IMPACT OF MACROECONOMIC VARIABLES ON STOCK MARKET INDEX IN NEPAL

A Thesis

By

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CERTIFICATION OF AUTHORSHIP

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirement s for a degree as full acknowledged within the text. I also certify that the thesis has been written by me. Any help that I received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the reference section of the thesis.

RECOMMENDATION LETTER

I recommended that the dissertation prepared **"IMPACT OF MACROECONOMIC VARIABLES ON STOCK MARKET INDEX IN NEPAL"** Prepared by Sindhu Acharya has been completed under my supervision for partial fulfillment of the requirements for the degree of master of management. I hereby forward it for approval.

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APPROVAL SHEET

We the undersigned have examined the thesis entitled **"IMPACT OF MACROECONOMIC VARIABLES ON STOCK MARKET INDEX IN NEPAL"** prepared by Sindhu Acharya candidate for the degree of master of business Studies (MBS semester) and conducted the viva coce examination of the candidate. We hereby certify that the thesis is worthy of acceptance.

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Sindhu Acharya

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ABBREVIATIONS

ARDL	Auto Regressive Distributive Lag
ARIMA	Autoregressive Integrated Moving Average
DPS	Dividend per Share
ECM	Error Correction Model
EPS	Earning per Share
ER	Exchange Rate
GDP	Gross Domestic Product
INFR	Inflation Rate
INTR	Interest Rate
MS	Money Supply
NEPSE	Nepalese Stock Exchange
NI	Stock Market Index
NRB	Nepal Rastra Bank
NSE	Nairobi Securities Exchange
OLS	Ordinary Least Square
PBR	Pay Back Ratio
RGDP	Real Gross Domestic Product
VDC	Variance Decomposition
VECM	Vector Error Correction Model

ABSTRACT

The objective of the study is to examine the impact of macroeconomic variables on stock market index in Nepal.The specific objective of the study is to find the trend of sampled macroeconomic variables: real gross domestic product, money supply, interest rate, inflation rate, exchange rate to stock market index? And to examine the impact of sampled macroeconomic variables on stock market index. The historical data are used for the period of 25 years of time starting from 1994 to 2018. The methodology of the study is descriptive and casual research design and ARDL techniques. The study is mainly concerned with the selected macroeconomic variable: stock market index, real gross domestic product, inflation rate, interest rate and broad money supply and its impact to the Stock market Index in Nepal. The major findings are: there is positive correlation between the NI and RGDP, NI and MS, & NI and ER. Further, there is there is the negative correlation between the MS and INTR, MS and INFR. Moreover there is evidence of co-integrating relationship of stock market index, interest rate and inflation rate and the selected other variables like stock market index , real gross domestic production, money supply, interest rate, inflation rate, exchange rate .Conversely, there is no evidence of co-integrating relationship between real gross domestic product and the selected other variables. The conclusion of the thesis is that the existence of long run and short run relationship between the variables. Stock market index, and inflation rate has the long run relation with the significant coefficient. Money supply and exchange rate have the short run relationship. Real gross domestic production and inflation rate are not significant.

CHAPTER-I

INTRODUCTION

1.1 Background of the study

Stock market has been recognized to have a prominent role in a country's economic development at the same time; stock market is also an indicator towards the development of the nation in term of economics. Industries raise the long term fund from capital market and stock market is platform for the finance. Further, stock market is place where investors can easily invest their money. The stock market does not always move fundamentally in many developing countries because country like Nepal does not have long history for stock market development, that development too is attributed to political change like multiparty democracy. Since establishment of Nepal Stock Exchange, both options of investment and market capitalization of stocks have magnified hugely (Khil & Lee, 2000).

Further, relationship between economic growth and stock market has also been strengthened. Due to this the performance of stock market can also reflect the performance of economy as a whole. Many literatures have stated that the stock prices had sharply fell and lead to poor stock market performance just before in recessions in many countries. Further, due to decade long internal armed conflict in Nepal, stock market performance and efficiency has not been as it was expected to be. Stock market is a suitable place for investors to avoid the threat of inflation as the monetary disturbance created by increased inflation can be maintained by increasing investment in stock market (Khil & Lee, 2000).

Nepalese market, commonly known as stock market index, itself has not been old enough to be matured so it is often blamed that stock market index movement is in control of few major investors. Some say that this volatility is purely due to demand and supply phenomenon stocks and some indicate the role of macroeconomic variables on this. Further, investment decision of share market investors is purely based on technical analysis because they do not have information about the relationship between stock market and macroeconomic variables so that they could perform fundamental analysis. So this study also aims to address this issue. As of

other emerging stock markets of developing nations, our stock market too is not fully efficient so that it could move based on economic fundamentals (Samadi, Bayani & Ghalandari, 2012).

1.2 Statement of problem

The macroeconomic factors affect stock market prices and financial markets influence the economy is accepted by the economic and financial. However, the findings regarding the direction of relationship have been mixed. Similarly, exchange rate, inflation rate and gold price were found to be effective on stock return, whereas oil price and liquidity were found to have no impact on stock.

The relationship between macroeconomic variables and stock market is a matter of concern for both the government agencies who are policy makers and investors. Further, academicians and general public are also interested to know about determinants of stock market stochasticity. Stock market efficiency is often associated with the development of the economy. The stock market in Nepal is the only secondary market where capital market instruments can be bought and sold. It is also a financial intermediary which bridges the gap between deficit unit and surplus units of economy. Further, huge volatility of stock market has been witnessed in last decade. So the importance of stock market in the economy and its surprising fluctuation has been source of motivation for the study.

This study attempts to identify the impact of macroeconomic variables on Stock market Index in the context of Nepalese stock market because of these controversies. Besides, the need for the research in a contextually different country like Nepal arises because of its economical difference from the countries earlier studied. Thus, this study deals with the following issues:

i. What is the trend of real gross domestic product, money supply, interest rate, inflation rate, exchange rate and stock market index?
ii. What is the impact of real gross domestic product, money supply, interest rate, inflation rate and exchange rate on stock market index?

1.3 Objectives of the study

The general objective of the study is to examine the impact of macroeconomic variables on stock market index in Nepal .The study focuses the correlation as well

as the impact of selected macroeconomics variables to the stock market index in Nepal. More specifically the major objectives of the study are:

i. To study the trend of macroeconomic variables: real gross domestic product, money supply, interest rate, inflation rate, exchange rate and stock market index.
ii. To examine the impact of macroeconomic variables on stock market index.

1.4 Research hypothesis

Naik & Padhi (2012), Hassan & Sangmi (2013), Rafay et al., (2014) and Gay & Nova (2016) has used the hypothesis to examine the the impact of macroeconomic variables on stock market index. Based upon their hypothesis study, hypothesis is proposed to explain the phenomenon in order to draw and test its logical or empirical consequences. Hypotheses were made to test the relationship between dependent and independent variables. The alternative hypotheses of the study are listed as follows:

/H_1/ : There exists significant relationship between real gross domestic product and stock market index

/H_2/ : There exists significant relationship between money supply and stock market index.

/H_3/ : There exists significance relationship between interest rate and stock market index.

/H_4/ : There exists significant relationship between inflation rate and stock market index

/H_5/ : There exists significant relationship between exchange rate and stock market index.

1.5 Significance of the study

This research can be significant and beneficial to different stakeholders in many ways. Investors can take this research to analyze and predict the stock market movement on the basis of macroeconomic indicators. This will help them to take rational decision and build better portfolios. Policymakers can use this research for the basis of revise current policies, making future policies. Policy makers will make right rules regulations to promote welfare of investors. Academician and other readers can take this for understanding the impact of macroeconomic variables in stock market in Nepal. Researcher can take this as reference for their research

regarding related topics. Since very few studies have been carried out in Nepal related to this topic, this study aims to contribute to the understanding of the effect of real gross domestic Product, money supply, interest rate, inflation rate and, exchange rate with stock market index in Nepal. This study shall contribute to the addition of existing literature related to the association of macroeconomic variables with stock market in Nepal.

1.6 Limitations of the study

Despite of the sincere efforts made in arriving at conclusions from the study, some limitations deserve consideration in order to obtain reliable interpretation of the results. The major limitations of the study are as follows:

i. There are many macroeconomic variables; only five variables are taken in the study so the research outcome may not give complete picture of stock market.

ii. The whole study is based on time series data. It covers the time period of 25 years starting from 1994 to 2018. It is because stock market of Nepal was established in 1993 and recorded data are available in 1994 onwards.

1.7 Organizational structure of the study

The early part of the research consists of front page, list of content, list of tables, list of figures and list of abbreviations. The main body part of this report consists of five sections as follows.The study is presented into following five chapters:

Chapter I : It deals with the subject matter consisting of introduction, problem statement, and research question, objectives of the Study, Significance of the study, Research Hypothesis, Limitations and organization of the study.

Chapter II : It includes the reviews of literature and provides theoretical framework that shows the basis of the research. In addition to this it also deals with various works and discussion related to Stock market Index.

Chapter III : It deals with research methodology. This includes Seven sub headings namely, research design, population and sample, conceptual framework ,description of the variables ,source of data, method of data analysis, model specification, autoregressive

distributed lag model and error correction representation of autoregressive distributive lag model.

Chapter IV : It concerns with analysis and research finding. The results of the analysis have been presented in tabulated form along with explanation where ever is necessary.

Chapter V : It provides a number of concluding observation and recommendation. The discussion, conclusion and implications of the study are presented in this chapter. Moreover references and appendices are also included at the end of the study.

CHAPTER-II
LITERATURE REVIEW

This chapter provides current stage of the research work, guidelines and helps to avoid unnecessary duplication of research work. Therefore, the following three main sections deals with theoretical review, review of previous studies based on national and international review and research gap.

2.1 Theoretical review

The study contains a review of theories on the relationship between selected macroeconomic variables and stock market development. Macroeconomic variables are closely examined to understand their effects on stock market development.

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 (b) The averages discount everything (c) The Dow Theory is not infallible.

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 a predictable path. Applying the random walk theory to stocks suggests that stock prices change randomly, making it impossible to predict stock prices.

Efficient market hypothesis (EMH)

Fama used the phrase "Efficient Market" to describe the market price that fully reflect 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.

2.2 Empirical review

In this section all the past empirical studies on selected macroeconomic variable to the stock market index are examined. The international and national reviewed from the 2010 to 2020 are presented in this section.

2.2.1 International context

Megaravalli & Sampagnaro (2018) studied the macroeconomic indicators and their impact on stock market in Asian three countries. The objective of the paper was to investigate the long-run and the short-run relationship between India, China and Japanese stock markets. The monthly time series data sampled period from 2008 January to November 2016 were used. The unit root test, the Cointegration test, Granger causality test and pooled mean group estimator methodology was applied to derive the long-run and short-run statistical dynamics. The finding showed that exchange rate has a positive and significant long-run effect on stock markets while the inflation has a negative and insignificant long-run effect.

Gay & Nova (2016) studied effect of macroeconomic variables on stock market returns for four emerging economies: Brazil, Russia, India and China. The author investigated the time-series relationship between stock market index prices and the macroeconomic variables of exchange rate and oil price for Brazil, Russia, India, and China (BRIC) using the Box-Jenkins ARIMA model. Gay & Nova found that no significant relationship between respective exchange rate and oil price on the stock market index prices of either BRIC country, also there was any significant relationship between present and past stock market returns, which suggested that markets of Brazil, Russia, India, and China exhibit the weak-form of market efficiency.

Gurloveleen & Bhatia (2015) investigated the impact of macroeconomic variables on the functioning of Indian stock market using the monthly data of ten macroeconomic variables. The objective of the paper was to check the association with the selected macroeconomic variables and average monthly closing stock prices of BSE 500

manufacturing firms. The researcher used the Augmented Dickey Fuller (ADF) test, multiple regression and Granger causality tests were employed to find out the results. Researcher found that foreign institutional investors and exchange rate were significant and others are not. This study revealed that the Indian stock market was a weak form efficient because no relationship was found amongst the variables.

Kibria, et al., (2014) observed the influence of five macroeconomic variables i.e. inflation, gross domestic product per capita, gross domestic product savings, money supply and exchange rate at KSE 100 index of Pakistan using the annual data of 23 years from 1991 to 2013. The study used the descriptive analysis, correlation analysis, granger causality test and regression analysis. The granger causality test showed that the gross domestic product savings and exchange rate does unidirectional granger cause money supply. On other side gross domestic product savings also unidirectional granger causes the KSE. Moreover, the results of regression analysis showed that the inflation, exchange rate, money supply, gross domestic product per capita and gross domestic product savings has positive significant impact on KSE 100 index.

Singh (2014) examined the causal relationship between industrial production, wholesale price index, money supply, interest rates, trade deficit, foreign institutional investment, exchange rate, crude oil price and gold price to determine their causal relationship with average monthly closing price of BSE 100 and CNX 100. The study used Pearson' correlation, multivariate stepwise regression and granger causality test. The correlation results revealed positive association of BSE 100 index with money supply and negative association with interest rate and gold price while CNX 100 showed negative relationship with money supply, interest rate and gold price.

Rafay et al., (2014) examined the causal relationship between macroeconomic variables and Karachi stock exchange index of Pakistan. The objective of the study was to determine the causal relationship and strength of association between macroeconomic variables and Karachi stock exchange index. The selected macroeconomic variables were interest rate, exchange rate, consumer price index, imports and exports. Secondary time series data of nineteen years were collected from 1992 to 2007 for the study. Regression analysis was used to determine the

relationship between dependent variables and independent variables. Further, granger causality test was applied to test the causality of relationship among the variables. The study found significant relationship with the stock market, and import. However, consumer price index, interest rate, exports and exchange rate has no relationship with Karachi stock exchange index.

Haruna, Yazidu & Paul (2013) studied the existence of casual link between inflation, money supply and FDI with stock market return in Ghana stock market using unit root test, vector-error correction model and granger causality test. The study found that significant relationship existed between stock returns and inflation, money supply, and only long run relationship with FDI.

Bellalah et. al (2013) investigated the long run relationship between macroeconomic indicators and stock exchange prices of USA, Japan and China. The macroeconomic variables were trade, oil price, and rate of interest, money supply (M3) and index of industrial production. The study used secondary time series data from May 2005 to May 2010. The autoregressive distributive lag model was used for data analysis. The results showed that in USA and China, long run as well as short run rates of interest, industrial production index and money supply were positively related to stock exchange prices. In Japan long run interest was positive and highly significant but short run interest was in less significant while money supply in long run was positive but in short run it is negative with stock exchange prices.

Hassan & Sangmi (2013) examined the effect of macroeconomic variables in stock price movement in India. The independent variables were six macroeconomic indicators namely inflation, foreign exchange rate, industrial production, money supply, gold price, interest rate and dependent variable were three indices of Indian stock market namely, SENSEX, NIFTY and BSE-100. The monthly time series historical secondary data from Apr 2008 to June 2012 were collected for the study. Multiple regression Model was used for data analysis. The study found that Indian stock market is affected by macroeconomic variables but some variables affect positively and some negatively.

Samadi, Bayani & Ghalandari (2012) studied the impact of macroeconomic variables: exchange rates, world gold prices, inflation, liquidity and oil price on the

stock returns index in Tehran stock exchange for the period 1379 to 1389 by GACH economic model. The results showed that the gold price, inflation and exchange rate were the variables influencing on the stock return and oil price and liquidity had no impact on the stock returns.

Kisaka & Mwasaru (2012) examined the causal relationship between foreign exchange rates and stock prices in Kenya. The objective of the study was to establish the causal linkages between leading prices in the foreign exchange market and the Nairobi Securities Exchange (NSE). The study used time series monthly data from November 1993 to May 1999. The Co-integration model and Vector Error Correction model were used to test the relationship. The result showed that foreign exchange rates and stock prices was non-stationary both in first differences and level forms, and the two variables are integrated of order one, in Kenya. The co-integration tests showed that the two variables were co-integrated.

Naik & Padhi (2012) investigated the relationships between the Indian stock market Index (BSE Sensex) and five macroeconomic variables, namely, industrial production index, wholesale price index, money supply, treasury bills rates and exchange rates. The objective of the study was to test whether the economic fundamentals in India explain the stock prices behavior in the market. The Johansen's co-integration and vector error correction model were applied to explore the long-run equilibrium relationship between stock market index and macroeconomic variables using the monthly time series data from April, 1994 to June 2011. The analysis revealed that macroeconomic variables and the stock market index were co-integrated and there exists long-run equilibrium relationship between them. It was found that the stock prices positively relate to the money supply and industrial production but negatively relate to inflation. The exchange rate and the short-term interest rate were found to be insignificant in determining stock prices. There was bidirectional causality exists between industrial production and stock prices whereas, unidirectional causality were found from money supply to stock price, stock price to inflation and interest rates to the stock prices in the study.

Quadir (2012) investigated the effects of macroeconomic variables on stock returns on Dhaka stock exchange. The selected macroeconomic variables were Treasury bill interest rate and industrial production. The time series monthly secondary data for

the period between January 2000 and February 2007 was used for the study. Autoregressive Integrated Moving Average (ARIMA) model was used for the study. The study found a positive relationship between Treasury bill interest rate and industrial production with market stock returns also the coefficients was statistically insignificant.

Ahmet, (2012) explored the relationship between ISE industry index and macroeconomic time series such as gold price, exchange rate, oil price, interest rate, money supply, current account deficit, and export volume are evaluated individually. This study found that a set of macroeconomic variables, gold price, exchange rate, oil price, interest rate, money supply, current account deficit, and export volume exhibit a long run equilibrium relationship with the ISE industry index.

Choo, Lee, & Ung (2011) investigated the behavior of Japanese stock market volatility with respect to a few macroeconomic variables including gold price, crude oil price and currency exchange rates using GARCH model for daily data over 12 years. The results showed that macroeconomic variables used in this study had no impact on the volatility of Japanese stock markets.

Tripathy (2011) investigated the causal relationship between selected macro-economic variables and Indian stock market to determine the form of efficiency of Indian Stock market. The time series secondary data of 2005 to 2011 were used for the study. The Bomboy stock exchange was chosen as indicator of Indian Stock market and sample size of four macro-economic variables i.e. Interest rate, inflation rate, exchange rate, Int'l stock market were chosen. The data was analyzed via Ljung-Box Q test, Unit Root test, and Granger Causality test to examine auto correlation. Both descriptive and inferential analysis was used for analysis. The contribution of study was to find out factors like interest rate, inflation rate, exchange rate that influenced in stock market volatility. The author suggested that these macroeconomic variables can be used to predict the future movement of stock market.

Ahmad et. al (2011) investigated the role of macroeconomic variables on stock market index in China and India. The objective of paper was to analyze the long run and short run relationships between the macroeconomic variables and the stock

market indices in the two big economies of Asia. The four selected macroeconomic variables were crude oil price, money supply, industrial production, and Inflation rate; the dependent variables were Bombay Stock Exchange of India and Shanghai Stock Exchange of China. Monthly Time series secondary data of the period of 1999 to 2009 were taken to study and the data was analyzed using Unit Root Test, Multivariate Co-integration Test and Vector Error Correction Model. The findings showed that in both long run and short run, there was a linkage between the four selected macroeconomic variables and stock market indices in China and India. The impact of crude oil price, and money supply in China is positive where as it was negative in India. Moreover, study found inflation has the positive influences in both countries. However the effect of industrial production was negative only in China.

Hsing (2011) examined the relationship between the Czech stock market index and selected macroeconomic variables. The selected macroeconomic variables were real output, government borrowing, money supply, domestic real interest rate, exchange rate, inflation rate, foreign stock market index and foreign interest rate. The time series data form 2002 Q1 to 2010 Q2 were collected for the study. The GARCH model was applied to test the relationship. The study found that the Czech stock market index was positively associated with real GDP and US Stock market Indexes, was negatively influenced by the ratio of government borrowing to GDP, the domestic real interest rate, the CZK/USD exchange rate.

Singh, Mehta & Varsha (2010) examined the casual relationship between index returns and certain crucial macroeconomic variable namely employment rate, exchange rate, GDP, inflation and money supply for Taiwan. The analysis was based on stock portfolios rather than single stocks. In portfolio construction, four criteria were used: Market capitalization, price/earnings ratio (P/E ratio), Pay Back Ratio (PBR) and yield. The purpose was to make a finer point with respect to the relationship between economic growth and stock market especially in terms of stock prices. The result revealed that exchange rate and GDP returns of all portfolios, while inflation rate, exchange rate, and money supply were having negative relationship with returns for portfolios of big and medium companies.

Buyuksalvarci (2010) studied the impact of macroeconomic variables on stock return in Turkey. The study applied multi-variable regression model using monthly data of

variables such as consumer price index, interest rate, gold price, industrial productions index, oil price, and foreign exchange rate and money stock in the period 2003-2010. The results showed that interest rate, industrial productions index, oil price and foreign exchange rate were the positive impact on stock returns in Turkey. However inflation and gold price was not a significant impact on stock return of Turkey.

2.2.2 National context

Shrestha (2019) examined the effect of macroeconomic variables on Stock market Index with reference to Nepal stock exchange. The objective of the study was to examine the effect of macroeconomic variables on stock market index of Nepal. The monthly data were taken from January 2002 to December 2016 using the Multivariate regression analysis applying OLS regression methods. The study concluded that the interest rate and wholesale price index were more explanatory power than exchange rate and gold price for explaining variation in stock market index and it was the greater effect on stock market index than exchange rate and gold price in Nepalese stock market.

Thapa (2019) investigated the influencing factors of stock price in Nepal. This paper explored the influencing factors of stock price in Nepal with reference to Nepalese commercial banks listed on the Nepal Stock Exchange Ltd. over the period of 2008 to 2018AD. The information was collected from questionnaire and financial statement of concerned organizations and analyzed using simple linear regression model. The conclusions of the work revealed that earning per share (EPS), dividend per share (DPS), effective rules and regulations, market whims and rumors, company profiles and success depend upon luck and positive association with share price while interest rate (IR) and price to earnings ratio (PER), showed the significant inverse association with share price. The researcher found that stock market responded significantly to changes in dividend and interest rate in Nepal.

Devkota (2018) studied the dynamic causality between stock prices on macroeconomic variables. The data were taken from 1994 to 2016 .The econometric methodology adopted in this paper consists of unit root test, Johansen's multivariate Cointegration test, Granger causality test based on Vector error correction model, and variance decomposition analysis. Devkota found that in the long-run, consumer

price index, exchange rate, Treasury bill rate, and money supply are positively related to the stock market index, while the gross domestic product is negatively related to the stock market index. The vector error correction model (VECM) results found that there were unidirectional long-run Granger causalities running from both the consumer price index and the money supply to the stock market index. Moreover there was a unidirectional short-run Granger causality running from the exchange rate to the stock market index. In addition to that research found that there were feedback relationships between the gross domestic product and the stock market index, and between the Treasury bill rate and the stock market index.

Devkota & Panta (2018) The study examined the causal relationship between the Nepalese stock exchange (stock market index) and interest rate, gold price, exchange rate in Nepal. The monthly time series data from January 2006 to June 2018 were used. Time series properties of the data are diagnosed using the unit root test and Johansen's Cointegration test. Moreover, the Granger causality test based on the Vector Error Correction Model (VECM) was used and found that direction of causation, to the short and long-run relationships between the variables. Devkota and Panta found that there exists a feedback relationship between the Stock market Index and the interest rate, and there exists a unidirectional causation from the gold price to both the exchange rate and the interest rate. There was a unidirectional causation between exchange rate and stock market index during the study period.

Karki (2018) examined the macro-economic factors of the stock market performance in Nepal. The study considered the annual data of four macroeconomic variables; real GDP, inflation, interest rate and broad money supply from 1994 to 2016 and attempted to revealed the relative influence variables on stock prices represented by ‘stock market index of the Nepalese capital market. Karki found that the performance of stock market was found to respond positively to real GDP, inflation and money supply, and negatively to interest rate. Moreover, Cointegration evidence was not found between macroeconomic variables and stock market index which means that stock price movements in Nepal were not explained by the macroeconomic variables. However the result supported random walk hypothesis in Nepalese stock market.

Phuyal (2016) studied can macroeconomic variables explain long term stock market Movements? The study was used Johansen's Cointegration method, whether a long-term association of selected macroeconomic variables existed with stock prices in the emerging market like Nepali stock market. Phuyal found that the Nepali stock market was a long run equilibrium relationship with a set of macroeconomic variables, like inflation rate, interest rate and remittance flow with the short term disequilibrium corrected by one point seventy nine percentage on monthly basis. The research further found that there was Granger causality between variables. In the short run, the stock market index was affected by the lag values of stock market index up to six levels and remittance income, as showed by Wald test.

Shrestha & Subedi (2014) studied the determinants of stock index in Nepal using monthly data for the period of mid-August 2000 to mid-July 2014. The macroeconomic variables chosen were consumer price index, broad money and Treasury bill rate. The correlation analysis showed the existence of the significant relationship between the stock market index and macro variables. The results found that the stock market index responds positively to inflation and broad money growth, and negatively to treasury bills rate. Shrestha and Subedi suggested that share investors take equities as a hedge against inflation and consider stock as an alternative financial instrument in Nepal. Moreover the lowering borrowing costs stimulate the investment in the Nepalese stock market. The stock market was also found to respond significantly to changes in political environment and the policy of NRB in the study.

Dangol (2010) examined the random walk behavior on daily market returns of the Nepal stock exchange for the period between July 2000 and January 2010.The researcher used the regression analysis to study. Dangol found that the Nepalese stock market does not show the characteristics of random walk.

2.3 Research gap

Many studies were conducted in the relationship between macroeconomic variables such as gross domestic product, inflation, interest rate money supply, gold price, exchange rate and remittance on stock market index. Covering the gap of previous studies this research attempts to re-examine the impact of different macroeconomic variables on stock market index. Whatever the researcher were found regarding

selected macroeconomic variables are limited to short span of time period. However this study has extended the time period from 1994 to 2018. Similarly previous researchers were using Regression Analysis (RA), Auto Regressive Moving Average (ARMA) model, Vector Error Correction (VEC) model. However, this study uses Auto Regressive Distributive Lag (ARDL) model.

CHAPTER-III

RESEARCH METHODOLOGY

This chapter presents all the necessary steps that have been followed throughout the research work in order to achieve and accomplish the stated objective of the study. This chapter focuses on the framework of the research design, sample selection and size, data collection procedure, data processing, definition of variables, meaning and definition of statistical tools used. This chapter highlights the research methodology used for the study.

3.1 Research design

The research design adopted in this study is descriptive and casual research design. Descriptive research design is helpful in organizing, tabulating, depicting and describing the data. Casual research design helps to investigate the possible casual relation between independent and dependent variables. This casual research design is used to find the evidence of correlation and regression between our selected macroeconomic variables and Nepalese Stock market. Here, selected macro-economic variables are real gross domestic production; money supply, inflation, interest rate, and exchange rate are independent variables and Stock market Index as the dependent variable.

3.2 Sample period

The study used 25 years of time series data from 1994 to 2018.In the 1993, stock market index was established. However data were available from the 1994; it is the rationale behind choosing the specific year. The data were taken from the Nepal Rastra Bank quarterly Bulletin. The study was mainly concerned with the selected macroeconomic variable and its impact to the Stock market Index in Nepal. It was therefore essential to obtain detail information of relationship and impact of selected macroeconomic variables to the Nepalese stock market that is Stock market Index in Nepal.

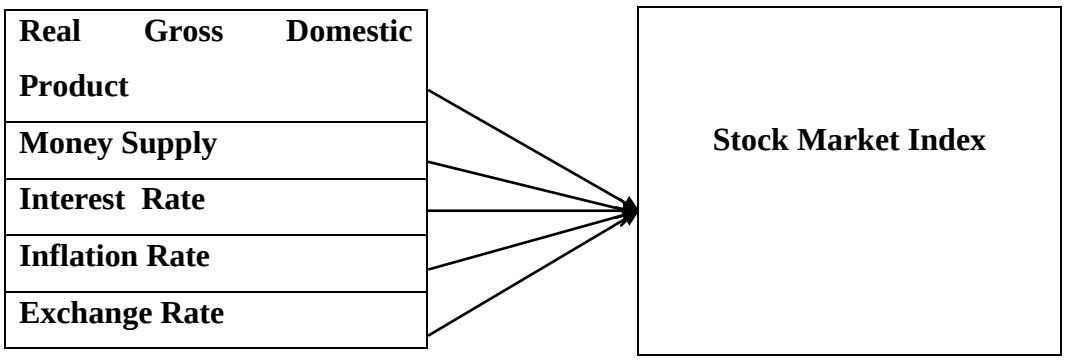
3.3 Conceptual framework

Stock market index is taken as a indicator of an economy. Growth in stock return is normally considered as a good sign since it implies the investors are confident about

the future prospect of the economy for this, it is necessary to understand the relationship between the stock market return and the factors that influence it. Several factors may affect the Stock market Index.

The possible systematic diagram based on conceptual framework is as follows. This is self-made model based on the assumption that all macroeconomic variables have impact on Nepal Stock market Index, some variables' effect is in high where as some may have low effect. However, due to model specification problem, researched included some more variables as independent variables and drop out the Kibria et. al (2014) conceptual framework.

Figure 3.1: Conceptual framework



Source: Kibria et. al (2014)

Figure 3.1 shows the conceptual framework. It is shown to analyze the relationship between selected macroeconomic variables and the Stock market Index following equation is used as the consideration of study is that dependent variable stock market index is the function of independent variables of real gross domestic production, money supply, interest rate, inflation rate, and exchange rate. The simple economic model is as follows.

$NI= \beta_{0+}\beta_1 RGDP_t+\beta_2 MS_t+\beta_3 INTR_t+\beta_4 INTR_t+ \beta_5 INFR_t+ \beta_6 ER_t$ ... (1)

Model used by the Kibria et.al (2014)

Where,

NI =Stock Market Index

RGDP = Real Gross Domestic Product

MS = money supply

INTR = Interest Rate

INFR = Inflation rate

ER = Exange Rate

3.4 Description and justification of the study variables

Stock market index can be affected by the many factors. Five macroeconomic variables are identified as independent variables. It includes real gross domestic product, money supply, interest rate, inflation rate and exchange rate.

Stock market index (NI) is a stock index performing as a standard to evaluate prices on the stock market index Stock Exchange over a period. Megaravalli & Sampagnaro (2018) Gay & Nova (2016), Buyuksalvarci (2010) Shrestha (2019), Thapa (2019) have used Stock market index as the dependent variable. In determining representative companies to calculate the index on, companies with the maximum market are preferred. On the other hand, to make sure full market demonstration, the company with the maximum market capitalization from each sector is also integrated. It is the dependent variable in the study.

Real Gross Domestic Production (RGDP) represents the economic growth and economic growth is the increased inflation- adjusted market value of the goods and services produced by an economy over time. Kibria, et al., (2014), Singh, Mehta and Varsha (2010), Devkota (2018) have used RGDP as the independent variables. It is conventionally measure as the percent rate of increased as one of the important determinant of stock market performance and has also been used to measure the growth of real economic activity growth is usually calculated in real terms i.e., inflation-adjusted terms to eliminate the effect of inflation on the price of goods produced. The king and levine (1993) were the first to address the relationship between financial development and economic growth using the cross country regression context. It was the independent variable in the study.

Money Supply (MS) contains coins, balances and cash carry in saving accounts and also in checking accounts. At identified time the total amount of monitory assets is money supply. Kibria, et al.,(2014), Singh (2014), Haruna, Yazidu & Paul (2013), Hassan and Sangmi (2013), Naik and Padhi (2012), Ahmet, (2012) have used money supply as an independent variable. Economists developed policies to evaluate money supply for the purpose of controlling interest rate and money circulation in

the economy. In case of increasing money supply mostly the interest is lower as a result it enhances the investments. The amount of money in an economy is referred to as the money supply or it is the total amount of monetary assets available in an economy at a specific time. There are several ways to define "money," but standard measures usually include currency in circulation and demand deposits. Money supply is one of the components of monetary policy that any central bank uses to cause a desired level of change in real activities. These frequent changes in the monetary policy component are believed to have a significant effect on the stock market. Therefore, it is important to analyze the relationship between money supply and an important determinant of the economy, the stock market.

Interest Rate (INTR) is the 91-Day Treasury bill rate used as proxy for interest rate since Treasury bill serves as the opportunity cost of holding shares and as a benchmark for measuring interest rate. Kibria, et al., (2014), Singh (2014), Rafay et al., (2014), Hassan and Sangmi (2013), Quadir (2012), Ahmet, (2012) have used money supply as an independent variable. It is the independent variable in the study.

Inflation Rate (INFR) represents one of the major threats to stock investors. When the inflation rates start to rise, investors get very nervous anticipating the potentially negative consequences and therefore because of lack of confidence among investors, they resist to invest in the stock market which leads to a decline in stock prices. Megaravalli & Sampagnaro (2018), Kibria, et al., (2014), Singh (2014), Rafay et al., (2014), Haruna, Yazidu & Paul (2013), Hsing (2011) have used inflation as an independent variable.

Megaravalli & Sampagnaro (2018), Kibria, et al., (2014), Singh (2014), Rafay et al., (2014),Haruna, Yazidu & Paul (2013), Hsing (2011)) have used money supply as an independent variable.Measuring inflation is a difficult problem for government statisticians. To do this, a number of goods that are representative of the economy are put together into what is referred to as a "market basket." The cost of this basket is then compared over time. This results in a price index, which is the cost of the market basket today as a percentage of the cost of that identical basket in the starting year. It is the independent variable in the study.

Exchange Rate (ER) is the rate of exchange in existing market place for which one currency can be replaced for another currency. For example if the U.S. change rate for the Canadian Dollar is $1.60, this shows that 1 American Dollar can be changed for 1.6 Canadian dollars. It is the independent variable in the study. Megaravalli & Sampagnaro (2018), Gay & Nova (2016), Rafay et al., (2014), Ahmet, (2012), Choo, Lee, and Ung (2011), Gurloveleen & Bhatia (2015), Kibria, et al., (2014), Singh (2014), Samadi, Bayani & Ghalandari (2012), Kisaka and Mwasaru (2012), Naik and Padhi (2012), have been using money supply as an independent variable.

3.5 Sources of data

The sources of data were mainly secondary sources. The sources were from the quarterly economic bulletins, published data of Nepal Rastra Bank the central bank of Nepal .The researches were strongly based on secondary sources of data. The prime objectives of this study were to find the impact of Selected Macroeconomic variables to the Stock market Index of Nepal. The data covers 25 years time period from 1994 to 2018.

3.6 Method of data analysis

Regression analysis shows the cause and effect relationship between the variables. In this study there are seven variables. Stock market Index is the dependent variable and real gross domestic product, money supply, inflation rate, interest rate, and exchange rate are the independent variables. Thus regression analysis is the best option to find the cause and effect among the variables. The study was based on the ARDL model having six independent variables. The data were analyzed by using the E-Views software.

3.7 Model specification

The variables of interest in this study are: the dependent variables was Stock market Index whereas the independent variables are real gross domestic product, money supply, inflation rate, interest rate and exchange rate The model is based on the methodology adopted by Kabria et.al (2014).However due to the model specification problem researcher has included some more variables in the study. The following model is the Econometric model in the study.

The model is:

$NI = \beta_0 + \beta_1 RGDP_t + \beta_2 MS_t + \beta_3 INTR_t + \beta_4 INFR_t + \beta_5 ER_t + e_t \ldots (2)$

Where: NI is the Stock market Index, RGDP is the real gross domestic production, MS is the money supply, INTR is the interest rate, INFR is the inflation rate & ER is the exchange rate.

Similarly, β_0 is the constant of the model $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ are the coefficients of the explanatory variables and e_t is the stochastic error term that captures the effect of other variables not included in the model. The signs of these variables are based on a priori expectation. That is, the direction of the relationship between the respective independent variables and the explained variable is according to their relationship in standard econometric theory. This study uses the ordinary least square technique. This technique emphasizes the regression and correlation analysis which helps to derive estimates of the parameters as well as determine the nature, direction and degree of the relationship between the explanatory and dependent variables. Specifically, the mode of the technique is the single equation regression model. The ordinary least square method produces the best linear unbiased estimates.

3.8 Autoregressive distributive lag model

The autoregressive distributive lag (ARDL) is used to examine the short run and long run relationship between the selected macroeconomic variables on stock return. In order to apply the co-integration, the first step is to determine the order of integration of each variable under study. This is because of the fact that ARDL techniques cannot be used if the order of integration of the variables is two or more. The unit root test has been used for this purpose both at the level and difference of the variables. The lag length used for the test is determined using a model selection procedures based on the Schwarz Information Criterion. The important features of this test is that it is free from unit root pre-testing and can be applied regardless of whether variables are I (0) or I (1).In addition, it does not matter whether the explanatory variables are exogenous. An ARDL representation of equation (2) can be written as:

$$\Delta(LNNI_t) = \beta_{01} + \beta_{11}(LNNI_{t-1}) + \beta_{21}(LNRGDP_{t-1}) + \beta_{31}(LNMS_{t-1}) + \beta_{41}(LNINTR_{t-1}) + \beta_{51}(LNINFR_{t-1}) + \beta_{61}(LNER_{t-1}) + \sum_{i=1}^{P} \alpha_{1i}\, \Delta(LNNI_{t-1}) +$$

$\sum_{i=1}^{q} \alpha_{2i}\, \Delta(LNRDGP_{t-1}) + \sum_{i=1}^{q} \alpha_{3i}\, \Delta(LNMS_{t-1}) + \sum_{i=1}^{q} \alpha_{4i}\, \Delta(LNINTR_{t-1}) +$
$\sum_{i=1}^{q} \alpha_{5i}\, \Delta(LNINFR_{t-1}) + \sum_{i=1}^{q} \alpha_{6i}\, \Delta(LNER_{t-1}) + + e_{1t} \dots$ (2)

$\Delta(LNRGDP_t) = \beta_{01} + \beta_{11}(LNRGDP_{t-1}) + \beta_{21}(LNNI_{t-1}) + \beta_{31}(LNMS_{t-1}) +$
$\beta_{41}(LNINTR_{t-1}) + \beta_{51}(LNINFR_{t-1}) + \beta_{61}(LNER_{t-1}) +$
$\sum_{i=1}^{P} \alpha_{1i}\, \Delta(LNRGDP_{t-1}) + \sum_{i=1}^{q} \alpha_{2i}\, \Delta(LNNI_{t-1}) + \sum_{i=1}^{q} \alpha_{3i}\, \Delta(LNMS_{t-1}) +$
$\sum_{i=1}^{q} \alpha_{4i}\, \Delta(LNINTR_{t-1}) + \sum_{i=1}^{q} \alpha_{5i}\, \Delta(LNINFR_{t-1}) + \sum_{i=1}^{q} \alpha_{6i}\, \Delta(LNER_{t-1}) +$
$e_{2t} \dots$ (3)

$\Delta(LNMS_t) = \beta_{01} + \beta_{11}(LNMS_{t-1}) + \beta_{21}(LNNI_{t-1}) + \beta_{31}(LNRGDP_{t-1}) +$
$\beta_{41}(LNINTR_{t-1}) + \beta_{51}(LNINFR_{t-1}) + \beta_{61}(LNER_{t-1}) + \sum_{i=1}^{P} \alpha_{1i}\, \Delta(LNMS_{t-1}) +$
$\sum_{i=1}^{q} \alpha_{2i}\, \Delta(LNNI_{t-1}) + \sum_{i=1}^{q} \alpha_{3i}\, \Delta(LNRGDP_{t-1}) + \sum_{i=1}^{q} \alpha_{4i}\, \Delta(LNINTR_{t-1}) +$
$\sum_{i=1}^{q} \alpha_{5i}\, \Delta(LNINFR_{t-1}) + \sum_{i=1}^{q} \alpha_{6i}\, \Delta(LNER_{t-1}) + e_{3t} \dots$ (4)

$\Delta(LNINTR_t) = \beta_{01} + \beta_{11}(LNINTR_{t-1}) + \beta_{21}(LNNI_{t-1}) + \beta_{31}(LNRGDP_{t-1}) +$
$\beta_{41}(LNMS_{t-1}) + \beta_{51}(LNINFR_{t-1}) + \beta_{61}(LNER_{t-1}) + \sum_{i=1}^{P} \alpha_{1i}\, \Delta(LNINTR_{t-1}) +$
$\sum_{i=1}^{q} \alpha_{2i}\, \Delta(LNNI_{t-1}) + \sum_{i=1}^{q} \alpha_{3i}\, \Delta(LNRGDP_{t-1}) + \sum_{i=1}^{q} \alpha_{4i}\, \Delta(LNMS_{t-1}) +$
$\sum_{i=1}^{q} \alpha_{5i}\, \Delta(LNINFR_{t-1}) + \sum_{i=1}^{q} \alpha_{6i}\, \Delta(LNER_{t-1}) + e_{4t} \dots$ (5)

$\Delta(LNINFR_t) = \beta_{01} + \beta_{11}(LNINFR_{t-1}) + \beta_{21}(LNNI_{t-1}) + \beta_{31}(LNRGDP_{t-1}) +$
$\beta_{41}(LNMS_{t-1}) + \beta_{51}(LNINTR_{t-1}) + \beta_{61}(LNER_{t-1}) +$
$+ \sum_{i=1}^{P} \alpha_{1i}\, \Delta(LNINFR_{t-1}) + \sum_{i=1}^{q} \alpha_{2i}\, \Delta(LNNI_{t-1}) + \sum_{i=1}^{q} \alpha_{3i}\, \Delta(LNRGDP_{t-1}) +$
$\sum_{i=1}^{q} \alpha_{4i}\, \Delta(LNMS_{t-1}) + \sum_{i=1}^{q} \alpha_{5i}\, \Delta(LNINTR_{t-1}) + \sum_{i=1}^{q} \alpha_{6i}\, \Delta(LNER_{t-1}) + e_{5t} \dots$
(6)

$\Delta(LNER_t) = \beta_{01} + \beta_{11}(LNER_{t-1}) + \beta_{21}(LNNI_{t-1}) + \beta_{31}(LNRGDP_{t-1}) +$
$\beta_{41}(LNMS_{t-1}) + \beta_{51}(LNINTR_{t-1}) + \beta_{61}(LNINFR_{t-1}) +$
$+ \sum_{i=1}^{P} \alpha_{1i}\, \Delta(LNER_{t-1}) + \sum_{i=1}^{q} \alpha_{2i}\, \Delta(LNNI_{t-1}) + \sum_{i=1}^{q} \alpha_{3i}\, \Delta(LNRGDP_{t-1}) +$
$\sum_{i=1}^{q} \alpha_{4i}\, \Delta(LNMS_{t-1}) + \sum_{i=1}^{q} \alpha_{5i}\, \Delta(LNINTR_{t-1}) + \sum_{i=1}^{q} \alpha_{6i}\, \Delta(LNINFR_{t-1}) +$
$e_{6t} \dots$ (7)

Where, Δ is the first difference operator. The Stock market Index(NI), Real Gross Domestic Production (RGDP), Money Supply (MS),foreign, Interest Rate (IR), Inflation Rate (INFR) and Exchange Rate (ER), are the variables are selected in the study. β_0 Flow component and e_t is the white noise residual. The coefficient $(\beta_{1i} - \beta_{6i})$ represent long run relationship whereas the remaining expressions with summation sign ($\alpha_{1i} - \alpha_{6i}$) represents short run dynamics of the model. In order to investigate the existence of the long-run relationship among the variables in the

system, the bound test approach has been employed. Under this, the null hypothesis of no co-integration $\alpha_{1i} = \alpha_{2i} = \alpha_{3i} = \alpha_{4i} = \alpha_{5i} = \alpha_{6i} = 0$ is tested against the alternative of co-integration $\alpha_{1i} \neq \alpha_{2i} \neq \alpha_{3i} \neq \alpha_{4i} \neq \alpha_{5i} \neq \alpha_{6i} \neq .0$.If the calculated F-statistics is greater than appropriate upper bound critical values, the null hypothesis rejection implying co-integration. If such statistics is below the lower bound, the null cannot be rejected, indicating the lack of co-integration. If we find evidence of a long-run relationship, we then estimate the error correction model (ECM), which indicates the speed of adjustment back to long-run equilibrium after a short-run disturbance. The standard ECM involves estimating the following equation (2, 3, 5 & 6)

$$\Delta(LNNI) = \beta_{01} + \beta_{11}(LNNI_{t-1})\beta_{21}(LNRGDP_{t-1}) + \beta_{31}(LNMS_{t-1}) + \beta_{41}(LNINTR_{t-1}) + \beta_{51}ln(INFR_{t-1}) + \beta_{61}ln(ER_{t-1}) + \lambda EC_{t-1} + e_t \ldots (8)$$

To establish the goodness of fit of the ARDL model, diagnostic and stability tests were conducted. The diagnostic test examines the serial correlation, functional form, normality, and hetroscedasticity and Multicolliniarity associated with the model. The structural stability test was conducted by employing the cumulative residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ).

3.9 Error correction representation of autoregressive distributive lag model

The Co-integration among variables can be examined within the framework of error correction model (ECM) with co-integrated variables. Short run dynamics are captured by the individual Co-efficient of the lagged term; the error correction model (ECM) contains the information of long run causality. Significance of lagged explanatory variable depicts short run causality while a negative and statistical significant ECM is assumed to signify long run causality. The short-run co-integration (causality) is determined from the following ARDL model, for case where RGDP & ER is the explained variable.

$$\Delta(LNNI_t) = \beta_{01} + \beta_{11}(LNNI_{t-1}) + \beta_{21}(LNRGDP_{t-1}) + \beta_{31}(LNMS_{t-1}) + \beta_{41}(LNINTR_{t-1}) + \beta_{51}(LNINFR_{t-1}) + \beta_{61}(LNER_{t-1}) + \sum_{i=1}^{P} \alpha_{1i}\,\Delta(LNNI_{t-1}) + \sum_{i=1}^{q} \alpha_{2i}\,\Delta(LNRDGP_{t-1}) + \sum_{i=1}^{q} \alpha_{3i}\,\Delta(LNMS_{t-1}) + \sum_{i=1}^{q} \alpha_{4i}\,\Delta(LNINTR_{t-1}) + \sum_{i=1}^{q} \alpha_{5i}\,\Delta(LNINFR_{t-1}) + \sum_{i=1}^{q} \alpha_{6i}\,\Delta(LNER_{t-1}) + +e_{1t} \ldots (9)$$

$$\Delta(LNRGDP_t) = \beta_{01} + \beta_{11}(LNRGDP_{t-1}) + \beta_{21}(LNNI_{t-1}) + \beta_{31}(LNMS_{t-1}) + \beta_{41}(LNINTR_{t-1}) + \beta_{51}(LNINFR_{t-1}) + \beta_{61}(LNER_{t-1}) + \sum_{i=1}^{P} \alpha_{1i}\,\Delta(LNRGDP_{t-1}) + \sum_{i=1}^{q} \alpha_{2i}\,\Delta(LNNI_{t-1}) + \sum_{i=1}^{q} \alpha_{3i}\,\Delta(LNMS_{t-1}) + \sum_{i=1}^{q} \alpha_{4i}\,\Delta(LNINTR_{t-1}) + \sum_{i=1}^{q} \alpha_{5i}\,\Delta(LNINFR_{t-1}) + \sum_{i=1}^{q} \alpha_{6i}\,\Delta(LNER_{t-1}) + e_{2t} \dots (10)$$

$$\Delta(LNINTR_t) = \beta_{01} + \beta_{11}(LNINTR_{t-1}) + \beta_{21}(LNNI_{t-1}) + \beta_{31}(LNRGDP_{t-1}) + \beta_{41}(LNMS_{t-1}) + \beta_{51}(LNINFR_{t-1}) + \beta_{61}(LNER_{t-1}) + \sum_{i=1}^{P} \alpha_{1i}\,\Delta(LNINTR_{t-1}) + \sum_{i=1}^{q} \alpha_{2i}\,\Delta(LNNI_{t-1}) + \sum_{i=1}^{q} \alpha_{3i}\,\Delta(LNRGDP_{t-1}) + \sum_{i=1}^{q} \alpha_{4i}\,\Delta(LNMS_{t-1}) + \sum_{i=1}^{q} \alpha_{5i}\,\Delta(LNINFR_{t-1}) + \sum_{i=1}^{q} \alpha_{6i}\,\Delta(LNER_{t-1}) + e_{4t} \dots (11)$$

$$\Delta(LNINFR_t) = \beta_{01} + \beta_{11}(LNINFR_{t-1}) + \beta_{21}(LNNI_{t-1}) + \beta_{31}(LNRGDP_{t-1}) + \beta_{41}(LNMS_{t-1}) + \beta_{51}(LNINTR_{t-1}) + \beta_{61}(LNER_{t-1}) + + \sum_{i=1}^{P} \alpha_{1i}\,\Delta(LNINFR_{t-1}) + \sum_{i=1}^{q} \alpha_{2i}\,\Delta(LNNI_{t-1}) + \sum_{i=1}^{q} \alpha_{3i}\,\Delta(LNRGDP_{t-1}) + \sum_{i=1}^{q} \alpha_{4i}\,\Delta(LNMS_{t-1}) + \sum_{i=1}^{q} \alpha_{5i}\,\Delta(LNINTR_{t-1}) + \sum_{i=1}^{q} \alpha_{6i}\,\Delta(LNER_{t-1}) + e_{5t} \dots (12)$$

3.9.1 Testing for long and short-run coefficients

Casual relations among variable can be explained within the framework of ECM, with co-integrated variables. While the short run dynamics are captured by the individual coefficients of the lagged terms, the error correction term (ECT) contains the information of long run causality. Significance of lagged explanatory variable depicts short run causality while a negative and statistical significant ECT is assumed to signify long run causality. The short run causality is determined from the following ARDL model.

$$\Delta(LNMS_t) = \beta_{01} + \beta_{11}(LNMS_{t-1}) + \beta_{21}(LNNI_{t-1}) + \beta_{31}(LNRGDP_{t-1}) + \beta_{41}(LNINTR_{t-1}) + \beta_{51}(LNINFR_{t-1}) + \beta_{61}(LNER_{t-1}) + \sum_{i=1}^{P} \alpha_{1i}\,\Delta(LNMS_{t-1}) + \sum_{i=1}^{q} \alpha_{2i}\,\Delta(LNNI_{t-1}) + \sum_{i=1}^{q} \alpha_{3i}\,\Delta(LNRGDP_{t-1}) + \sum_{i=1}^{q} \alpha_{4i}\,\Delta(LNINTR_{t-1}) + \sum_{i=1}^{q} \alpha_{5i}\,\Delta(LNINFR_{t-1}) + \sum_{i=1}^{q} \alpha_{6i}\,\Delta(LNER_{t-1}) + \lambda EC_{t-1} + e_{3t} \dots (13)$$

$$\Delta(LNER_t) = \beta_{01} + \beta_{11}(LNER_{t-1}) + \beta_{21}(LNNI_{t-1}) + \beta_{31}(LNRGDP_{t-1}) + \beta_{41}(LNMS_{t-1}) + \beta_{51}(LNINTR_{t-1}) + \beta_{61}(LNINFR_{t-1}) + + \sum_{i=1}^{P} \alpha_{1i}\,\Delta(LNER_{t-1}) + \sum_{i=1}^{q} \alpha_{2i}\,\Delta(LNNI_{t-1}) + \sum_{i=1}^{q} \alpha_{3i}\,\Delta(LNRGDP_{t-1}) +$$

$\sum_{i=1}^{q} \alpha_{4i}\, \Delta(LNMS_{t-1}) + \sum_{i=1}^{q} \alpha_{5i}\, \Delta(LNINTR_{t-1}) + \sum_{i=1}^{q} \alpha_{6i}\, \Delta(LNINFR_{t-1}) + \lambda EC_{t-1} + e_{6t} \ldots$ (14)

Where Δ is the difference operator, ECM representing the error-correction term derived from the long run co-integration relation from the above specified ARDL model (13, 14) in each equation should exhibit a negative and significant sign for causality to exist in the long run. The model that was used for testing the long run relationship and coefficient is further tested with the diagnostic tests of Serial Autocorrelation, Hetroscedasticity, Multicolliniarity and any model misspecifications. Once error correction models were estimated, its task to applying the cumulative sum of residuals (CUSUM) and the CUSUM of square (CUSUMSQ) tests to assess the parametric consistency. The graphical representation of the recursive coefficients is used to judge the stability of the coefficients.

CHAPTER-IV

RESULTS

This chapter discusses the data analysis and interpretation of the study. The data were collected from the various quarterly bulletins published by Nepal Rastra Bank (NRB), in various issue. The data were fed in E-views for analysis and interpretation. The data used in this study consist of annual time series of stock market index, Real GDP, money supply; inflation rate, interest rate, and exchange rate are taken from the period of 1994 to 2018. The stock market index, real gross domestic product, money supply, inflation rate, interest rate, exchange rate data were obtained from the quarterly bulletin of Nepal Rastra Bank (NRB).

4.1 Trend analysis

In trend analysis researcher observed the trend of stock market index and other variables: real gross domestic product, money supply, inflation rate, interest rate and exchange rate under study.

Figure 4.1

Trend of Stock Market Index (NI)

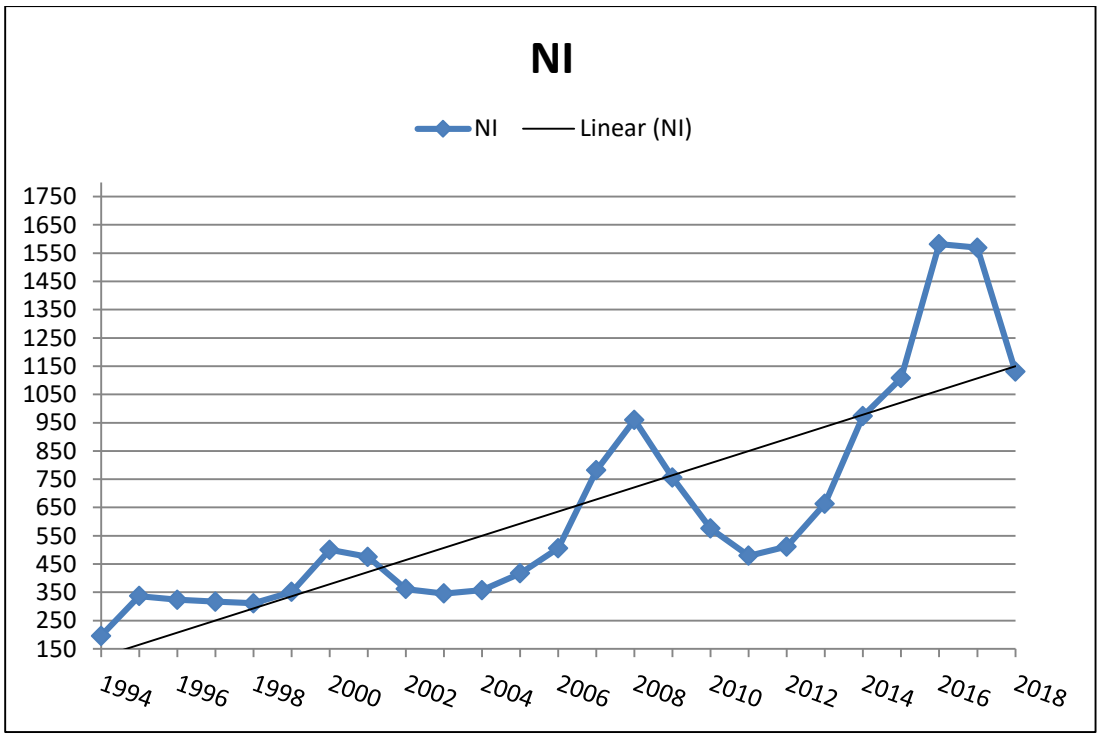


Figure 4.1 shows that trend line of the stock market index. Stock market index is the market worth of all the listed companies which informs to the investors about the trend of stock market. Starting from the 1994 to 2018, stock market index is continuously fluctuating and rising with span of time horizon. Stock market index become reach 2001, 2008, 2016 and 2017 and started to decline afterwards.1998, 2003, 2004 and 2010 were the years where stock market index were in down position. Higher the stock market index indicates higher returns from stock market and lower the stock market index indicate lower the return from the investment in the stock market.

Figure 4.2

Trend of real gross domestic product (RGDP)

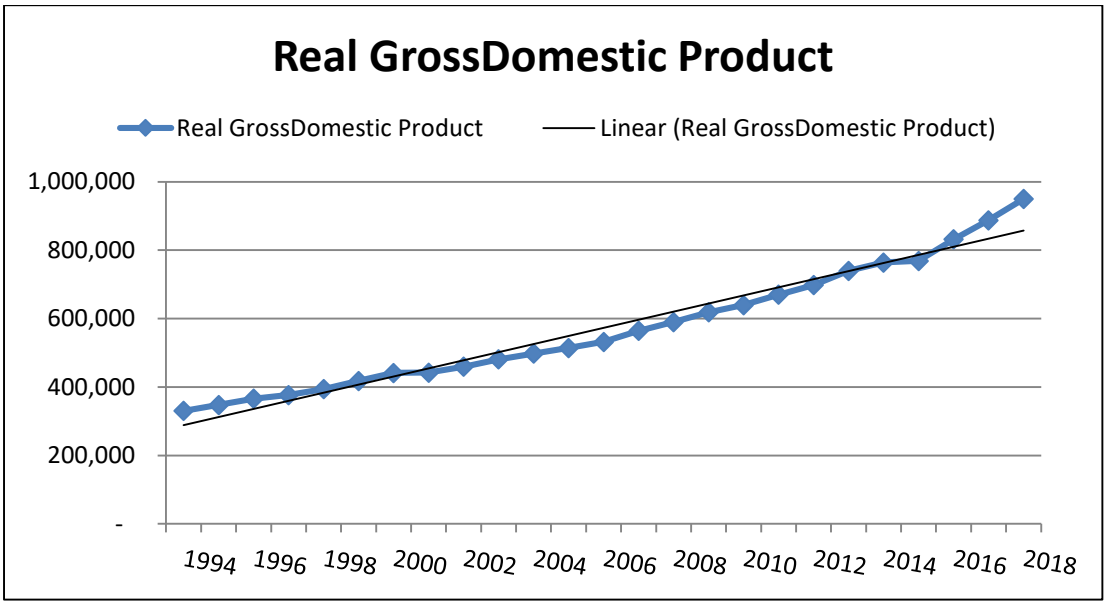


Figure 4.2 shows that trend line of real gross domestic product. The real gross domestic product continuously started to increase from the study period 1998 to 2018. However the speed of increasing real gross domestic product started from 2014 onwards. It is because of the nature of investment in an economy.

Figure 4.3

Trend of money supply (MS)

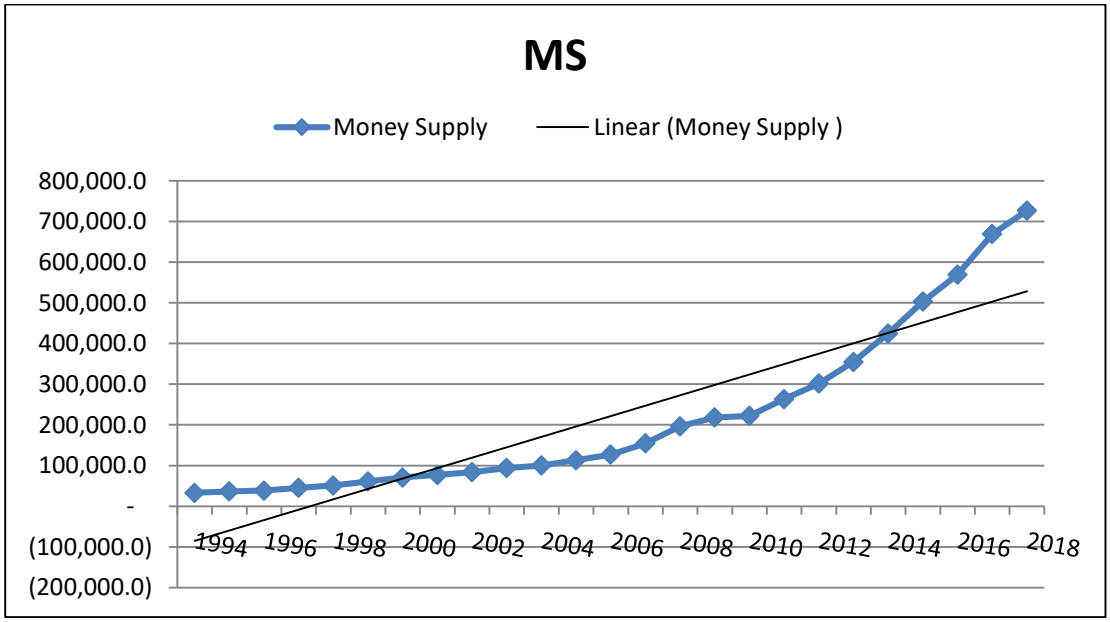


Figure 4.1 shows that money supply in an economy. As the real gross domestic product continuously increasing, money supply also continuously increases from the date of study period. However the speed of increasing money supply is continuous from 2010 onwards. Expansionary monetary policy is the reason why money supply is increasing every succeeding year.

Figure 4.4

Trend of inflation (INFR)

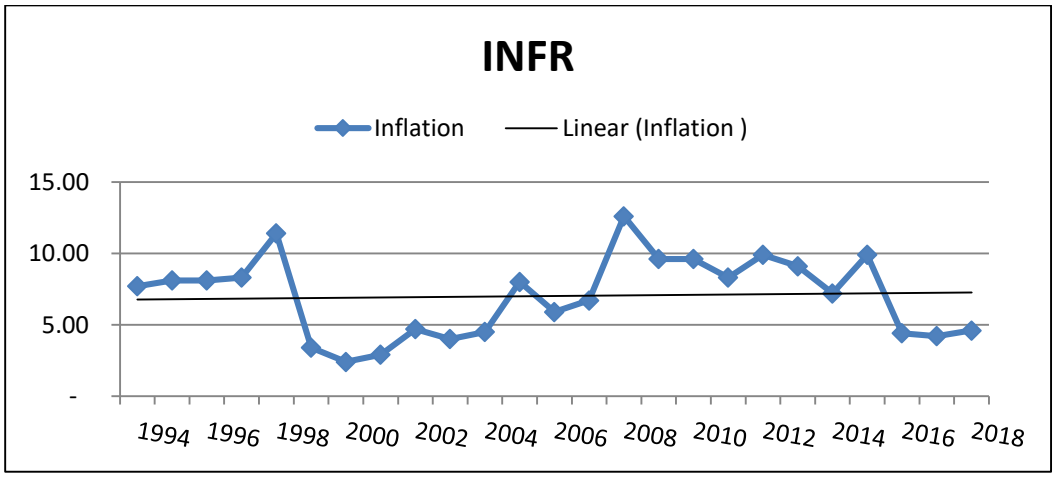


Figure 4.4 shows that inflation rate in an economy. The rate of inflations is fluctuated a lot. It was the 1999 and 2008 where inflation is in very peak. The inflation is fluctuated because of increasing money supply in an economy. In other words the central bank of Nepal is not able to control the price level in an economy.

Figure 4.5

Trend of interest rate (INTR)

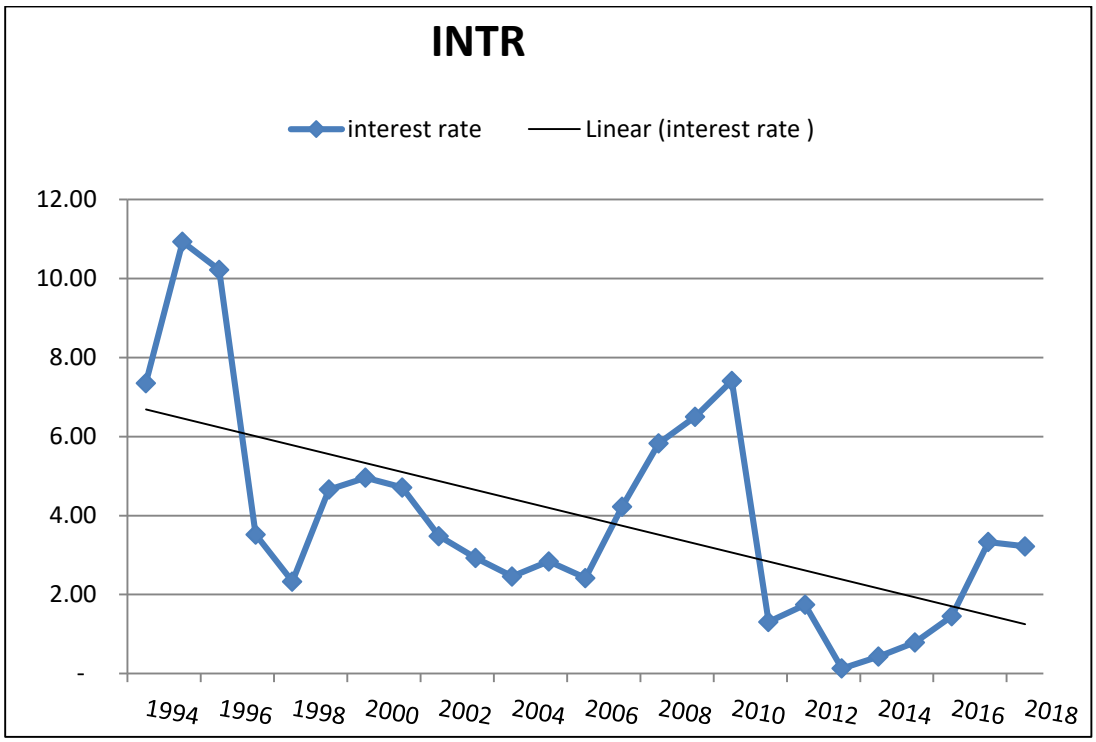


Figure 4.5 shows that interest rate. The interest rate is fluctuated in the study period. In1995 and 2009 interest rate is high comparing to other study period. However in the study period 2012, inflation rate is almost negative.

Figure 4.6

Trend of exchange rate (ER)

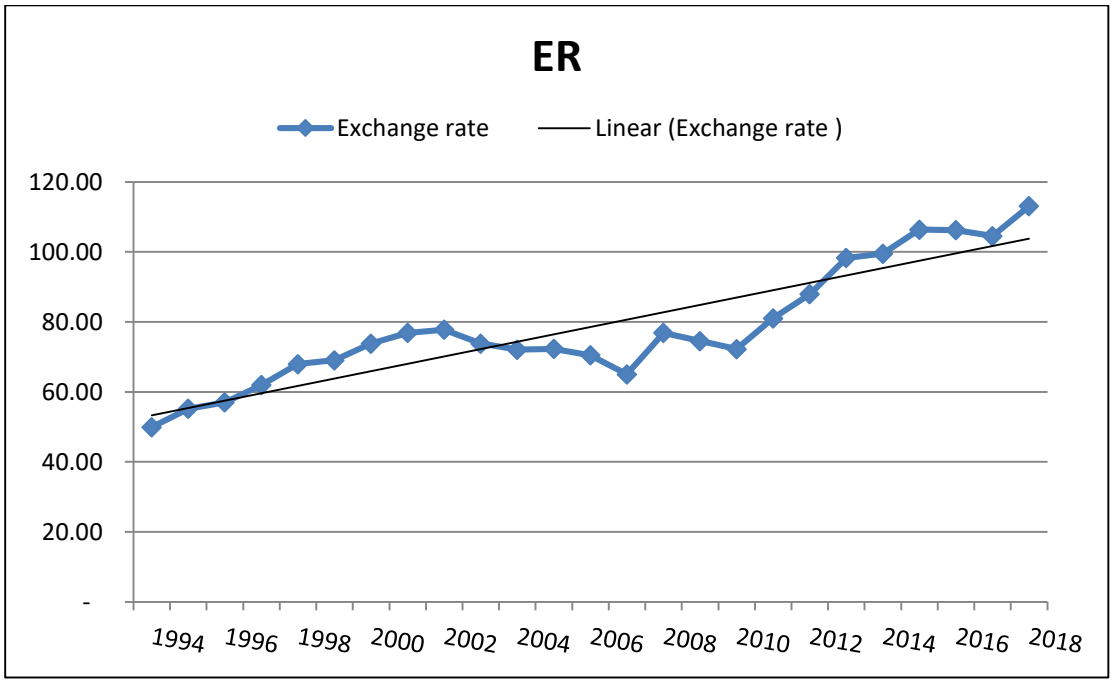


Figure 4.6 shows that trend of exchange rate in the study period. The Exange rate is continuously increasing in the study period. It is due to the heavy trade deficit that exchange rate is increasing.

4.2 Descriptive statistics

The descriptive statistics for the dependent and independent variables are presented hereunder. The dependent variable is Stock market Index (NI) where as independent variables are Real Gross Domestic Production (RGDP), Money Supply (MS), Inflation rate (INFR), Interest Rate (INTR) and Exchange Rate (ER).

Table No 4.1

The descriptive statistics of selected macroeconomic variables and stock market index

Descriptive Statistics					
	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Stock market Index	25	195.4000	1581.530	635.4398	384.5529
Rear Gross Domestic Production (NRS in Millions)	25	330291.0	950033.0	573008.3	177514.3
Money Supply (NRS in Millions)	25	32985.40	726642.8	221426.9	207374.4
Interest Rate (%)	25	0.130000	10.93000	3.966800	2.810861
Inflation Rate (%)	25	2.400000	12.60000	7.020000	2.783283
Exchange Rate(NPR/USD)	25	49.94000	113.1100	78.55840	17.16372

Source: Researcher's Own Calculation

Table 4.1 shows that descriptive statistics of selected macroeconomic variables and stock market index. It shows the minimum, maximum, mean and standard deviation of independent and dependent variables. The mean value of stock market index over the last twenty five years' period is 635.4398. Stock market index reached maximum of 1581.530 and minimum of 195.4000 during the study period. During that, stock market index's standard deviation was 384.5529 which signify that stock market index movement is highly volatile. The selected macroeconomic variables were

factors that could have impact in the stochasticity of the stock market index. The mean of stock market index is 635.4398. The mean of real gross domestic production is 573008.3 million, mean of money supply is NRs 221426.9 million, and interest rate mean during the study period is 3.966800.

The mean inflation rate is 7.020000 and exchange rate mean during the study period is 78.55840.The standard deviation of stock market index during the study period is 384.5529 and standard deviation of real gross domestic production is 177514.3, standard deviation of money supply is 207374.4, standard deviation of interest rate is 2.810861 standard deviation of inflation rate is 2.783283 and exchange rate standard deviation during the study period is 17.16372.

The maximum and minimum of stock market index during the study period is 1581.530 and 195.4000 respectively. In the same way the maximum and minimum of real gross domestic production is 950033.0 and 330291.0 respectively. The maximum and minimum of money supply is 726642.8 and 32985.40 respectively. In the similar manner, the maximum and minimum of interest rate is 10.93000 and 0.130000 respectively. Moreover, the maximum and minimum of inflation Rate is 12.60000 and 2.400000 respectively. Furthermore, the maximum and minimum of exchange rate during the study period is 113.1100 and 49.94000 respectively.

4.3 Correlation analysis

The correlation is the relationship between two or more variables. The highest range of correlation is +1 and lowest range of the correlation is -1. Thus if the correlation result lies +1 then it is positive relationship between the variables and if the correlation result is close to -1, then there is strong negative correlation between the variables. Similarly, if the correlation is zero then there is no relation at all between the variables, which is also known as neutral correlation. In the correlation analysis the two variables shows the positive and negative correlation.

Table 4.2
The results of correlation analysis

Correlation						
Variables	**NI**	**RGDP**	**MS**	**INTR**	**INFR**	**ER**
NI	1.000	0.584	0.892	-0.335	-0.070	0.811
RGDP	0.854	1.000	0.962	-0.543	0.006	0.929
MS	0.892	0.962	1.000	-0.461	-0.052	0.925
INTR	-0.335	-0.543	-0.461	1.000	0.083	-0.658
INFR	-0.070	0.006	-0.052	0.083	1.000	-0.124
ER	0.811	0.929	0.925	-0.658	-0.124	1.000

Source: Researcher's Own Calculation

Table 4.2 shows that results of correlation analysis. There is the positive correlation between the NI and RGDP. The correlation coefficient is 0.854, which is close to +1, which means NI and RDGP strong positive correlation. In other words when NI increases RGDP also increases and when NI decreases RGDP also decreases. There is the strongly positive correlation between the NI and MS, & NI and ER. The correlation coefficient of NI and MS, & NI and ER are 0.892, and 0.811 respectively. However, there is the negative correlation between the NI and INTR, NI and INFR.

There is the positive correlation between the RGDP and NI. The correlation coefficient is 0.584, which is close to +1, which means RGDP and NI strong positive correlation. In other words when RGDP increases and when NI also increases and vice versa. Similarly there is the strongly positive correlation between the RGDP and MS, RGP and ER & RGDP and INFR. The correlation coefficient of RGDP and MS, & RGP and ER, RGDP and INFR are 0.962, 0.929 and 0.006 respectively. However, the coefficient -0.543 there is the negative correlation between RGDP and INTR.

Moreover, the correlation coefficient 0.892, 0.962 and 0.929 shows that there is the positive correlation between the MS and NI, MS and RGDP and MS and ER. However, the coefficient -0.461 and -0.052 shoes that there is the negative correlation between the MS and INTR, MS and INFR respectively. The coefficient 0.811, 0.929 and 0.925, shows the positive correlation between the ER and NI, ER and RGDP, ER and MS respectively. However, there is the negative correlation coefficient -0.658 and -0.124 shows negative correlation between the ER and INTR & ER and INFR respectively.

In the same way the coefficient -0.335, -0.543, and -0.461 shows the negative correlation between the INTR and NI, INTR and RGDP, INTR and MS, & INTR and ER & respectively. However, the positive correlation coefficient 0.083 shows positive correlation between the INTR & INFR. Similarly On the one hand, correlation coefficient -0.070, -0.052, and -0.124 shows the negative correlation between the INFR and NI, INFR and MS, and INFR and ER respectively. On the other hand, the positive coefficient 0.006 shows positive correlation between the INFR and RGDP.

4.4 Unit root results

Individual time series data must be stationary before running regression analysis. Otherwise the regression results will be spurious. Therefore, it is better to determine the order of integration of the variables under the study. The unit root test is used for this purpose at level and first difference. The unit root results showed that all variables are suffered unit root at level. The test statistics clearly indicates that level form series are spurious from unit root. Thus, first difference data are employed to unit root testing. The results show that the level forms of data at first difference are completely unit root free and all series are integrated of orders one. Thus, level forms of data at first difference are employed to empirical analysis, particularly empirical models. The unit root results are reported below table no.4.3.

Table 4.3

ADF unit root method

Variables	**Level**		**Variables**	**First difference**	
	Intercept	**Intercept & Trend**		**Intercept**	**Intercept & Trend**
LOGNI	(1.4001) (0.5643)	(4.2473) (0.0172)	D(NI)	(4.8375) (0.0014)	(5.0345) (0.0042)
LOGRGDP	(0.7269) (0.8213)	(4.5836) (0.0066)	D(RGD)	(6.4021) (0.0000)	(2.9873) (0.1584)
LOGMS	(0.8582) (0.9930)	(2.5067) (0.3220)	D(MS)	(3.9537) (0.0064)	(3.9264) (0.0275)
LOGER	(1.0399) (0.7218)	(1.8687) (0.6391)	D(ER)	(4.8168) (0.0009)	(4.6587) (0.0060)
LOGINTR	(2.2546) (0.1937)	(3.7670) (0.0387)	D(INTR)	(4.7560) (0.0010)	(4.8621) (0.0039)
INFR	(2.6588) (0.958)	(2.5874) (0.2883)	D(INFR)	(6.3678) (0.0000)	(6.2295) (0.0002)

Source: Researcher's Own Calculation

Table 4.3 shows that ADF unit root method. In statistics and econometrics, an augmented Dickey–Fuller test (ADF) tests the null hypothesis that a unit root is present in a time series sample. The more negative it is, the stronger the rejection of the hypothesis that there is a unit roots at some level of confidence.

4.5 ARDL bound test for co-integration

The unit root results representing all the series variables are stationary at first difference. Thus researcher applies bounds testing approach to co-integration to test long run relationship between the variables. The appropriate lag order of variables should be determined before proceeding to the ARDL bounds to Cointegration.

Table 4.4

Statistics for selecting log order

Variables	Lag	Lag L	LR	FPE	AIC	SC	HQ
Endogenous variables: LOGNI	0	27.88658	NA	0.008838	-1.903181	-1.606965	-1.828683
	1	28.64598	1.056553	0.009093	-1.882259	-1.536674	-1.795345
	2	35.26999	8.640010*	0.005634*	-2.371303*	-1.976349*	-2.271973*
Endogenous variables: LOGRGDP	0	86.13249*	NA*	5.58e-05*	-6.968043*	-6.671827*	6.893545*
	1	86.92437	1.101740	5.73e-05	-6.9499 45	-6.604360	-6.863031
	2	87.57806	0.852645	5.96e-05	-6.919832	-6.524877	-6.820502
Endogenous variables: LOGMS	0	62.62533	NA	0.000431	-4.923941	-4.627725	-4.849444
	1	70.85378	11.44829 *	0.000232 *	-5.552503 *	-5.206918 *	-5.465589*
	2	71.03992	0.242790	0.000251	-5.481732	-5.086778	-5.382402
Endogenous variables: LOGINTR	0	42.94680	NA	4.181667	4.256244	4.552460	4.330741
	1	-39.10011	5.351921*	3.289518*	4.008705*	4.354290*	4.095619*
	2	-38.52180	0.754322	3.447955	4.045374	4.440328	-4.144703
Endogenous variables: LOGINFR	0	-50.48199	NA *	8.052186 *	4.911477 *	5.207693*	4.985975*
	1	-49.55329	1.292108	8.163827	4.917677	5.263262	5.004591
	2	-49.46036	0.121214	8.925930	4.996553	5.391507	-5.095883
Endogenous variables: LOGEXR	0	51.28218	NA	0.001156	-3.937581	-3.641365	-3.863083
	1	55.15921	5.394129*	0.000907 *	-4.817757 *	-3.842172*	-4.100844 *
	2	55.20252	0.056490	0.0009996	-4.104567	- 3.709612	-4.005237

Source: Researcher's Own Calculation

Table 4.4 shows that the statistics for selecting log order**.** On the basis of the lag values results reported in the table implies that NI has two lag and RGDP and INFR

has zero lag. Similarly, MS, INTR and EX has one lag. The appropriateness of lag order avoids the spuriousness of ARDL bounds testing approach to co integration results.

Table 4.5

ARDL result for bound test of co-integration

Model Number	**Dependent Variable**	**F-statistics**	**I(0)**	**I(1)**	**Co-integration**	**What Next?**
2	LOGNI	7.033231	2.62	3.79	Yes co-integration	ECM
3	LOGRGDP	5.267556	2.62	3.79	Yes co-integration	ECM
4	LOGMS	1.900905	2.62	3.79	No, co-integration	ARDL
5	LOGINTR	4.629900	2.62	3.79	Yes co-integration	ECM
6	LOGINF	5.153718	2.62	3.79	Yes co-integration	ECM
7	LOGEXR	0.648768	2.62	3.79	No, co- integration	ARDL

Source: Researcher's Own Calculation

Table 4.5 shows that ARDL result for bound test of co-integration. If the computed F-statistic exceeds the upper critical bounds value, then the H0 is rejected. If the F-statistic falls into the bounds, then the test becomes inconclusive. Lastly, if the F-statistic is below the lower critical bounds value; it implies no co- integration. The above table 4.5 is the result of the Bound test of co-integration when the F-statistics is below the lower bound value there is no co-integration among the variables. Similarly, when the F-statistics is greater than the upper bound value there is co-integration among the variables. In the analysis researcher found LOGMS and LOGEXR in the model 4, and 7 have no co-integration. However, variables LOGNI, LOGRGDP, LOGINTR and LOGINF in the model 2, 3, 5 and 6 have long run relationship among the variables. It is because F-Statistics is lower than the upper bound value in LOGMS and LOGEXR which helps to accept the null hypothesis of no long run relationship. Moreover, in the LOGNI, LOGRGDP, LOGINTR and LOGINF, the computed value of F-Statistics is greater than the upper bound value of F-Static which helps us to reject the null hypothesis of no long run relationship. Therefore, researcher concludes that there is long run relationship among LOGNI, LOGRGDP, LOGINTR and LOGINF variables.

4.6 Long –run co-efficient estimation of ARDL model

Due to the existence of co-integration relationship of the models 2, 3, 5 and 6 researcher estimate long- run relationship. In order to apply the co-integration, the first step is to determine the order of integration of each variable under study. This is because of the fact that ARDL techniques cannot be used if the order of integration of the variables is two or more. The unit root test has been employed for this purpose both at the level and difference of the variables. The lag length used for the test is determined using a model selection procedures based on the Schwarz Information Criterion.

Table 4.6

Error correction representation of ARDL model dependent variable: LOGNI

Regressor	**Coefficient**	**t-statistics**	**P-value**
C	-0.009954	-0.146495	0.8858
DLOG_NI(-1)	1.315446	3.051182	0.0093
DLOG_NI(-2)	-0.634246	-2.327677	0.0367
DLOG_MS(-1)	0.411302	0.314049	0.7585
DLOG_IR(-1)	-0.019410	-1.524467	0.1513
DLOG_INFR	-0.016521	-1.969155	0.0706
DLOG_ER(-1)	-1.389885	-1.231891	0.2398
ECM1(-1)	-0.676387	-1.516010	0.1535

Source: Researcher's Own Calculation

Table 4.6 shows that Error Correction Representation of ARDL Model Dependent variable LOGNI. Where DLOG_NI (-1), DLOG_NI (-2), DLOG_MS (-1), DLOG_IR (-1), DLOG_INFR, DLOG_ER (-1) are the short run coefficient. The result of ARDL bound test of co-integration showed that there is evidence of co-integrating relationship of stock market index and the selected other variables like stock market index, real gross domestic product, money supply, interest rate, inflation rate, exchange rate . The lagged ECM term included in the Stock market Index is negative but not statistically significant. ECM (-1) is the speed of adjustment. It is 67.63%. In other word the speed of adjustment toward long-run equilibrium is 67.63percentages. Breusch-Godfrey Serial Correlation signifies these is no serial correlation between the LOGNI and regresses.

Table 4.7

Error correction representation of ARDL model dependent variable: RGDP

Regressor	**Coefficient**	**t-statistics**	**P-value**
C	-3.03E-18	-1.001168	0.3365
DLOG_RGDP	1.000000	1.01E+16	0.0000
DLOG_NI(-1)	-6.57E-18	-0.583464	0.5704
DLOG_NI(-2)	2.61E-18	0.258501	0.8004
DLOG_MS(-1)	7.20E-17	1.413724	0.1829
DLOG_IR(-1)	-4.55E-19	-1.089795	0.2972
DLOG_INFR(-1)	1.48E-19	0.517206	0.6144
DLOG_ER(-1)	-1.06E-16	-2.971497	0.0117
ECM2(-1)	1.053264	1.117697	0.2856

Source: Researcher's Own Calculation

Table 4.7 shows that error correction representation of ARDL model dependent variable: RGDP. The DLOG_RGDP, DLOG_NI (-1), DLOG_NI (-2), DLOG_MS (-1), DLOG_IR (-1), DLOG_INFR (-1), DLOG_ER (-1), ECM2 (1) are the short run co-efficient. The result of ARDL bound test of co-integration showed that there is evidence of co-integrating relationship of exchange rate and the selected other variables like stock market index, Real gross domestic Production, Money supply, Interest rate, Inflation rate. The lagged ECM2 (-1) term included in the real gross domestic Production is positive and also not statistically significant. This conform lack of evidence of long run causality between real gross domestic Production and stock market index Money supply, Interest rate, Inflation rate and Exange rate. Breusch-Godfrey Serial Correlation signifies these is no serial correlation between the ER and regresses.

Table 4.8

Error correction representation of ARDL model dependent variable: LOGINTR

Regressor	**Coefficient**	**t-statistics**	**P-value**
C	-1.957143	-1.521541	0.1540
DLOG_IR(-1)	0.004923	0.017701	0.9862
DLOG_NI(-1)	2.595457	0.518495	0.6135
DLOG_NI(-2)	2.521440	0.573624	0.5768
DLOG_RGDP	-13.18270	-0.288192	0.7781
DLOG_MS(-1)	44.97828	1.979867	0.0711
DLOG_INFR	-0.295695	-1.890357	0.0831
DLOG_ER(-1)	-52.66333	-2.527945	0.0265
ECM3(-1)	-0.787604	-2.195348	0.0485

Source: Researcher's Own Calculation

Table 4.8 shows that error correction representation of ARDL model dependent variable: LOGINTR. DLOG_IR (-1), DLOG_NI (-1), DLOG_NI (-2), DLOG_RGDP, DLOG_MS (-1), DLOG_INFR, DLOG_ER (-1) are the short run co-efficient. The result of ARDL bound test of co-integration showed that there is evidence of co-integrating relationship of interest rate and the selected other variables like stock market index, Real gross domestic Production, Money supply, Inflation rate, Exange Rate. The lagged ECM3 (-1) term included that the interest rate is positive and also significant. This conform evidence of long run causality between interest rate and Stock market Index gross domestic product, money supply, inflation rate, exchange rate. Breusch-Godfrey Serial Correlation signifies these is no serial correlation between the Interest Rate and regresses.

Table 4.9

Error correction representation of ARDL model dependent variable: LOGINF

Regressor	Coefficient	t-statistics	P-value
C	-2.25E-15	-2.569370	0.0246
DLOG_INFR	1.000000	9.22E+15	0.0000
DLOG_NI(-1)	-1.21E-15	-0.391034	0.7026
DLOG_NI(-2)	-2.15E-15	-0.767876	0.4574
DLOG_RGDP	7.92E-14	2.486275	0.0286
DLOG_MS(-1)	1.72E-14	1.147088	0.2737
DLOG_IR(-1)	2.08E-16	1.468928	0.1676
DLOG_ER(-1)	-5.22E-16	-0.039877	0.9688
ECM4(-1)	-1.479981	-2.690445	0.0197

Source: Researcher's Own Calculation

Table 4.9 shows that error correction representation of ARDL model dependent variable: LOGINF. The DLOG_INFR, DLOG_NI (-1), DLOG_NI (-2), DLOG_RGDP, DLOG_MS (-1), DLOG_IR(-1), DLOG_ER(-1) are the short run co-efficient. The result of ARDL bound test of co-integration showed that there is evidence of co-integrating relationship of Inflation rate and the selected other variables like stock market index , Real gross domestic Production, Money supply, interest rate, Exange Rate. The lagged ECM4 (-1) term included that the Inflation rate is positive and also significant. This conform evidence of long run causality between inflation rate and stock market index gross domestic product, money supply, interest rate, exchange rate. Breusch-Godfrey Serial Correlation signifies these is no serial correlation between the Interest Rate and regresses.

4.7 Stability test for the selected variables in the long run

In the final stage of ARDL model the stability of the long-run coefficients is examined by plotting in graphical representation of CUSUM test shown in figure 4.7& 4.9, 4.11.4.13, for long run OLS model. Similarly, ARDL model the stability of the long-run coefficients is examined by plotting in graphical representation of CUSUM square are shown in figure 4.8.4.10, 4.12 & 4.14 for the long run OLS model. The graphical presentation of CUSUM and CUSUM of Squares test is presented below.

Figure 4.7

Plot of cumulative sum of recursive residual (LOGNI)

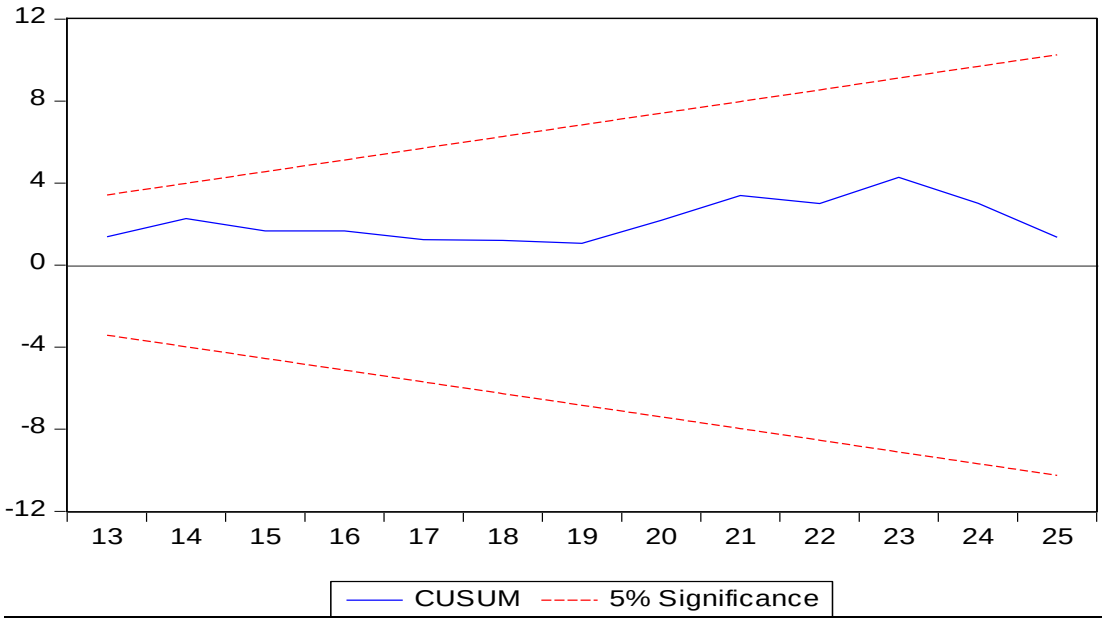


Figure 4.7 shows that plot of CUSUM statistics for LOGNI within the critical lines at the 5% significance level. The plot of CUSUM lies within the critical limit implying the stability of the model.

Figure 4.8

Plot of cumulative sum of squares recursive residual (LOGNI)

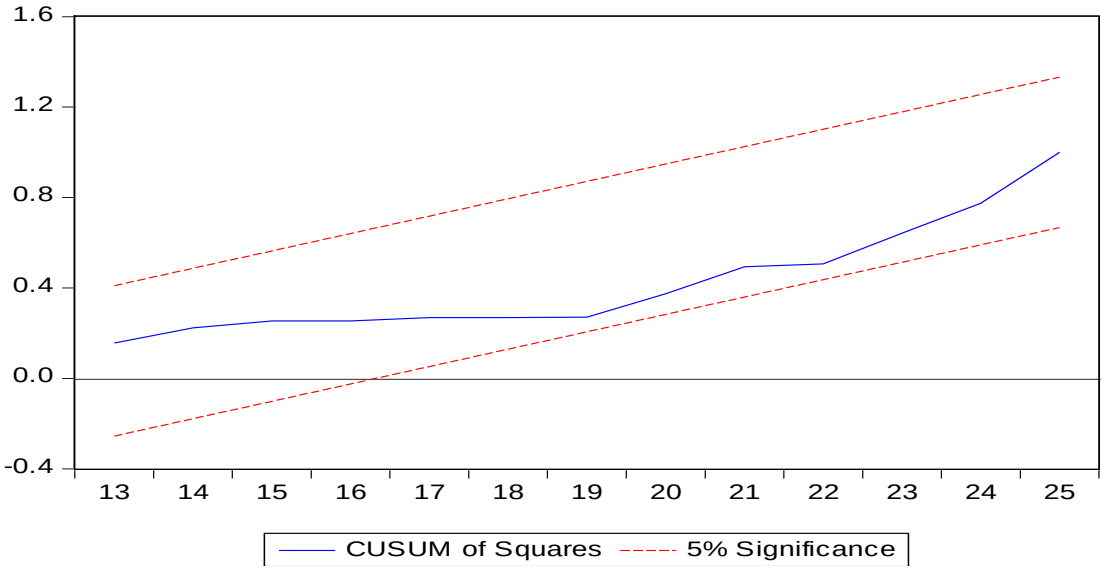


Figure 4.8 shows that plot of CUSUMSQ statistics for LOGNI within the critical lines at 5% significant level. The plot of CUSUMESQ lies within the critical limit implying the stability of the model.

Figure 4.9

Plot of cumulative sum of recursive residuals (LOGRGD)

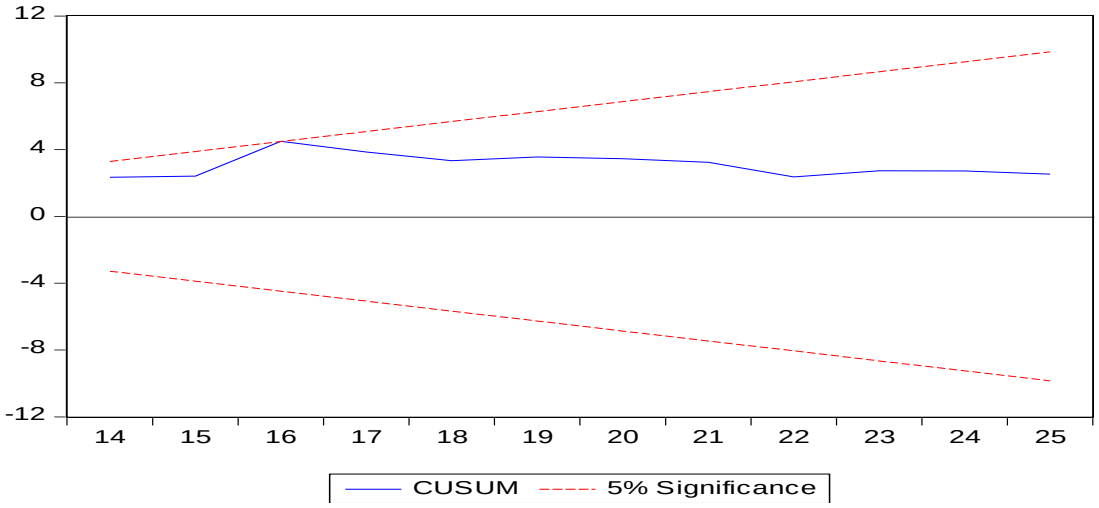


Figure 4.9 shows that plot of CUSUM statistics for LOGRGDP within the critical lines at the 5% significance level. The plot of CUSUM lies within the critical limit implying the stability of the model as well as stability of real gross domestic production on stock market index .Thus, real gross domestic product on the stock market index is stable.

Figure 4.10

Plot of cumulative sum of squares recursive residuals (LOGRGDP)

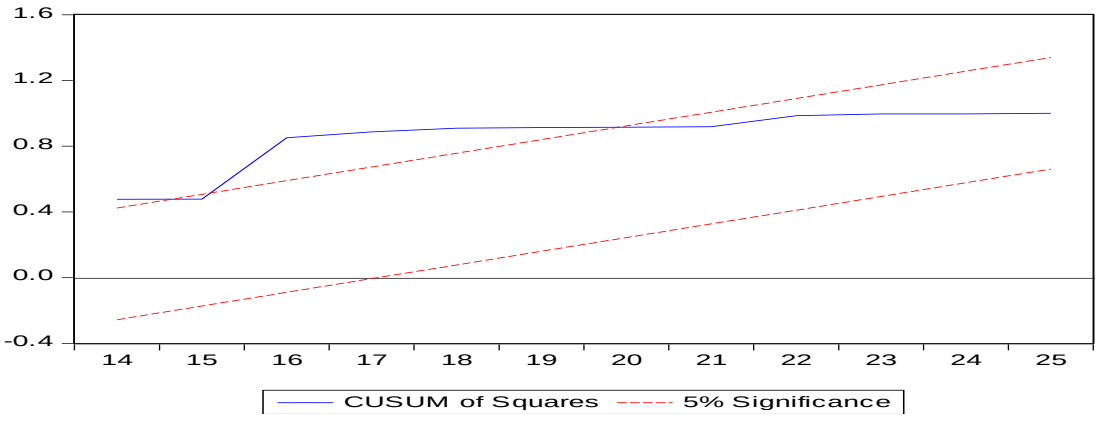


Figure 4.10 shows the plot of CUSUMSQ statistics for LOGRGDP within the critical lines at 5% significant level. The plot of CUSUMESQ does not lie within the critical limit implying the instability of the model. Thus, RGDP on the stock market index is not stable.

Figure 4.11

Plot of cumulative sum of recursive residuals (LOGINTR)

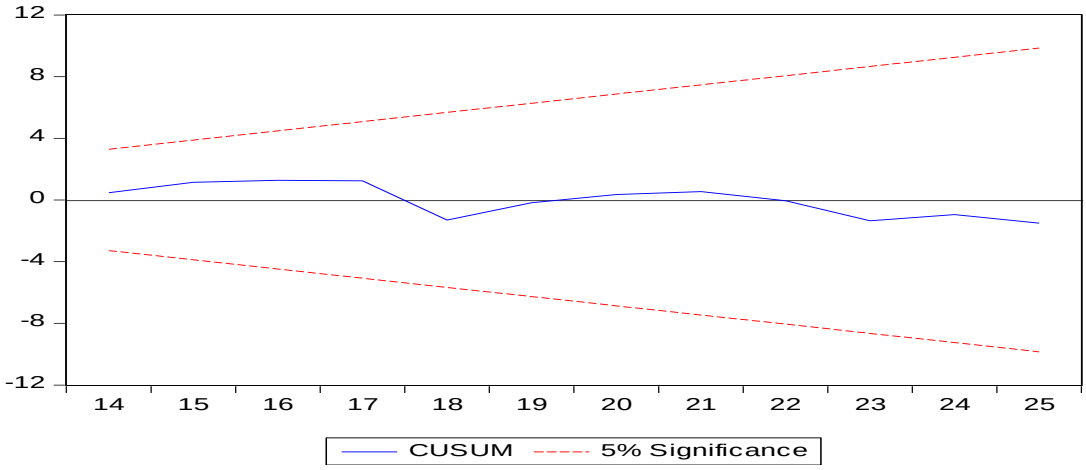


Figure 4.11 shows that plot of CUSUM statistics for LOGINTR within the critical lines at the 5% significance level. The plot of CUSUM lies within the critical limit implying the stability of the model as well as stability of LOGINTR on stock market index. Thus, LOGINTR on the stock market index is stable.

Figure 4.12

Plot of cumulative sum of square recursive residual (LOGINTR)

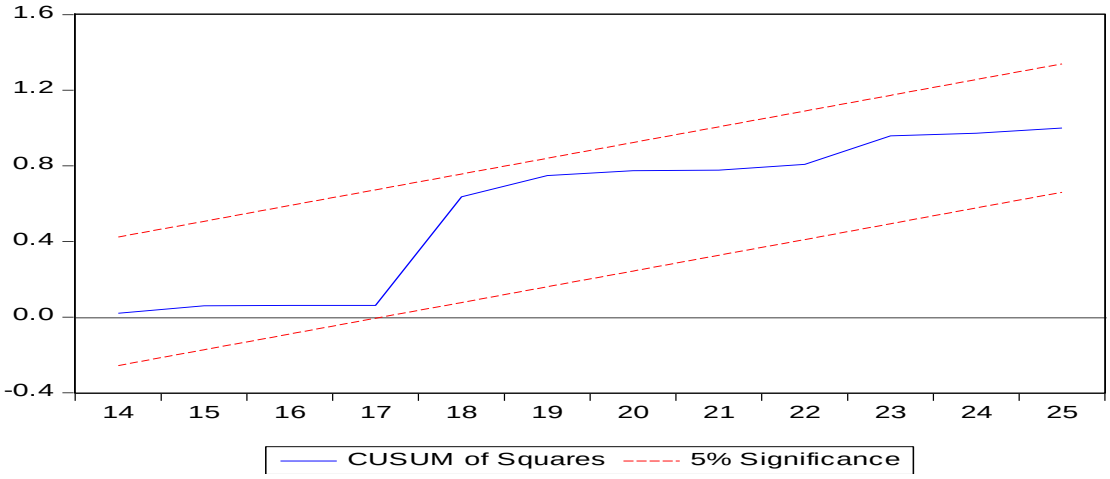


Figure 4.12 shows that plot of CUSUMSQ statistics for LOGINTR within the critical lines at 5% significant level. The plot of CUSUMESQ lies within the critical limit implying the stability of the model as well as stability of the LOGINTR on stock market index. Thus, LOGINTR on the stock market index is stable.

Figure 4.13

Plot of cumulative sum of recursive residual (LOGINF).

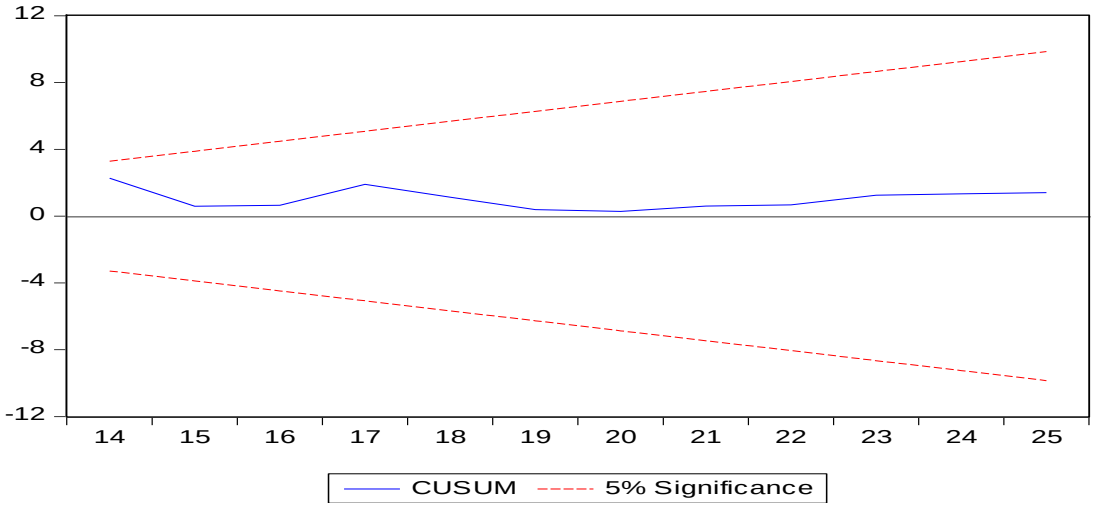


Figure 4.13 shows that plot of CUSUM statistics for LNINF within the critical lines at the 5% significance level. The plot of CUSUM lies within the critical limit implying the stability of the model as well as stability of LOGINF on stock market index .Thus LOGINF on the stock market index is stable.

Figure 4.14

Plot of cumulative sum of squares recursive residuals (LOGINF)

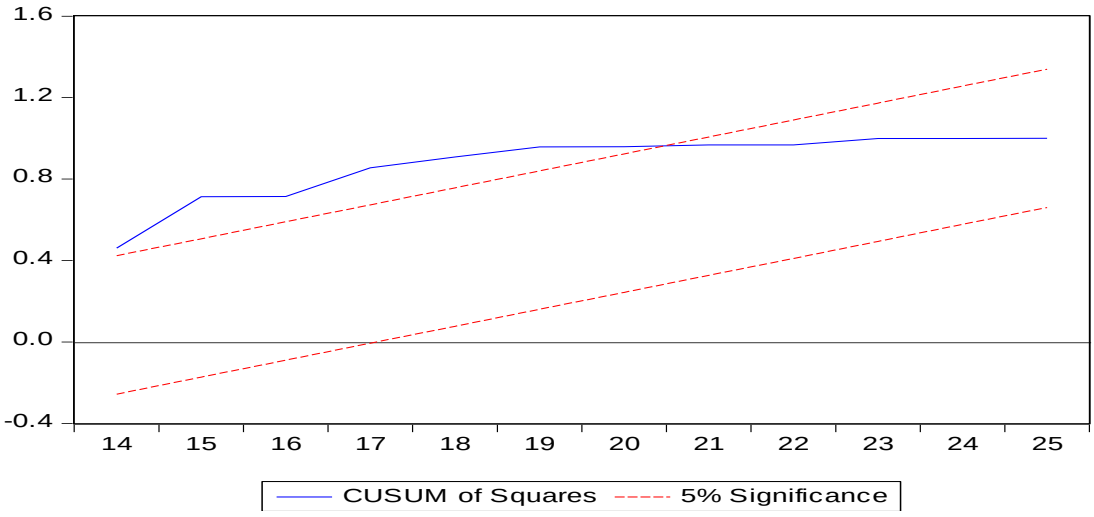


Figure 4.14 shows that plot of CUSUMSQ statistics for LNGINF within the critical lines at 5% significant level. The plot of CUSUMESQ does not lie within the critical limit implying the does not stability of the model. Thus, LOGINF does not have stable with stock market index.

4.8 Normality test

The normality tests are supplementary to the graphical assessment of normality. One of the tests for the assessment of normality is Jarque-Bera test.

Figure 4.15

Plot of LOGNI

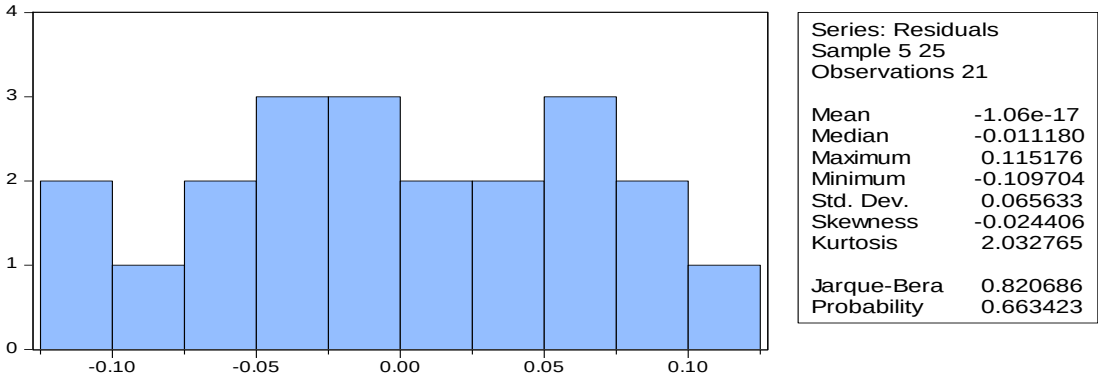


Figure 4.15 show that residual of the LOGNI is normally distribution. The null hypothesis of residuals are normally distributed where as alternative hypothesis of residuals are not normally distributed. The probability of Jarque-Bera test is greater than 5% that is 66%. That is why we accept the null hypothesis. Thus residual of the LOGNI is normally distributed.

Figure 4.16

Plot of LOGRGDP

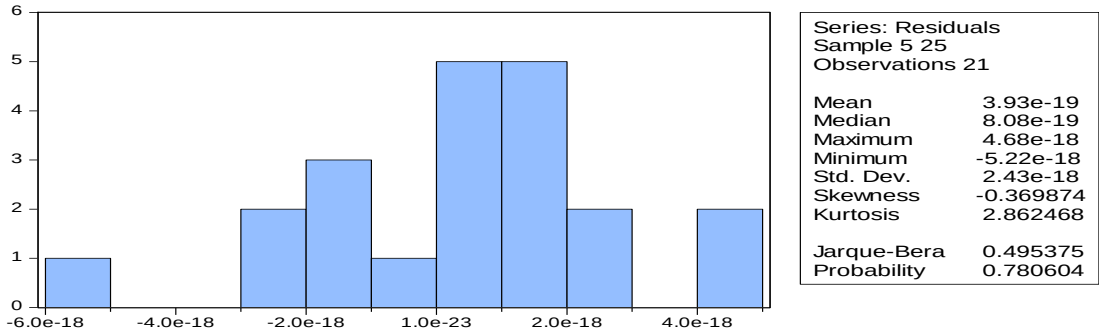


Figure 4.16 shows that residual of the LOGRGDP is normally distribution. In the above figure null hypothesis of residuals are normally distributed where as alternative hypothesis of residuals are not normally distributed. The probability of

Jarque-Bera test is greater than 5% that is 78%. That is why we accept the null hypothesis. Thus residual of the LOGRGDP is normally distributed.

Figure 4.17

Plot of LOGINTR

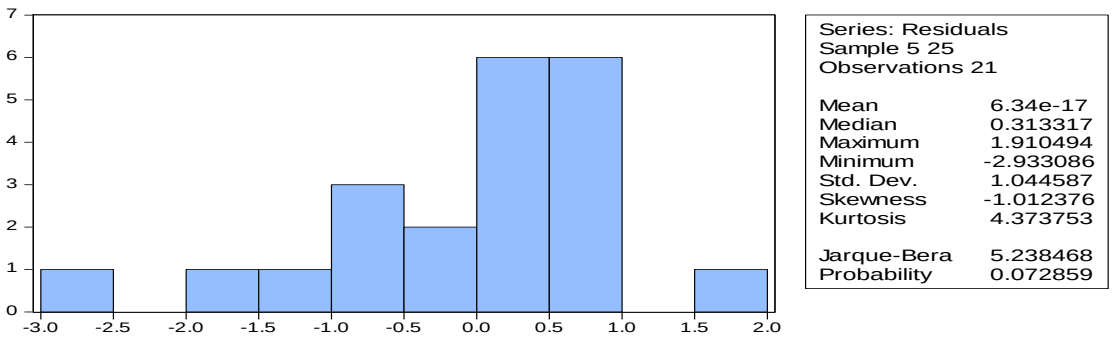


Figure 4.17 show that residual of the LOGINTR is normally distribution. Null hypothesis of residuals are normally distributed where as alternative hypothesis of residuals are not normally distributed. The probability of Jarque-Bera test is greater than 5% that is 7.2%. That is why we accept the null hypothesis. Thus residual of the LOGINTR is normally distributed.

Figure 4.18

Plot of LOGINFR

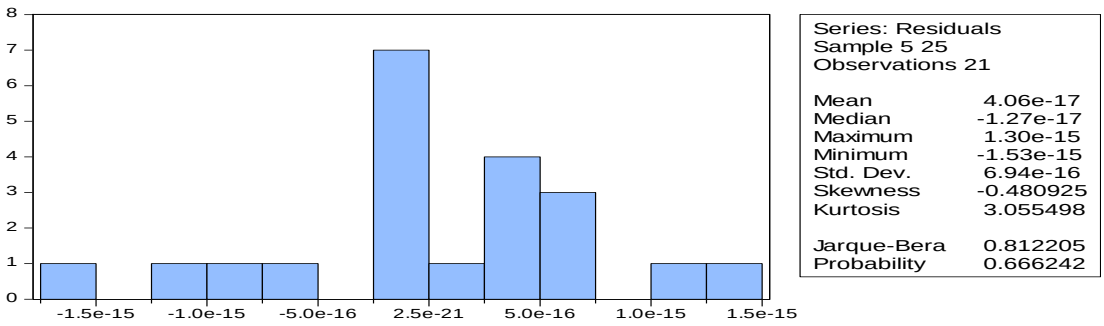


Figure 4.18 shows that residual of the LOGINFR is normally distribution. In the above figure null hypothesis of residuals are normally distributed where as alternative hypothesis of residuals are not normally distributed. The probability of Jarque-Bera test is greater than 5% that is 66%. That is why we accept the null hypothesis. Thus residual of the LOGINFR is normally distributed.

4.9 Major findings

This section illustrates the main findings of the study that is derived from above analysis of secondary data of stock market index.

i. There is positive correlation between the NI and RGDP .The correlation coefficient between NI and RGDP is 0.854.Similarly there is strongly positive correlation between the NI and MS, & NI and ER. The coefficient of strongly positive correlation between NI and MS and NI and ER is 0.892 and 0.811.However there is there is the negative correlation between the MS and INTR, MS and INFR. The coefficient between MS and INTR and MS INFR is -0.461and -0.052 respectively.

ii. The result of ARDL bound test of co-integration shows that there is evidence of co-integrating relationship of LOGNI and the selected other variables like stock market index , real gross domestic production, money supply, interest rate, inflation rate, exchange rate . The lagged error correction model term included in the stock market index is negative but not statistically significant. ECM (-1) is the speed of adjustment. It is 67.63%. In other word the speed of adjustment toward long-run equilibrium is 67.63percentages.

iii. The result of ARDL bound test of co-integration shows that there is no evidence of co-integrating relationship of real gross domestic product and the selected other variables like stock market index, real gross domestic product, money supply, interest rate, inflation rate. The lagged ECM2 (-2) term is not significant since its coefficient carries the positive sign (1.053264) .moreover Breusch- Godfrey serial correlation also support for it. Meaning there is correlation between real gross domestic product and selected macroeconomic variables und study. This conform lack of evidence of long run causality between real gross domestic Production and stock market index, money supply, interest rate, inflation rate and exchange rate.

iv. The result of ARDL bound test of co-integration showed that there is evidence of co-integrating relationship of interest rate and the selected other variables like stock market index, real gross domestic product, money supply, inflation rate, exchange rate. The lagged ECM3 (-1) term included that the interest rate is positive and also significant. This conform evidence of long run causality between interest rate and stock market index, gross

domestic product, money supply, inflation rate, exchange rate. The ECM (-3) is the speed of adjustment. It is 78.76%. In other words the speed of adjustment of interest rate toward long-run equilibrium is 78.76 percentages.

v. The result of ARDL bound test of co-integration shows that there is evidence of co-integrating relationship of inflation rate and the selected other variables like stock market index, real gross domestic product, money supply, interest rate, exchange rate. The lagged ECM4 (-1) coefficient is -1.149981 indicates that the inflation rate is positive and also significant. This conform evidence of long run causality between Inflation rate and stock market index, gross domestic product, money supply, interest rate, exchange rate. However inflation is correlated with the selected macroeconomic variable in the study.

CHAPTER-V
CONCLUSIONS

This chapter provides the discussion drawn from the test carried out in the study and on collusions of the findings. The last of this chapter provides the implication of the study carried out to future researcher, professors, investigates, novice entrepreneurs to spend in the stock market in Nepal.

5.1 Discussion

There exists long run relationship between stock market index and selected macroeconomic variables particularly inflation rate and interest rate. Similarly, there exists short run relationship between stock market index and money supply and exchange rate.

The result shows there is correlation between stock market index and selected macroeconomic variable particularly gross money supply, Exchange rate, Shrestha and Subedhi (2014) also found the existence of correlation between NEPSE index and selected macroeconomic variables particularly money supply and consumer price index (inflation). Similarly study conducted by Phuyal (2016) also found the long run equilibrium relation between inflation rates, interest rate with the stock market index. Thus results derived by this study also supported by the result done by the Subedhi (2014). In addition, the study did by Devkota and Panta (2018) findings supports to this study. Thus there exists long run relationship between stock market index and selected macroeconomic variables particularly inflation rate and interest rate. Similarly, there exists short run relationship between stock market index and money supply and exchange rate.

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. The stock market prices seem to fluctuate over the study period. There exists long run relationship between the variables. Stock market index, and inflation rate has the long run relation with the significant coefficient. Money supply and exchange rate have the short run relationship. Real gross domestic production and inflation rate are

not significant. In the analysis the coefficients of money supply and exchange rate are significant in the short run. The study also confined that the stock market index and real gross domestic product and inflation has the positive relationship. Thus, we inferred that broad money supply, exchange rate, gross domestic production and inflation are the determinant factor of the stock market index in Nepal. Moreover the speed of adjustment toward long-run equilibrium of interest rate is 78.76 percentages.

5.2 Conclusion

The study concluded that there exists long run relationship between the variables. Stock market index, and inflation rate has the long run relation with the significant coefficient. Money supply and exchange rate have the short run relationship. Real gross domestic production and inflation rate are not significant. In the analysis the coefficients of money supply and exchange rate are significant in the short run. The study also confined that the stock market index and real gross domestic product and inflation has the positive relationship.

The Nepalese stock market is still in its initial phase. There is no long history of stock market in Nepal. Many practices, strategies and policies have to be done in this sector. The study addressed macroeconomic determinants of stock market price in Nepal .The result suggests that the fluctuation of stock market prices in long run is strongly related to broad money supply, interest rate, inflation and exchange rate.

5.3 Implications

This research can be significant and beneficial to different stakeholders in many ways. Investors can take this research to analyze and predict the stock market movement on the basis of macroeconomic indicators. This will help them to take rational decision and build better portfolios. Policymakers can use this research for the basis of revise current policies, making future policies. Policy makers will make right rules regulations to promote welfare of investors. Academician and other readers can take this for understanding the impact of macroeconomic variables in stock market in Nepal. Researcher can take this as reference for their research regarding related topics.

It is clear that interest rate is the determining variable of the stock market in Nepal. The direction of movement to stock market prices with interest rate is opposite. The interest rate holds same movement in same direction in short run as well long run. Low interest rate makes stocks more attractive because of low cost of credit and low opportunity cost foregone by holding bank deposits. The GDP, money supply and exchange rate can positively define in short run while only money supply holds positive relationship in long run. An increase in money supply causes stock market prices to increase. This suggests that an increase in money supply leads to economic expansion through increased cash flows and stock prices would benefit by expansionary monetary policy. Hence, money supply has significant impact on stock market in Nepal. Therefore, in conclusion, Nepalese stock market is highly determined by macro- economic variables in long run. It is confirmed that broad money supply, interest rate, inflation and exchange rate can explain the stock market price in Nepal. Policy makers should take into consideration of various macro-economic indicators while formulating economic as well as financial policies.

Other studies can be carried out for the scope of the future research. Other researcher can use other model like VCM, ARMA model as well. Other south study comparisons can be done by using ARDL model.

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APPENDICES

Dependent Variable: DLOG_NI

Method: Least Squares

Date: 12/25/20 Time: 16:11

Sample (adjusted): 5 25

Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.009954	0.067948	-0.146495	0.8858
DLOG_NI(-1)	1.315446	0.431127	3.051182	0.0093
DLOG_NI(-2)	-0.634246	0.272480	-2.327677	0.0367
DLOG_MS(-1)	0.411302	1.309673	0.314049	0.7585
DLOG_IR(-1)	-0.019410	0.012732	-1.524467	0.1513
DLOG_INFR	-0.016521	0.008390	-1.969155	0.0706
DLOG_ER(-1)	-1.389885	1.128254	-1.231891	0.2398
ECM1(-1)	-0.676387	0.446163	-1.516010	0.1535

R-squared	0.573967	Mean dependent var	0.026334
Adjusted R-squared	0.344565	S.D. dependent var	0.100554
S.E. of regression	0.081407	Akaike info criterion	-1.896371
Sum squared resid	0.086153	Schwarz criterion	-1.498458
Log likelihood	27.91190	Hannan-Quinn criter.	-1.810014
F-statistic	2.502013	Durbin-Watson stat	2.126109
Prob(F-statistic)	0.072815		

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.577278	Prob. F(1,12)	0.2331
Obs*R-squared	2.439579	Prob. Chi-Square(1)	0.1183

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 12/25/20 Time: 16:14

Sample: 5 25

Included observations: 21

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.007332	0.066744	0.109855	0.9143
DLOG_NI(-1)	-0.038519	0.422975	-0.091067	0.9289

DLOG_NI(-2)	0.038116	0.268346	0.142039	0.8894
DLOG_MS(-1)	-0.019041	1.281618	-0.014857	0.9884
DLOG_IR(-1)	-0.001925	0.012552	-0.153356	0.8807
DLOG_INFR	-0.003117	0.008577	-0.363395	0.7226
DLOG_ER(-1)	-0.441610	1.158653	-0.381141	0.7098
ECM1(-1)	0.720735	0.721066	0.999541	0.3373
RESID(-1)	-0.869046	0.691972	-1.255897	0.2331

R-squared	0.116170	Mean dependent var	-1.06E-17
Adjusted R-squared	-0.473049	S.D. dependent var	0.065633
S.E. of regression	0.079658	Akaike info criterion	-1.924624
Sum squared resid	0.076145	Schwarz criterion	-1.476972
Log likelihood	29.20855	Hannan-Quinn criter.	-1.827472
F-statistic	0.197160	Durbin-Watson stat	1.588629
Prob(F-statistic)	0.985846		

Dependent Variable: DLOG_RGDP

Method: Least Squares

Date: 12/25/20 Time: 16:27

Sample (adjusted): 5 25

Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.03E-18	3.02E-18	-1.001168	0.3365
DLOG_RGDP	1.000000	9.89E-17	1.01E+16	0.0000
DLOG_NI(-1)	-6.57E-18	1.13E-17	-0.583464	0.5704
DLOG_NI(-2)	2.61E-18	1.01E-17	0.258501	0.8004
DLOG_MS(-1)	7.20E-17	5.09E-17	1.413724	0.1829
DLOG_IR(-1)	-4.55E-19	4.17E-19	-1.089795	0.2972
DLOG_INFR(-1)	1.48E-19	2.86E-19	0.517206	0.6144
DLOG_ER(-1)	-1.06E-16	3.55E-17	-2.971497	0.0117
ECM2(-1)	1.053264	0.942352	1.117697	0.2856

R-squared	1.000000	Mean dependent var	0.019114
Adjusted R-squared	1.000000	S.D. dependent var	0.008078
S.E. of regression	3.19E-18	Sum squared resid	1.22E-34
F-statistic	1.61E+31	Durbin-Watson stat	2.111365
Prob(F-statistic)	0.000000		

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	96.42874	Prob. F(2,10)	0.0000
Obs*R-squared	19.93653	Prob. Chi-Square(2)	0.0000

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 12/25/20 Time: 16:28

Sample: 5 25

Included observations: 21

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.35E-18	8.48E-19	5.128642	0.0004
DLOG_RGDP	-3.04E-17	3.21E-17	-0.945443	0.3667
DLOG_NI(-1)	6.62E-18	3.32E-18	1.991213	0.0745
DLOG_NI(-2)	-5.82E-18	2.65E-18	-2.193699	0.0530
DLOG_MS(-1)	-7.74E-17	1.33E-17	-5.828686	0.0002
DLOG_IR(-1)	4.81E-19	1.02E-19	4.723767	0.0008
DLOG_INFR(-1)	-1.47E-19	8.46E-20	-1.735158	0.1134
DLOG_ER(-1)	1.08E-16	9.04E-18	11.89802	0.0000
ECM2(-1)	-0.985201	0.252961	-3.894674	0.0030
RESID(-1)	-0.032264	0.111975	-0.288132	0.7791
RESID(-2)	-0.184582	0.088356	-2.089078	0.0632

R-squared	0.949358	Mean dependent var	3.93E-19
Adjusted R-squared	0.898717	S.D. dependent var	2.43E-18
S.E. of regression	7.75E-19	Sum squared resid	6.00E-36
F-statistic	18.74662	Durbin-Watson stat	2.088203
Prob(F-statistic)	0.000035		

Dependent Variable: DLOG_IR

Method: Least Squares

Date: 12/25/20 Time: 16:34

Sample (adjusted): 5 25

Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.957143	1.286290	-1.521541	0.1540
DLOG_IR(-1)	0.004923	0.278138	0.017701	0.9862
DLOG_NI(-1)	2.595457	5.005748	0.518495	0.6135
DLOG_NI(-2)	2.521440	4.395632	0.573624	0.5768
DLOG_RGDP	-13.18270	45.74277	-0.288192	0.7781
DLOG_MS(-1)	44.97828	22.71782	1.979867	0.0711
DLOG_INFR	-0.295695	0.156423	-1.890357	0.0831

DLOG_ER(-1)	-52.66333	20.83247	-2.527945	0.0265
ECM3(-1)	-0.787604	0.358761	-2.195348	0.0485

R-squared	0.640166	Mean dependent var	-0.014286
Adjusted R-squared	0.400277	S.D. dependent var	1.741380
S.E. of regression	1.348556	Akaike info criterion	3.733473
Sum squared resid	21.82324	Schwarz criterion	4.181125
Log likelihood	-30.20146	Hannan-Quinn criter.	3.830625
F-statistic	2.668592	Durbin-Watson stat	2.127183
Prob(F-statistic)	0.061082		

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.209535	Prob. F(2,10)	0.8144
Obs*R-squared	0.844652	Prob. Chi-Square(2)	0.6555

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 12/25/20 Time: 16:36
Sample: 5 25
Included observations: 21
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.075649	1.549079	-0.048835	0.9620
DLOG_IR(-1)	0.003544	0.303540	0.011675	0.9909
DLOG_NI(-1)	0.457574	5.424539	0.084353	0.9344
DLOG_NI(-2)	-0.527863	5.118903	-0.103120	0.9199
DLOG_RGDP	-1.903692	57.11727	-0.033330	0.9741
DLOG_MS(-1)	1.991615	24.62959	0.080863	0.9371
DLOG_INFR	0.012449	0.173442	0.071775	0.9442
DLOG_ER(-1)	0.358199	24.40771	0.014676	0.9886
ECM3(-1)	0.151363	0.460773	0.328499	0.7493
RESID(-1)	-0.292492	0.460158	-0.635634	0.5393
RESID(-2)	0.056765	0.436277	0.130111	0.8991

R-squared	0.040222	Mean dependent var	6.34E-17
Adjusted R-squared	-0.919557	S.D. dependent var	1.044587
S.E. of regression	1.447255	Akaike info criterion	3.882896
Sum squared resid	20.94547	Schwarz criterion	4.430027
Log likelihood	-29.77041	Hannan-Quinn criter.	4.001638
F-statistic	0.041907	Durbin-Watson stat	1.917752
Prob(F-statistic)	0.999988		

Dependent Variable: DLOG_INFR

Method: Least Squares

Date: 12/25/20 Time: 16:49

Sample (adjusted): 5 25

Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.25E-15	8.77E-16	-2.569370	0.0246
DLOG_INFR	1.000000	1.08E-16	9.22E+15	0.0000
DLOG_NI(-1)	-1.21E-15	3.11E-15	-0.391034	0.7026
DLOG_NI(-2)	-2.15E-15	2.80E-15	-0.767876	0.4574
DLOG_RGDP	7.92E-14	3.19E-14	2.486275	0.0286
DLOG_MS(-1)	1.72E-14	1.50E-14	1.147088	0.2737
DLOG_IR(-1)	2.08E-16	1.42E-16	1.468928	0.1676
DLOG_ER(-1)	-5.22E-16	1.31E-14	-0.039877	0.9688
ECM4(-1)	-1.479981	0.550088	-2.690445	0.0197

R-squared	1.000000	Mean dependent var	-0.176190
Adjusted R-squared	1.000000	S.D. dependent var	3.045801
S.E. of regression	8.98E-16	Sum squared resid	9.68E-30
F-statistic	2.88E+31	Durbin-Watson stat	1.849267
Prob(F-statistic)	0.000000		

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	87.36867	Prob. F(2,10)	0.0000
Obs*R-squared	19.85918	Prob. Chi-Square(2)	0.0000

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 12/25/20 Time: 16:50

Sample: 5 25

Included observations: 21

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.90E-15	2.24E-16	8.485140	0.0000
DLOG_INFR	-2.27E-16	2.86E-17	-7.929824	0.0000
DLOG_NI(-1)	1.84E-15	8.13E-16	2.262914	0.0471
DLOG_NI(-2)	1.91E-15	7.39E-16	2.577153	0.0276
DLOG_RGDP	-7.37E-14	8.97E-15	-8.215908	0.0000
DLOG_MS(-1)	-1.17E-14	4.10E-15	-2.853877	0.0171
DLOG_IR(-1)	-1.80E-16	3.73E-17	-4.837882	0.0007
DLOG_ER(-1)	-2.63E-15	3.63E-15	-0.725111	0.4850
ECM4(-1)	1.299604	0.145813	8.912789	0.0000

RESID(-1)	0.006931	0.089304	0.077612	0.9397
RESID(-2)	-0.035314	0.097297	-0.362950	0.7242

R-squared	0.945675	Mean dependent var	4.06E-17
Adjusted R-squared	0.891350	S.D. dependent var	6.94E-16
S.E. of regression	2.29E-16	Sum squared resid	5.24E-31
F-statistic	17.40778	Durbin-Watson stat	2.008202
Prob(F-statistic)	0.000050		

Dependent Variable: LOG_NI
Method: Least Squares
Date: 01/22/21 Time: 20:48
Sample: 1 25
Included observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.091353	13.34447	0.231658	0.8193
LOG_RGDP	- 0.852323	1.637043	-0.520648	0.6086
LOG_MS	0.740185	0.539079	1.373054	0.1857
LOG_INFR	-0.004304	0.008504	-0.506196	0.6185
LOG_IR	0.024226	0.010662	2.272164	0.0349
LOG_ER	0.701674	0.723996	0.969169	0.3446

R-squared	0.852756	Mean dependent var	2.736848
Adjusted R-squared	0.814008	S.D. dependent var	0.238947
S.E. of regression	0.103050	Akaike info criterion	-1.501637
Sum squared resid	0.201768	Schwarz criterion	-1.209107
Log likelihood	24.77046	Hannan-Quinn criter.	-1.420502
F-statistic	22.00758	Durbin-Watson stat	0.882372
Prob(F-statistic)	0.000000		