. Plenty of money circulating in the economy both makes more money available to invest in stocks and also makes alternative investment instruments. Broad money is more inclusive in calculating total money supply of an economy Money supply affects the investment in stock market indirectly and economic growth directly. To measure the broad money supply, the proxy of board money (M2) published by central bank of Nepal is taken as data for the study.

ii) Exchange Rate: Remittance is one of the major sources of earning for large population in Nepal. According to the data published in the economic survey of Ministry of Finance 4.36 million work-force has been working outside country till 2019/20. Their earning is affected by the change in exchange rate. If the Nepalese currency is devaluated against the US dollar the remittance amount in Nepalese equivalent currency will increase. This will also increase the amount available for saving and investment. In adverse scenario, the available fund will be lower and affect the amount available for saving and investment. So, it is assumed that exchange rate is also one independent variable to define the stock index of Nepal. To measure the exchange rate, the equivalent USD rate with Nepalese currency has been taken, the equivalent exchange rate is published daily by the Central Bank of Nepal and the year-end rate has been taken for the study.

iii) Real GDP: Real GDP is the value of the final goods and services produced in the economy during a given period. The stock prices and future RGDP growth are related. It is assumed that changes in information about the future course of RGDP cause prices to change in the stock market today and the changes in stock prices will reduce firm's asset positions and affect the cost of their borrowing. When it costs more for firms to borrow money, they borrow and invest less, RGDP growth slows. Changes in information about the future course of RGDP may cause prices to change in the stock market. To measure the real GDP, the proxy of RGDP published by central bank of Nepal is taken as data for the study.

CHAPTER IV
PRESENTATION AND ANALYSIS OF DATA

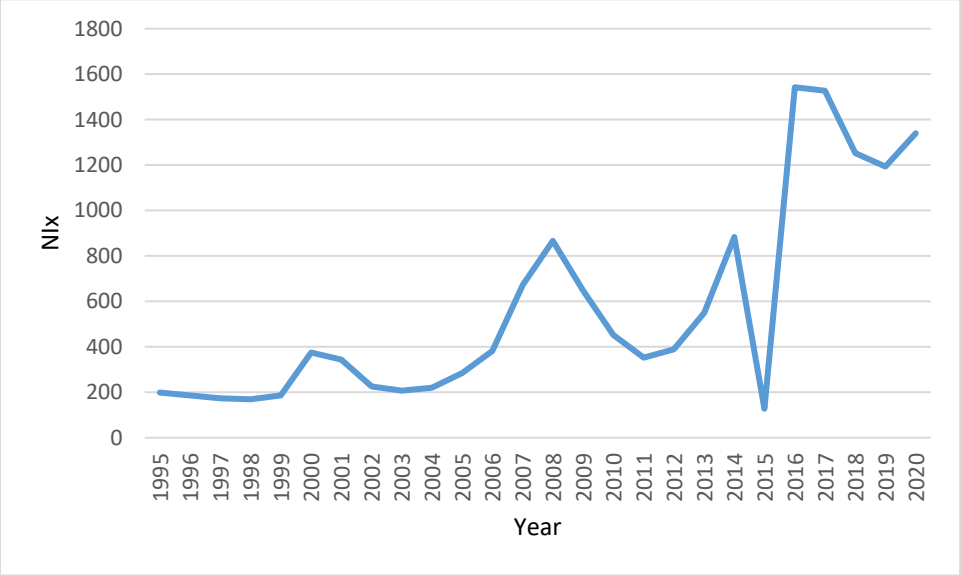
4.1 Trend analysis of Nepse Index and selected macro-economic variables

In trend analysis we observe trend of NEPSE index and other variables under study.

4.1.1 Trend of Nepse Index

Figure 4.1

Trend of Nepse Index (absolute value)



Source: SEBON, 2020

NEPSE Index is the market worth value of all listed companies which is the economic indicator that leads to the investor about the stock market trend. The higher NEPSE Index indicates the higher return in the stock market and lower NEPSE Index indicates the lower return in the stock market. Stock Exchange creates the investment opportunities in the primary as well as secondary market for the investors. NEPSE index as in base year i.e. 1993/94 was 226.0. Then after it was declined to 195.5 in 1994/95. The declining trend was continuing to 1997/98. In the fiscal year 1998/99the trend of the NEPSE Index increased and reached about 1000 in fiscal year 2007/08. Again the declining trend was continuing in fiscal year 2011/12 plummeted at around

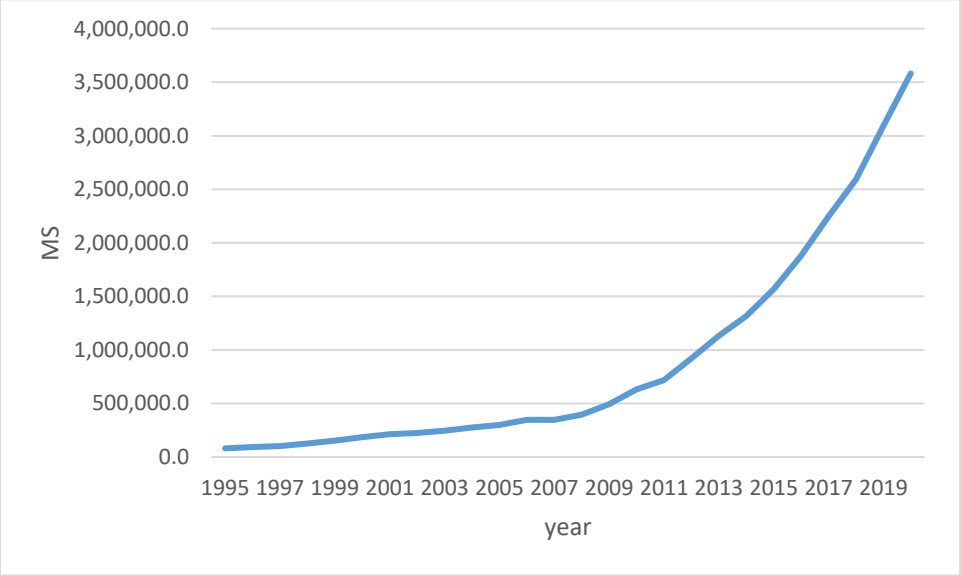
400 points. In the same fiscal year NEPSE index increased throughout and recorded highest in the fiscal year 2015/16 i.e. 1718.15 points. The increase percent was 78.74 percent as compared to the fiscal year 2014/15 at 961.23 points. It was due to the Monetary Policy 2015-16, in which NRB, the central monetary authority, had directed banks and financial institutions to raise minimum paid-up capital by up to four times by end of the fiscal year 2016/17. Similarly, declining trend was continuing in fiscal year 2019/20 decrease at around 1259.10 points

4.2 Trend of Selected Macro-Economic Variables

4.2.1 Trend of Money Supply

Figure 4.2

Trend of Money Supply (absolute value)



Source: NRB, 2020

Stock prices tend to move higher when the money supply in an economy is high. Plenty of money circulating in the economy both makes more money available to invest in stocks and also makes alternative investment instruments. Broad money is more inclusive in calculating total money supply of an economy Money supply affects the investment in stock market indirectly and economic growth directly.

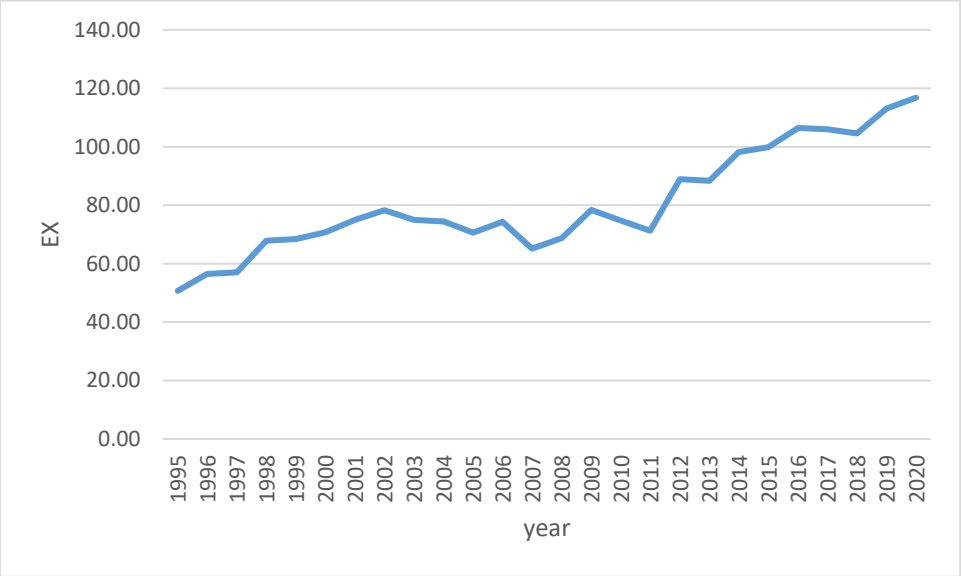
In figure 4.2 Money supply tends to increase slightly in the fiscal year 1995 which maintain its consistency till the fiscal year 1998.IN the meanwhile, the trend of money supply seems to be gradually increasing has reached to its highest in the fiscal year

2020.The trend shows that the stock prices move higher when the money supply in an economy is high and vice-versa.

4.2.2 Trend of Exchange Rate

Figure 4.3

Trend of Exchange Rate (absolute value)



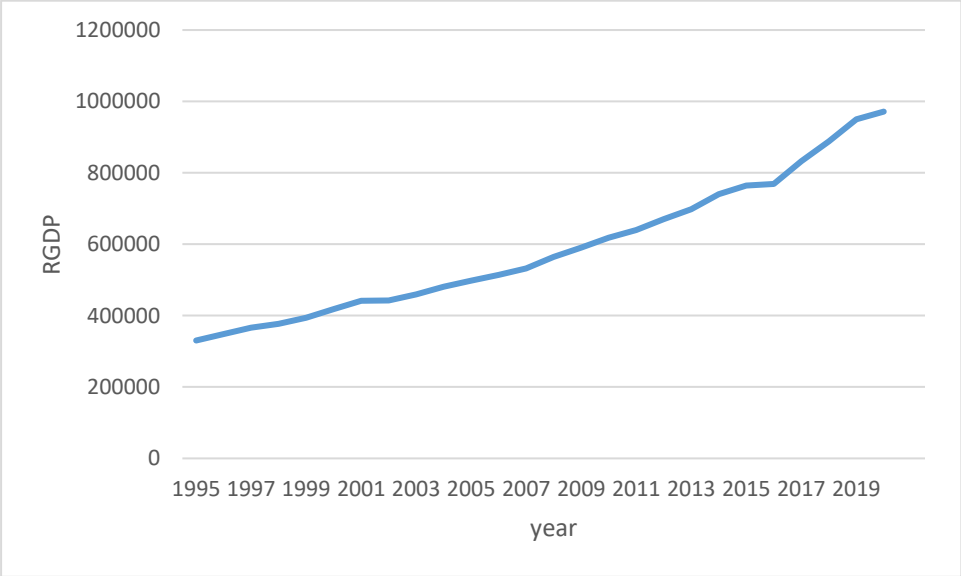
Source: NRB, 2020

Exchange rate is also one independent variable to define the stock index of Nepal. To measure the exchange rate, the equivalent USD rate with Nepalese currency has been taken, the equivalent exchange rate is published daily by the Central Bank of Nepal and the year-end rate has been taken for the study. In figure 4.3 the trend of exchange rate is fluctuating over the time. There is a significant increase in exchange rate from the fiscal year 1995 to fiscal year 2002 which shows that the investment to the stock market is positive and significant. Similarly the trend of exchange rate seems to be declining from the fiscal year 2003 till the year 2007.Moreover,from the fiscal year 2009 the exchange rate has gradually increase and reached to its highest in the fiscal year 2020.

4.2.3 Trend of Real GDP

Figure 4.4

Trend of RGDP (absolute value)



Source: NRB, 2020

Real GDP is the value of the final goods and services produced in the economy during a given period. The stock prices and future RGDP growth are related. It is assumed that changes in information about the future course of RGDP cause prices to change in the stock market today and the changes in stock prices will reduce firm's asset positions and affect the cost of their borrowing. In figure 4.4 the trend of RGDP seems to be increasing from the fiscal year 1995 till the fiscal year 2020.

4.3 Descriptive Statistics of the Variables

The descriptive statistics of Nepse Index of Nepal (NIx), Money Supply(M2), Exchange rate (EX) and Real GDP (RGDP) included mean, median, maximum value, minimum value, standard deviation, skewness, kurtosis and standard error are presented in the following Table 4.1.

Table 4.1

Descriptive Statistics of the Variables for the period 1995-2020

Variable Description	Nix	M2	RGDP	EX
Mean	567.1691	894760.0	588343.2	80.76385
Median	378.6825	371470.0	548277.5	74.88500
Maximum	1542.246	3582138	971500.0	116.8300
Minimum	127.5100	80984.70	330291.0	50.70000
Std. Dev.	453.0149	1003273	190690.3	18.16291
Skewness	1.026428	1.377218	0.511167	0.491692
Kurtosis	2.677146	3.762659	2.166705	2.227112
Observations	26	26	26	26

Source: Author's own calculation from E-views

Table 4.1 shows that the mean value of Nepse Index (NIx) is 567.1691 percent with standard deviation 453.0149. Its maximum and minimum values are Rs. 1542.246 and Rs. 127.5100 million respectively. Similarly, the average Money Supply (M2) value is 894760.0 percent with standard deviation 1003273. Its maximum value is 3582138 and minimum value is 80984.70 .The average value of RGDP is 588343.2.Its maximum and minimum values are Rs 971500.0 and Rs 330291.0 Likewise, the mean value of exchange Rate (EX) is 80.76385. The maximum value of Exchange Rate is Rs. 116.8300 million. The minimum values of this variable is Rs 50.70000 million with standard deviation of 18.16291. The values of standard deviation indicate that most of the variables are highly volatile during the study periods of 26 years. Skewness of the variables shows that all the four variables NIx, M2, EX and RGDP are positively skewed.

4.4 Stationary Test of Variables

The time series data should be stationary. If the time series data are non-stationary it may provide the spurious result. The percent study used Augmented Dickey Fuller (ADF) test to test the stationary of the variables at level and first difference. The result of ADF test is presented in following table 4.2

Table 4.2

Result of Augumented Dickey Fuller Unit Root test

Variables	Constant		Remarks
	t-statistics	P-value	
LnNI	-2.302815	0.1788	
LnM2	1.135393	0.9967	
LnEX	-1.169372	0.6710	
LnRGDP	0.345810	0.9760	
ΔLnNI	-7.508245	0.0000***	I(1)
ΔLnM2	-3.404772	0.0210***	I(1)
ΔLnEX	-6.358360	0.0000***	I(1)
ΔLnRGDP	-4.935169	0.0006***	I(1)

Source: Author's own calculation from E-views

Note: */**/*** Significant at 10%, 5% and 1% level of significance respectively.

The result of the ADF test statistics of concerned variables are used in this study. If the variables are stationary in level then that variables are known as I(0) and if variables are stationary only after first difference then it is called I(1). The result of ADF test shows that all variables are non-stationary at level but stationary only after first difference. All variables LnNI, LnM2, LnRGDP and LnEX are stationary at first differences so this study applies Auto Regressive Distributive Lag Model (ARDL) and ECM to test the short run and long-run co-integration of the variables. Furthermore, the graphical presentation of selected variable at level and first differentiation has been presented below. The graphical presentation also shows that the variable are not stationary at the level, however variables are stationary at I (1).

4.4.1 Movement of variables at level

The result of the ADF test statistics of concerned variables are used in this study. If the variables are stationary in level then that variables are known as I(0). The result of ADF test shows that all variables are non-stationary at level. The table and graphical presentation is shown below:

Table 4.3

Stationary Result at Level

Variables	t-statistics	P-value	Remarks
LnNIx	-2.302815	0.1788	I(0)
LnM2	1.135393	0.9967	I(0)
LnEX	-1.169372	0.6710	I(0)
LnRGDP	0.345810	0.9760	I(0)

Source: Author's own calculation from E-views

Figure 4.5

Movement of variables at level

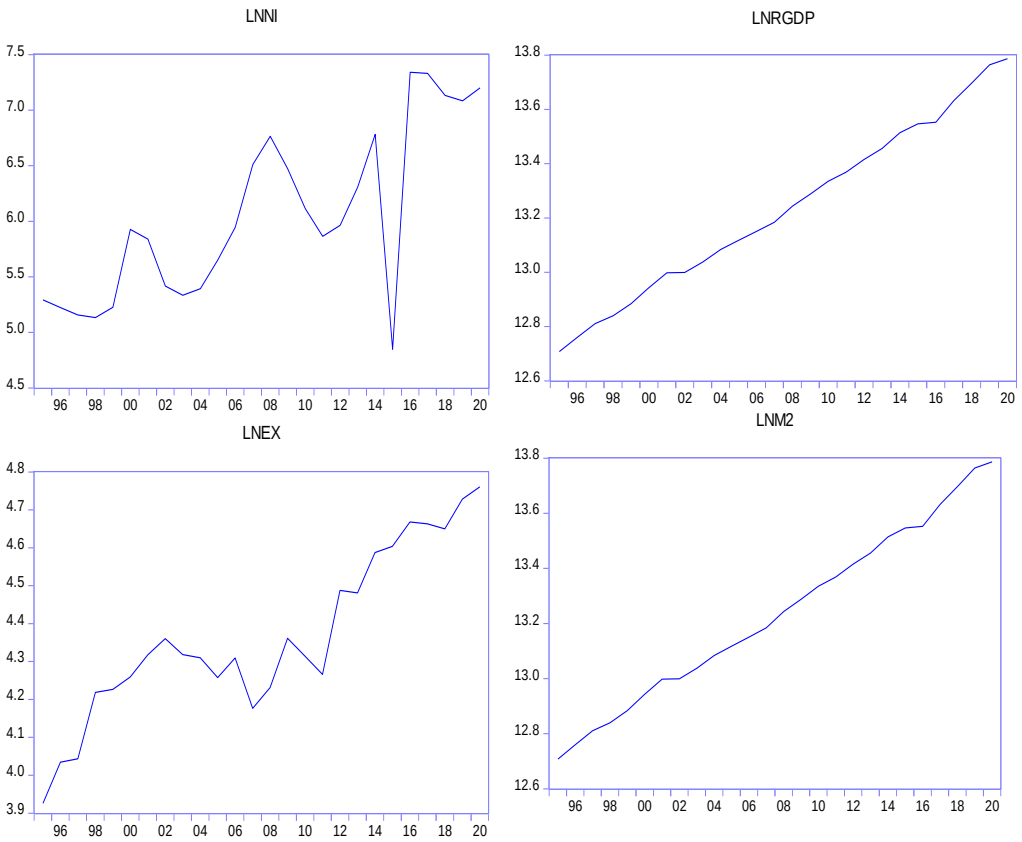


Figure 4.5 shows the graphical movement of dependent variable (NEPSE) and three independent variables real GDP (RGDP), exchange rate (EX) and money supply (M2) at level test of ADF. The result shows that the variables are above 5% level of significance and are non-stationary at level.

4.4.2 Movement of Variables at First Difference

Table 4.4

Stationary Result at First Difference

Variables	t-statistics	P-value	Remarks
ΔLnNI	-7.508245	0.0000***	I(1)
ΔLnM2	-3.404772	0.0210***	I(1)
ΔLnEX	-6.358360	0.0000***	I(1)
ΔLnRGDP	-4.935169	0.0006***	I(1)

Source: Author's own calculation from E-views

If the variables are stationary in first difference then that variables are known as I(1). The result of ADF test shows that all variables are stationary at level. The graphical presentation is shown below:

Figure 4.6

Movements of variables at first difference

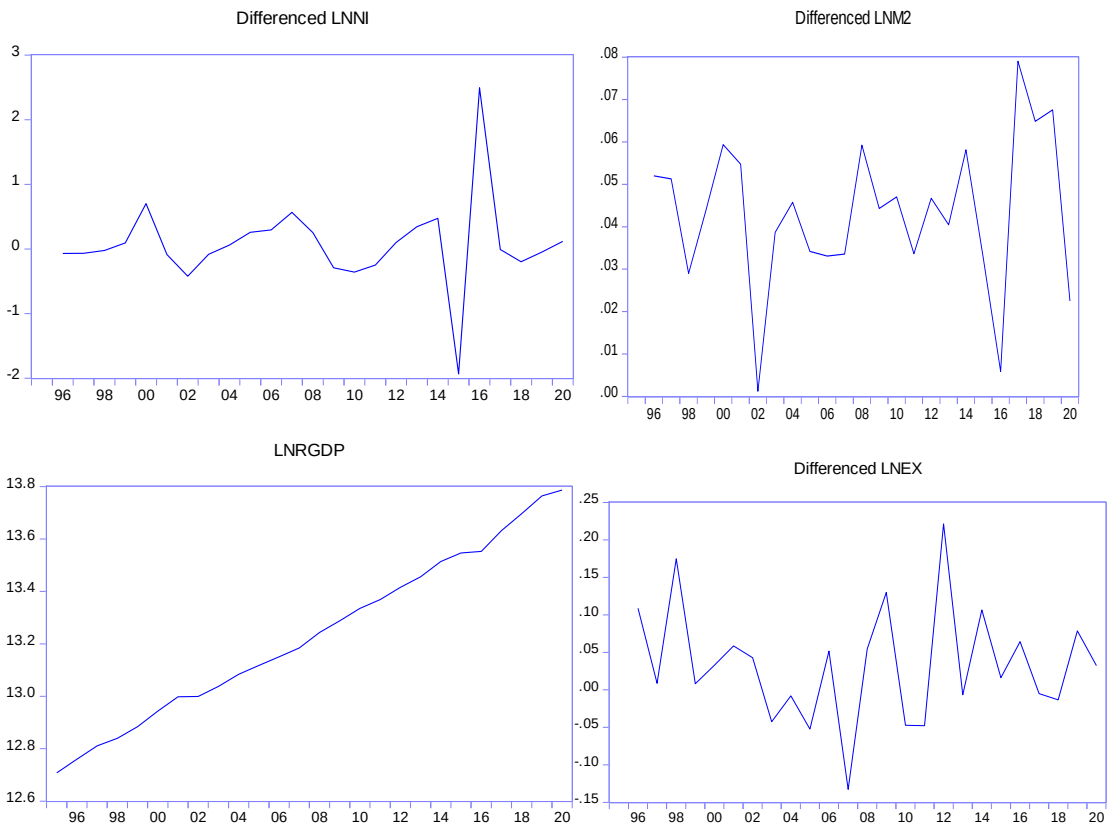


Figure 4.6 shows the graphical movement of dependent variable (NEPSE) and three independent variables real GDP (RGDP), exchange rate (EX) and money supply (M2) at level test of ADF. The result shows that the variables are below 5% level of significance and are stationary at first difference.

4.5 Lag Order Selection Criteria

The VAR approach is used to select the Lag Length Criteria.

Table: 4.5

VAR Lag Order Selection Criteria

VAR Lag Order Selection Criteria
Endogenous variables: LNNI LNM2 LNEX
LNRGDP
Exogenous variables: C
Date: 01/21/22 Time: 10:25
Sample: 1995 2020
Included observations: 23

Lag	LogL	LR	FPE	AIC	SC	HQ
0	36.47298	NA	6.98e-07	-2.823737	-2.626260	-2.774072
1	128.3916	143.8726*	9.75e-10*	-9.425356*	-8.437970*	-9.177032*
2	141.6786	16.17544	1.43e-09	-9.189441	-7.412145	-8.742456
3	156.3861	12.78917	2.45e-09	-9.077053	-6.509849	-8.431409

Source: Author's own calculation from E-views

Prior to apply co-integration analysis, the lag order is determined through the Akaike Information Criterion (AIC) and Schwarz Information Criterion (SIC). Since, the study use annual data maximum of one lag has been used. While evaluating the calculated AIC and SIC figure with different lags, it can be observed that at lag one the AIC criterion is significant. Also, the SC is significant at lag one. Furthermore, in this study the AIC criterion has been selected for lag selection. The use of the ARDL model is best for the estimation of level relationships because the model suggests that once the order of the ARDL has been recognized, the relationship can be estimated by OLS. Second, the bounds test allows a mixture of I (1) and I (0) variables as repressors, that

is, the order of integration of appropriate variables may not necessarily be the same. Therefore, the ARDL technique has the advantage of not requiring a specific identification of the order of the underlying data and this technique is suitable for small or finite sample size.

4.6 Co-integration Result

Based on our model, ARDL bound test

Table: 4.6

F-bound Test

Test Statistic	Value	Significance	I(0)	I(1)
F-statistic	4.048907	10%	2.37	3.2
K	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

Source: Author's own calculation from E-views

The F-bound test for the above equation is further explained in terms of critical value. The NIx is treated as the dependent variable in this equation. The above result shows that the value of F-statistics is 4.048907 which exceed the upper bound critical value of 3.67 at 5 percent level of significance. Hence, this implies that the macroeconomic variables (M2, EX, RGDP) and Nepse Index are co-integrated.

4.7 ARDL long-run Estimation

Table 4.7

Long run ARDL Model

Variables	Coefficient	Std.Error	t-Statistic	Prob
RGDP	-9.70926	3.429809	-2.83085	0.0221
M2	0.704805	0.285664	2.467250	0.0223
EX	-1.026795	1.538944	-0.667207	0.5119
C	1.302623	3.500659	0.372108	0.7135

EC=LNNI **(**-9.70926*LNRGDP+0.704805*LNM2-1.026795*LNEX+1.3026)

Source: Author's own calculation from E-views

Table 4.7 shows the result of long run ARDL model based on AIC. It is observed that real GDP has negative and significant relationship with stock market prices at 5% level in long run. The real GDP coefficient indicates that one unit change in RGDP changes

Nepse index by 9.70 times in opposite direction. The estimated coefficient of M2 shows that it has positive coefficient and is statistically significant at 5 percent level of significance. The broad money coefficient indicates that one unit change in M2 changes Nepse index by 0.70 times in same direction. Broad money has positive and significant effect in stock index in Nepal. It supports the first hypothesis (H1) of the research in long run. The positive relationship between broad money supply and stock index has been supported by Naik and Padhi (2012), Ratanapakorn and Sharma (2007), and Mukherjee and Naka (1995). Finally, the coefficient of exchange rate is negative and is statistically insignificant. Since, there is the insignificance relation between exchange rate and Nepse index and the coefficient of the exchange rate is negative the hypothesis not supported. Phuyal (2016) did not find the significant relationship between exchange rate and Nepse index.

4.8 Error correction Representation of the Model

Table 4.8

Error Correction Form

ARDL Error Correction Regression
Dependent Variable: D(LNNI)
Selected Model: ARDL(1, 0, 0, 0)
Case 2: Restricted Constant and No Trend
Date: 01/21/22 Time: 15:41
Sample: 1995 2020
Included observations: 25

Variables	Coefficients	Std. Error	t-Statistic	Prob.
D(LNRGDP)	1.065478	1.78731	0.596135	0.5676
D(LNM2)	-4.001463	1.853641	-2.158704	0.0455
D(LNEX)	4.337201	1.863249	2.327763	0.0325
CointEq(-1)	-0.971279	0.202584	-4.794454	0.0000

R-squared	0.482882	Mean dependent var	0.076321
Adjusted R-squared	0.482882	S.D. dependent var	0.699402
S.E. of regression	0.502946	Akaike info criterion	1.502511
Sum squared resid	6.070915	Schwarz criterion	1.551266
Log likelihood	-17.78138	Hannan-Quinn criter.	1.516033
Durbin-Watson stat	2.024156		

Source: Author's own calculation from E-views

The ECM was examined to evaluate the short run dynamic relationship between Nepse Index and other independent macroeconomic variables, so as to confirm the reliability of long term coefficient. According to the ARDL Error Correction Regression the model is explained 48.28 percent of dependent variable by independent variable. The ECM coefficient holds negative sign and is statistically significant, which indicate the consistency short run model. The estimate coefficient of ECM also determines the movement of correction towards the equilibrium. In other word the result of ECM shows that, any divergence from long run relation in the current period has to be adjusted by 97.12 percent in the corresponding period, so that the adjustment is acceptable. Similarly, the diagnostic statistics for the model shows that the AIC and SC indicates that the model is statistically fit and suitable for the data. The coefficient of real GDP is positive but insignificant in short run. The coefficient of money supply is negative however is statistically significant and shows negative relationship with NEPSE Index. The coefficient of exchange rate is found to be positive and significant which shows positive relationship with NEPSE Index in short run. The above result suggests that only two the macroeconomic variable (money supply and exchange rate) describe the stock index in short run.

4.9 Diagnostic test for ARDL approach

Table 4.9

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.600627	Prob. F(4,20)	0.6665
Obs*R-squared	2.681069	Prob. Chi-Square(4)	0.6125
Scaled explained SS	5.098634	Prob. Chi-Square(4)	0.2773

Source: Author's own calculation from E-views

Table 4.10

Autocorrelation Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.241634	Prob. F(3,18)	0.8661
Obs*R-squared	0.967832	Prob. Chi-Square(3)	0.8090

Source: Author's own calculation from E-views

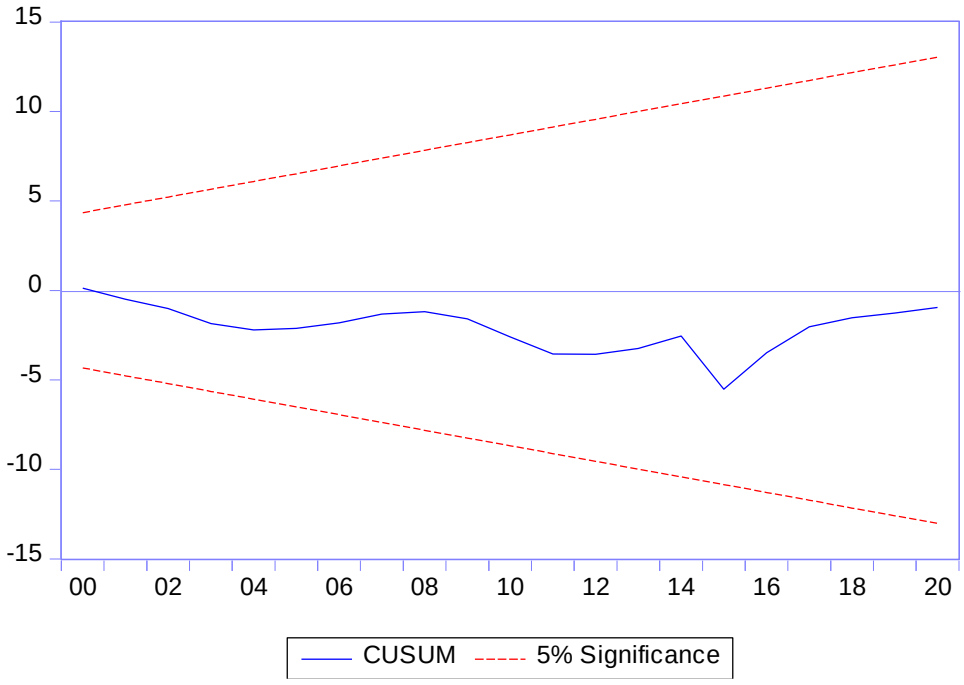
To test the reliability of the model, various diagnostic tests including test of serial co-relation and Heteroscedasticity in the error term, stability, and accuracy of the model has been applied. There is no evidence of the serial correlation in the data. The Breusch-Pagan-Godfrey test suggests that stochastic terms are normally distributed and there is no heteroscedasticity. Hence, it is reasonable to say the model is well behaved, since the p-value of both test is greater than five percent level of significance.

4.10 CUSUM Test

At last, the Cumulative Sum of Recursive residual (CUSUM) test has been employed and the result has been plotted below.

Figure 4.7

CUSUM TEST



As it is observed in Figure 2, the lines are between the significant of 5 percent. The result of the CUSUM test statistics indicate that the critical limit of 5 percent has not been exceeded, which implies the model to be stable. In general, our model is robust and stable as both long run and short-run coefficients are acceptable over the study period 1995 to 2020. The diagnostic tests confirm that the models have the desired econometric properties.

CHAPTER V
MAJOR FINDINGS CONCLUSIONS AND RECOMMENDATIONS

5.1 Major Findings

The main objective of this study was to examine the effect of Macroeconomic Variables on stock market of Nepal and to show the trend of NEPSE Index and three macroeconomic variables (money supply, exchange rate and RGDP). To fulfill this objective, this study used the dataset of 26 years over periods 1995-2020. To examine the relationship of NEPSE with macroeconomic variables this study used trend line, table and graphs. The ADF test was applied to test the stationary of the time series data and AIC for VAR lag selection criteria. The long-run model was estimated by using F-Bound test. Similarly, ECM model was applied for the short run dynamism of the model. Finally, To test the reliability of the model, various diagnostic tests including test of serial co-relation and Heteroscedasticity in the error term, stability, and accuracy of the model has been applied. The major findings of the study are listed as given below:

i. The study analyzes trend of stock market in Nepal along with exploration of macroeconomics determinants of stock market prices and role of macroeconomics variables in stock market of Nepal with the help of secondary data analysis.

ii. The stock market prices (NEPSE index) seems to fluctuate over the study period. Since 2003, the index increased continuously and reached about 1000 in fiscal year 2007/08. It continued to decrease after the global financial crisis until 2011. Thereafter, it started increasing and recorded the highest point of 1718.15 in the fiscal year 2015/16. Such high index was due to the monetary policy of the FY 2015/16, in which Nepal Rastra Bank directed banks and financial institutions to raise capital by four times. However, the index declined to 1259.10 in the FY 2018/19. Thus, the index in FY 1993/94 was 226.0 and reached to 1259.10 in FY 2018/19 after reaching high fluctuation in FY 2007/08 and FY 2019/2020.

iii. The result of ADF test shows that all variables are stationary only after the first difference i.e. all variables used in this study are I(1).

iv. The F-bound test indicates that variables are co-integrated and long run model is free from spurious regression.

v. The result obtained suggested that there is negative relationship between Real GDP and NEPSE Index in long run. Fluctuation of Nepse Index in long run is strongly and positively related to broad money supply and there is insignificant relationship of NEPSE Index with exchange rate.

vi. The result of ECM model indicate that in short run, RGDP has insignificant relation with Nepse index, money supply has negative relationship with Nepse index and exchange rate is positively related with Nepse index. When one percent increase in M2 leads to 4 percentage decrease in NEPSE Index and 1 percentage change in exchange rate leads to 4.3 percent increase in NEPSE index respectively.

vii. The coefficient of ECM (-1) is negative and significant at 5% percent level indicates that NI and other explanatory variables are converging into long-run equilibrium.

5.2 Conclusion

The result obtained suggested that the fluctuation of Nepse Index in long run is strongly related to broad money supply. Real GDP has negative coefficient, so the direction of movement to Nepse index with Real GDP is opposite in long run. Exchange rate however could not define Nepse index in long run but regarding the short run relation between the Nepse index and exchange rate, the coefficient of exchange rate is also found to be positive and significant. Money supply holds negative relation with Nepse index in short run with negative coefficient and Real GDP is insignificant with Nepse index in short run.

Therefore, the result suggests that the selected macroeconomic variables (money supply, RGDP and exchange rate) describe the stock index in long run and short run respectively which confirms the belief that macroeconomic variables, broad money supply exchange rate and real GDP affects the Nepalese stock market.

5.3 Recommendation

The finding of the paper can be helpful to finance practitioners. Policymakers should take into consideration of various macro-economic indicators while formulating economic as well as financial policies. Furthermore, it is recommended that capital market development policies should be aligned with macroeconomic fundamental

policies. The result of the study will also be helpful to the investors of Nepal Stock Exchange, to analyze the situation and make rational short term and long term investment decision. However, the limitation of the study should not be overlooked. Even though, the stock market is high frequency data generating area, only annual data has been considered which has limited the sample size of 26. Furthermore, only three macroeconomic variables have been selected to define Nepse Index, inclusion of other variable could have improved the result. In future, similar studies can be extended with inclusion of more other variables such as; remittance, CPI, Interest rate etc. Hence, this paper recommends future researchers to study on more variable, longer period, higher frequency comparison with other emerging economies and developing countries in order to increase the validity on the existence of asymmetric impact.

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Appendix 1

Absolute Value of Nepse Index
198.885
185.537
173.547
169.625
186.226
374.953
343.908
225.244
207.255
219.912
284.716
382.412
672.67
866.349
647.064
452.052
352.231
389.003
548.995
882.789
127.51
1542.2462
1527.467
1251.813
1193.547
1340.44

Source: SEBON

Appendix 2

Absolute Value of Money Supply
80,984.7
92,652.2
103,720.6
126,462.6
152,800.2
186,120.8
214,454.2
223,988.3
245,911.2
277,310.1
300,440.0
347,421.8
346,824.1
395,518.2
495,377.1
630,521.2
719,599.1
921,320.1
1,130,302.3
1,315,376.3
1,565,967.2
1,877,801.5
2,244,578.6
2,591,702.0
3,094,466.6
3,582,137.7

Source: QEB,NRB

Appendix 3

Absolute value of Exchange rate
50.70
56.53
57.03
67.93
68.48
70.75
75.03
78.30
75.05
74.45
70.65
74.40
65.15
68.80
78.35
74.74
71.25
88.90
88.32
98.25
99.86
106.49
105.95
104.56
113.11
116.83

Source: QEB,NRB

Appendix 4

Absolute value of RGDP
330291
347921
366225
376999
393903
417992
441518
442049
459488
481004
497739
514486
532038
564517
590107
618529
639694
670279
697954
739754
764336
768835
832060
887817
949886
971500

Source: QEB, NRB

Appendix 5

VAR Lag Order Selection Criteria

VAR Lag Order Selection Criteria
Endogenous variables: LNNI LNM2 LNEX LNRGDP
Exogenous variables: C
Date: 01/21/22 Time: 10:25
Sample: 1995 2020
Included observations: 23

Lag	LogL	LR	FPE	AIC	SC	HQ
0	36.47298	NA	6.98e-07	-2.823737	-2.626260	-2.774072
1	128.3916	143.8726*	9.75e-10*	-9.425356*	-8.437970*	-9.177032*
2	141.6786	16.17544	1.43e-09	-9.189441	-7.412145	-8.742456
3	156.3861	12.78917	2.45e-09	-9.077053	-6.509849	-8.431409

Source: Author's own calculation from E-views

Appendix 6

F-Bound Test

Test Statistic	Value	Significance	I(0)	I(1)
F-statistic	4.048907	10%	2.37	3.2
K	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

Source: Author's own calculation from E-views

Appendix 7

Long run ARDL Model

Variables	Coefficient	Std.Error	t-Statistic	Prob
RGDP	-9.70926	3.429809	-2.83085	0.0221
M2	0.704805	0.285664	2.467250	0.0223
EX	-1.026795	1.538944	-0.667207	0.5119
C	1.302623	3.500659	0.372108	0.7135

EC=LNNI **(**-9.70926*LNRGDP+0.704805*LNM2-1.026795*LNEX+1.3026)

Source: Author's own calculation from E-views

Appendix 8

Error Correction Form

ARDL Error Correction Regression
Dependent Variable: D(LNNI)
Selected Model: ARDL(1, 0, 0, 0)
Case 2: Restricted Constant and No Trend
Date: 01/21/22 Time: 15:41
Sample: 1995 2020
Included observations: 25

Variables	Coefficients	Std. Error	t-Statistic	Prob.
D(LNRGDP)	1.065478	1.78731	0.596135	0.5676
D(LNM2)	-4.001463	1.853641	-2.158704	0.0455
D(LNEX)	4.337201	1.863249	2.327763	0.0325
CointEq(-1)	-0.971279	0.202584	-4.794454	0.0000

R-squared	0.482882	Mean dependent var	0.076321
Adjusted R-squared	0.482882	S.D. dependent var	0.699402
S.E. of regression	0.502946	Akaike info criterion	1.502511
Sum squared resid	6.070915	Schwarz criterion	1.551266
Log likelihood	-17.78138	Hannan-Quinn criter.	1.516033
Durbin-Watson stat	2.024156		

Source: Author's own calculation from E-views

Appendix 9

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.464158	Prob. F(3,21)	0.7103
Obs*R-squared	1.554623	Prob. Chi-Square(3)	0.6697
Scaled explained SS	3.542378	Prob. Chi-Square(3)	0.3153

Source: Author's own calculation from E-views

Appendix 10

Autocorrelation Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.241634	Prob. F(3,18)	0.8661
Obs*R-squared	0.967832	Prob. Chi-Square(3)	0.8090

Source: Author's own calculation from E-views

Research Matrix

S.N.		Objectives	Research question/ Hypothesis	Indicators	Tools of Data Analysis	Source of Data
1		To analyze the trend of macro-economic variables and NEPSE index.	What are the trend of selected macro-economic variables and stock market in Nepal?	Money supply, Exchange rate, Real GDP	Table, Graph ,Percentage, Average.	Secondary
2		To examine the effect of selected macro-economic variables on NEPSE index.	What are the effects of selected macroeconomic variables on NEPSE index?	Money supply, Exchange rate, Real GDP	Unit root, ARDL, Co-integration, ECM.	Secondary data