CHAPTER I
INTRODUCTION

This chapter consists of background of the study, statement of the problem, objectives of the study, significance of the study, limitations of the study and organization of the study.

1.1 Background of the Study

The relationship between money, income and prices has been a subject of discussion between economists for a long time. Specifically, the role of money in determination of income and prices has been being debated extensively over the decades. According to the classicists, the increase in money stock shifts up the aggregate demand without affecting the supply side (Ackley, 2007). This increment on money supply leads to increase in price level which just offsets the increase in nominal money, leaving the real money stock unchanged. Money, then, is completely neutral in the classical economy, real output, income and other real variables are completely left unchanged by change in the money supply. (Branson, 2005)

The Monetarists led by Milton Friedman faithfully claim that money supply plays an active role in determining income and prices (Salih, 2013). This indicates that both income and prices are mainly caused by changes in the stock of money supply in the short-run (Froyen, 2014). Monetarists believe that the direction of causation runs from money to income without any feedback and the inflation is a monetary phenomenon in that changes in money supply cause changes of prices (Al-Jarrah, 1996). In clear notation, the monetarists' proposition suggests that there is a unidirectional causality from money supply to income and also a unidirectional causality from money supply to prices.

Contrary to the Monetarists' view, Keynesians held the view that money does not play an active role in determining income and prices. They stress on that the direction of causation runs from income to money without any feedback (Al-Jarrah, 1996). According to their view changes in the stock of money supply affects the interest rate and hence investment and consumption (Salih, 2013). The effect goes through the

income at last. They have to say, changes in the stock of money supply, affects income only indirectly (Shapiro, 2001). Accordingly, changes in income cause changes in the stock of money supply through changes in the demand for money, given sticky interest rates (Branson, 2005). This indicates a unidirectional causality from income to money supply. Similarly, according to the Keynesians, prices are determined by the demand and supply forces. In Keynesian point of view, inflation as a real phenomenon caused mainly by real factors (Al-Jarrah, 1996). The Keynesians economists negate the role of money in the price change. They are of the view that changes in prices are mainly due to structural factors (Ahmad, Asad, & Hussian, 2008).

The new classical point of view totally ignored the association between money supply and income in both long-run and short-run because of rational expectation hypothesis (Froyen, 2014). Rather the overall effect of change in money supply remains only on price level (Maddock & Carter, 1982). Their view coincides the view of classical.

The new Keynesian are giving the strong microeconomic foundation to the Keynesian system (Froyen, 2014). So, they are in the supporting view to the Keynesian view of indirect association between money supply, income and price (Gordon, 1990). But they are not so much rigid like the early Keynesian to believe the effectiveness of monetary policy (Froyen, 2014).

Despite this clear dispute, it is very crucial to understand the relationship between the variables such as; income, money and prices in an economy. Understanding this relationship is pretty important, especially to the public policymakers, in conducting effective stabilization policies. The causal relationships between money and income as well as between money and prices have been an active area of research in economics particularly after the publication of the influential paper by Sims in 1972. Based on Granger causality; Sims developed a test of causality and applied it to data from the United States to examine the causal relationship between money and income. He found the evidence of unidirectional causal relationship running from money to income supporting the Monetarists' claim (Salih, 2013).

1.2 Statement of the Problem

The money supply, income and price level have increasing pattern over the many years in Nepal. The narrow money supply published by NRB in the fiscal year 1974/75 was figured Rs. 1337.7 million. However, it increased by almost 426 times in FY 2016/17 and figured Rs. 569402.4 million. Accordingly, the broad money supply has increased by almost 1256 times over the 43 years. It was Rs. 2064.4 million in FY 1974/75 and grown to Rs. 2591702.0 million in the end of FY 2016/17. Likewise, the GDP at 2000/01 prices was Rs. 143080 million in the FY 1974/75 which is grown by almost 6 times and has become Rs. 825049 million in FY 2016/17. But the GDP at current prices over this period has increased by almost 157 times. On the other hand, the national consumer price index based on 2014/15 prices was 4.2 in FY 1974/75 which is increased to 114.8 in FY 2016/17. The average increment rate of narrow money, broad money, GDP and price level over the 43 years are 15.65, 18.63, 4.29 and 8.29 percent respectively. These figures clearly show that all these macroeconomic variables are in increasing trend. There may be possibility of achieving the unidirectional or bilateral causal relationship between money, price and income though the causal nexus differs from one school to another (Gyanwaly, 2012). Hence, there might be long run as well as short-run relationship between these variables.

Although these variables are growing together over the long period of time, there is almost non-existence of an empirical work explaining the relationship between these variables. There are few works done in this field in Nepal but these studies are insufficient to address the problem under this big topic. In the one hand, the trend, structure and composition of these variables are important to discuss which solve the problem that how these variables are growing. On the other hand, the relationship between these variables has significance because it traces out the nexus between these variables and provides policy implications to the policy makers. So, the main task of this study is to discuss and identify the casual relationship between these variables in the latest context of Nepal.

Hence, the problem of this study can be synthesized in the following research questions;

i. What are the trend, structure and composition of money supply, price level and real income in Nepal?
ii. Is there any long-run and short-run relationship between these macroeconomic variables?

1.3 Objective of the Study

The general objective of this study is to deal with money supply and its relationship with other macroeconomic variables such as price level and income. However, the specific objectives of the study are as below;

i. To explain the trend, structure and the composition of money supply, price level and income.
ii. To find out the long run and short run relationship between the money supply, real income and the price level in Nepal.

1.4 Significance of the Study

There have been a lot of studies on the topic of money supply in Nepalese context and international level. The previous studies in Nepalese context were mainly focused to identify the determinants of money supply. There are few writings on the casual relationship between price level and money supply as well as the national income and the money supply in Nepal.

How these pivotal variables of monetary economics are related to each other is equally important to their determinants. So, this study is trying to explain the trend structure and composition of money supply, income and price level and causal relationship between money supply, real income (GDP) as well as general price level. So, this research continues the researcher's tradition of checking robustness of the previous studies on the field of money supply and its relationship with real GDP as well as price level. In a nutshell, the study under the topic of money supply is always significant for two purposes; robustness of the theoretical background as well as the empirical findings of the previous studies, and some value addition regarding the subject matter.

1.5 Limitation of the Study

There few limitations of the study. First of all, there are methodological limitations of this study. The conclusions drawn by this study may not be matched with the conclusions drawn by the study which used another methodology. Second, the writer needed the quarterly or monthly data for the dynamic analysis of the model, but because of the unavailability of such data recorded in Nepal, this study is obliged to use the annual data which may lead the less dynamic results. Another limitation of this study is that it covers only the data from 1975-2016 of Nepal, which may not provide the conclusion for all.

1.6 Organization of the Study

The thesis has five basic chapters.

The first chapter is introductory of thesis. In the first chapter, there are sub-sections such as; background of the study, statement of the problem, objective of the study, significance of the study, limitations of the study, organization of the study.

The second chapter is the review of literature where the various theoretical and empirical works previously written on the subject matter have been reviewed.

The third chapter is of research methodology, where the methods of data collection and methods of estimation and analysis have been discussed.

The fourth chapter is the findings and analysis, where the descriptive and inferential statistics to analyze the data have been discussed.

The fifth chapter is the summary, conclusions and recommendations, where the conclusive remarks of this study is presented.

CHAPTER II
LITERATURE REVIEW

There are many studies on the topic of the relationship between money supply, price level and income in national and international context. This section discusses the various theoretical and empirical review of the literature written in the past regarding the relationship between money supply, price and income. Moreover, the study reviews the various writings on the casual relationship between macroeconomic variables such as money supply, real income, and price level nationally and internationally.

2.1 Review of Theoretical Concepts and Underpinnings

The theoretical literature review of the study can be discussed in the different headings regarding the different school of thoughts and the scholars.

2.1.1 Classical School

According to the classical point of view, money is neutral (Gyanwaly, 2012). It is in the sense that change in money supply does not affect real variables such as employment, output and real income. But they believe that it affects the price in the same direction. The classical school of thought is based on the following propositions (Ackley, 2007);

a) There is always full employment in the economy except voluntary unemployment.
b) The economy is always in the state of equilibrium. Even if there is disequilibrium situation, that vanishes in the long run.
c) Money does not matter: classical treated money as a medium of exchange. It does not play any significant role in determining the output and employment; hence, the real income. The levels of real variables are determined by the availability and uses of real resources such as labor and capital.

To view the relationship between the money, real income and price level according to classical the study has to look a sight on the theoretical arguments of quantity theory of money, classical dichotomy and the Pigou effect.

a) Quantity Theory of Money

According to the classical theory, demand for money is only for transaction purpose. Money supply is considered to be determined exogenously by central monetary authority. Rise in money supply leads to raise in general level of price. There is direct association between money supply and price level (Ackley, 2007).

According to Irving Fisher (Ackley, 2007), the quantity theory of money is given by

$$MV = PT \quad \text{……..2.1}$$

Where, M= amount of money in circulation

V= velocity of money (considered to be constant. i.e. $V=V_{con}$)

P= general price level

T= transaction of goods and services (assumed to be constant. i.e. $T= T_{con}$)

Now, from equation 2.1,

$PT_{con}=MV_{con}$

Or, $P = \left(\frac{Vcon}{Tcon}\right) M$ 2.2

It shows the positive relationship between money supply and general price. As money supply changes, the price also proportionately changes in the same direction. "Given a money, which people do not desire for its own sake but use merely as a medium of exchange, then all prices will rise and fall together with changes in money stock. That is, we have an absolute level price, which depends on the quantity of money." (Ackley, 2007)

Similarly, income version of quantity theory (Froyen, 2014) is given by

$$MV = PY \text{ …….. 2.3}$$

Where, Y= real national income

MV = total money supply

PY= total money demand

b) Classical Dichotomy

According to the classical thinkers, there are two different sectors in the economy; real and monetary sector and they argued that there is no significant linkage between these two which is popularly known as classical dichotomy. The real wage, output , employment and the real income are solely determined by the real factors; labor, capital and labor productivity, etc. whereas the money wages and prices are separately determined by monetary factors; i.e. money supply. (Ackley, 2007)

This dichotomy suggests that money does not matter for real income; affecting only the general price level.

c) Pigou Effect

A.C. Pigou formulated a neo-classical theory of employment which is known as Pigou effect. Pigou postulates that when interest rate is unable to handle economy into full employment situation, then, decrease in money supply, which leads to fall in velocity of money raising the value of money. The rise in value of money increases in purchasing power which, in turn, increases in aggregate demand of goods and services. This again leads to increase in investment environment which ultimately leads to full employment and increase in out (Norikazu, 2011).

In conclusion, the Pigou effect offers the positive association between the money supply and price level and inverse relationship between the money supply and the real national income which is slightly different than the conventional classical point of view (Intelligent Economist, n.d.).

2.1.2 The Keynesian School

After the Great depression of 1930s, which is regarded as the symbol of failure of the classical notion of a self-regulating economy, Keynes prescribed an entirely different point of view than the conventional capitalist economics to run the economies. According to this school, a properly designed fiscal policy combined with monetary policy is the most effective way to combat the depression (Branson, 2005). For

monetary policy to be effective, a small increase in money supply should lead to significant fall in the rate of interest, which in turn, should lead to significant increase in investment. But in depression, interest rates are already very low (Shapiro, 2001). So, the paper can assimilate that money supply does not directly lead to change the real income but affects the general price as of the Keynesian point of view.

Keynes denied the existence of the dichotomy in the economy; postulated by the classicists. He has integrated monetary sector with the real sector of the economy in a single framework (Coddington, 1976).

An increase in the money supply lowers the interest rate, and the lower interest, in turn, increases AD and income (Froyen, 2014). This is unfair to say that Keynesians believe that money is unimportant. The money is one, but not the only, determinant of income in the Keynesian analysis. However, many of the early Keynesian ignored the importance (or gave little importance) of the money altogether, emphasizing only the effectiveness of the fiscal policy for the economies both close to full employment as well as in deep depression (Blinder, 1988).

2.1.3 The Monetarists School

After the oil crisis of 1970s in the advanced countries, the notion of Philips' curve was questioned because of the simultaneous occurrence of both high levels of inflation and high levels of unemployment at the same time (Laidler, 1981). Then the monetarist notion came to conquer the world of economics. This view argues that, the money supply directly affects the price and income (Froyen, 2014). According to Friedman-Philips model, monetary policy can reduce unemployment only by fooling buyers and sellers of labor in the short-run. Eventually, the unemployment rate returns to the natural rate of unemployment and natural output rate returns to the level consistent with the natural rate of unemployment (Mayer, 1975). Thus according monetarists, money is neutral only in the long-run.

The four major propositions of monetarism (Froyen, 2014) are as follows;

a) The nominal income is significantly influenced by the money supply.

b) In the long-run, the influence of money remains only on the price and other nominal magnitudes. The real variables, such as output and employment, are determined only by the real factors.

c) However, in the short-run, the money supply does influence the real variables as well. Money is considered the dominant factor affecting cyclical movements in output and employment.

d) The private sector in inherently stable. Instability is primarily generated by the government policies.

Contrary to the view of the early Keynesian, Friedman argued that the demand for money was stable (Froyen, 2014). Friedman restated the classical quantity theory of money.

2.1.4 New Classical School

According the New classical point of view monetary and fiscal policies cannot affect real variables systematically even in the short run (Investopedia, n.d.). This school is based on the rational expectation hypothesis. The rational expectations are formed on the basis of all relevant information available regarding the variable (Maddock & Carter, 1982). So, according to them, the money supply does not affect the real variables even in the short run. Its impact remains always in the price. The monetary policy is effective only when the change in money supply is unanticipated which is seldom happens in the economy (Froyen, 2014).

2.1.5 New Keynesian School

New Keynesians, on the other hand, give at least as much emphasis is placed on monetary policy as on the fiscal policy (Investopedia, n.d.). The new Keynesian school basically tries to give the microeconomic foundation on the Keynesian proposition of wage-price rigidities (Froyen, 2014). The wage and price are downward rigid because of sticky price, efficiency and hysteresis. They support the major propositions of the Keynesian system (Gordon, 1990).

2.2 Review of International Empirical Literature

Friedman and Schwartz (1963) found that the changes in the behavior of the money stock had been closely related with the changes in economic activity, money income, and prices in American economy during the period from 1867 to 1960. They also found that the interaction between monetary and economic change had been highly stable. However, they observed that monetary changes often had an independent origin; they have not been simply a reflection of changes in economic activity.

Al-Jarrah (1996) investigated the nature of the linkages between money, real income, and prices in Saudi Arabia. The study used multivariate Johansen technique, Granger-causality tests, and variance decomposition and impulse response functions to test for causal relationships among variables. The results indicated that real income contributes significantly in explaining changes in the money, while the reverse was not true. Consumer prices were also significant in predicting changes in money in the Kingdom. The evidence on the contribution of money in explaining prices change, however, was weak.

Holod (2000) investigated the relationships between the money supply, exchange rate and prices in the Ukrainian economy by employing the monthly data from 1995:01 to 1999:06. The study used vector autoregression (VAR), vector error correction model and impulse response functions as its methodology to show how a shock in one of the variables influences the time behavior of others. The paper found some evidence that money supply shocks affected the price level behavior but the effect was not very strong. On the other hand, the paper found that the money supply responded significantly to the shocks in the price level.

Ahmad, Asad and Hussian (2008) used the time series data of real GDP, nominal GDP, prices and money supply for the period of 1973 to 2007. The study used ADF to test the stationary of the data series and series were found integrated of the order zero. The Granger causality test was used for causal relationship. The paper found the estimated coefficient between the growth of money supply and inflation positive and significant. The study accepted the Monetarist proposition that money supply determined the price levels and income. The authors suggested a tight monetary policy along with fiscal measures to control inflation in Pakistan.

Ishan and Anjum (2013) described the main role of money supply (M2) on GDP of Pakistan. The study used the secondary data of 12 years from 2000 to 2011. The paper found the excessive money supply (M2) by SBP (State Bank of Pakistan) to run the country entails to high rate of inflation if the indicators i.e. CPI, interest rate are not controlled within the prescribed limits. The research found the evidence that high rate of inflation has adversely affected the economy of Pakistan because of excessive supply of money (M2) by SBP. The study revealed the impact of money supply (M2) on the GDP of Pakistan whereby the country have seen inflation rate in double digits. By using regression model, the paper has proved that Interest rate and CPI have a significant relation with GDP but inflation has no significant relation with the GDP. Thus, they have suggested that the money supply needs aggressive control to boost the economy.

Salih (2013) examined the relationship between the three macroeconomic variables money, income, and prices in the Saudi Arabian economy. The methodology used in the paper is cointegration, bivariate and trivariate Vector Autoregressive (VAR) models, and Granger Causality/Block Exogeneity tests. The author further supplemented the results with impulse response and variance decomposition. The results for Saudi Arabia for the period 1968-2011 indicated two-way causation between income and money supply. The results also showed that income Granger causes prices, and money Granger causes money prices.

Luo (2013) investigated the money supply behavior (endogeneity or exogeneity) of BRICS (Brazil, Russia, India, China, and South Africa) using quarterly data from 1982 to 2012. The author used the econometric methodologies like Chow Breakpoint Test, Unit Root Test, Johanson Cointegration Test, Granger causality Test, Vector Error Correction and Trivarite Vector Autocorrelation Matrix for the thesis. In four countries: Brazil, China, Russia (the period of 2004-2012) and South Africa (1982-1993), the study found money supply endogeneity evidence. Thus, this implies that bank loans cause the money supply, or there is bidirectional causality between these two. Regarding the other countries (India and the 1982-2003 period of Russia) the thesis found money supply to be exogenous which means money supply cause bank loans. The study concluded that in the short run; most of the countries share at least some degree of the monetarist view which envisages exogeneity of money supply.

Singh, Das and Baig (2015) examined the casual relationship between money supply, output and prices of India in the short and long-term both. Different metrics for money, output and prices were used to understand the relationship between each. The paper used ADF and PP test for unit root test, EG test and Johansen test for co-integration and Granger causality test for causal relationship among variables. The paper deployed quarterly as well as monthly data for analysis. Variables to understand food inflation was especially used considering the fact that food prices are less income elastic and are viewed differently by citizens. The findings of the study indicated that the relationship is sensitive to the choice of variable which is relevant in the understanding of relationship between money, output and prices. Narrow Money was found to be a better policy variable than reserve money or Broad Money in India.

Koti and Bixho (2016) have presented different approaches and theories associated with money and inflation. The paper analyzed the theoretical links between money supply and the variables such as unemployment, trade and exchange rate, taxes and wages by occupying the data of Albania from 1994 to 2015. The study used the multiple regression analysis formulated with the guidance of the theories of money. The results of the study showed the strong relationship of the money supply with economic growth, interest rate and inflation, but it had a negative sign toward inflation showing that the case of Albania was special, because of the lack of optimum money supply from the banking system and outside. So, they found that all money supplied in the economy is fully absorbed by the individuals and private sector without increasing the inflation.

2.3 Review of Nepalese Empirical Literature

Khatiwada (1994) analyzed the causal relationship between money and money income as well as money and prices by deploying the regression, the Granger's causality test and Sim's test. The paper covered the annual Nepalese data from the FY 1965/66 to 1989/90. The study found a unidirectional causality running from money to money income. The test of causality between money and prices uniformly indicated that there is unidirectional casual relation from money to prices and no feedback from prices to money.

NRB (2001) examined the money-price relationship in Nepal. The study estimated the money-price relationship by using quarterly data from third quarter of 1975 to second quarter of 1999. The study showed the delayed impact of money on prices in Nepal disapproving the theory of money and price which suggests an instantaneous relationship between money and price. The study occupied ADF to test unit root and Engel- Granger co-integration test to check long run relationship among varibles. The Almon lag model was applied to ascertain the sum total effects of money supply on prices over the period. The study found that 10 percent changes in M1 bring about 4.5 percent changes in prices in Nepal. M1 compared to M2 was found to have stronger relationship with prices in Nepal. The results of the paper also showed that there was no structural shift in money price relationship during the study period.

Gyanwaly (2012) analyzed the causal relationship between money, price and income in Asian countries by employing the annul data from 1964 A.D. to 2011 A.D. The paper used the Unit Root Test as well as the Granger's cointegration and causality test in its methodology. The study reached to the conclusion that money supply is an endogenous variable in all the countries though the extent of endogeneity in term of price and income variables slightly differs from on to another. The paper found that both narrow and broad money are unidirectionally causing the general price level in case of Nepal. The study found the bidirectional causality between broad money and GDP in Nepal. The study also found money supply in Nepal is not neutral because it is causing income and output of the economy at the cost of high inflation.

2.4 Research Gap

Travelling on the literature regarding the relationship between money supply and the macroeconomic variables such as income and price level, there are evidences of unidirectional as well as bidirectional causality depending on different countries. In Nepalese context, there are couple of studies done so far. The studies found unidirectional causality runs from money to price and income (Gyanwaly, 2012), (Khatiwada, 1994) & (NRB , 2001). So, this study is going to check the robustness of these findings. And we are going to use the Johnsen cointegration test followed by VECM and VAR Granger causality which is purely new methodology regarding this topic in Nepalese context. Moreover, the last study in this topic is done by Gyanwaly in 2012. So, the time gap is another inspiration to study in this topic.

CHAPTER III
RESEARCH METHODOLOGY

This chapter contains the extensive discussion on the methodology used in this study. Research design, sample period, sources of data, model specification and methods of analysis are the major headings in this chapter.

3.1 Research Design

This study is quantitative in nature. So it has used both descriptive and inferential research design. For the analysis of trend, structure and composition of the variables, the descriptive research design is used and to trace out the relationship between variables the inferential research design has been used.

3.2 Sample Period

To analyze the relationship between money supply and macroeconomic variables (real income growth and price level), the study has used the annual data from July 1975-July 2017 (end of the fiscal year) of Nepal. The only logic behind the sample period is easy availability of the data.

3.3 Sources of Data

The data used in this study are secondary. The data are used from quarterly economic bulletin published by Nepal Rastra Bank (Quarterly Economic Bulletin, 2017), current macroeconomic and financial situation published by NRB (Current Macroeconomic and Financial Situation, 2017) and various economic surveys published by Ministry of Finance of Nepal (Economic Survey). However, we have used the data in natural logarithm form rather than in original form for some analysis.

3.4 Model Specification

In the analysis, we have used narrow money supply, broad money supply, income, and price level as variables. However, we have separated former three variables into nominal as well as real form for the different model. The reason behind this is to find out impact of real money supply to real income, nominal money supply to price level

and price level to nominal income separately. And there is another variable general price level in our some models. The nominal and real gross domestic product (NGDP and RGDP) at producers' prices are used as a proxy of nominal and real income respectively. The RGDP is deflated on 2014/15 prices. Likewise, we have used the annual national consumer's price index (NCPI) for the general price level. The price level will be based on 2014/15 price. Likewise, the nominal as well as real money supply of both forms (NM1, NM2, RM1 and RM2) are used originally in the models. The real money supply in both forms are also deflated on 2014/15 prices.

3.4.1 Relationship between Macroeconomic Variables

Most of the theories and empirical studies suggest that the money supply causes the price level and income. The models are set as follows (Gujarati & Sangeetha, 2007).

$$RGDP = f(RM)$$

or, $$RGDPt = a1 + b1RMt + e1 \quad \text{..... (3.1)}$$

There are two models for this relationship with narrow and broad money supply.

And, $$NCPI = f(NM)$$

or, $$NCPIt = a2 + b2NMt + e2 \quad \text{..... (3.2)}$$

There are also two models for the relationship between NCPI and two money supply.

Accordingly, the theory suggests that the price level causes the nominal income of a nation. So, the model is as follows.

$$NGDP = f(NCPI)$$

or, $$NGDPt = a3 + b3NCPIt + e3 \quad \text{..... (3.3)}$$

So, there are five models in this study.

3.5 Methods of Analysis

Time series econometrics has been used to estimate and analyze the coefficients. We intend to use the following methods of analysis.

3.5.1 Unit Root Test

The classical regression model assumes that the both data series of dependent and explanatory variables be stationary, i.e, the errors have a zero mean and finite variance (Enders, 2010). But in the most cases, the macroeconomic time series are non-stationary (Asteriou & Hall, 2007). 'Whether the data is stationary or not?' we can find out by performing the unit root test. There are few methods of testing unit root of the data. Here, the paper has performed the Augmented Dickey-Fuller (ADF) test for the test of stationarity of the data. There are three possible forms of the ADF test (Enders, 2010) ;

The equation for no intercept and no trend is,

$$\Delta Y_t = \gamma Y_{t-1} + \sum_{i=1}^{P} \beta_i \Delta Y_{t-1} + u_t \quad \text{.....(3.4)}$$

The equation for only intercept and no trend is,

$$\Delta Y_t = \alpha_0 + \gamma Y_{t-1} + \sum_{i=1}^{P} \beta_i \Delta Y_{t-1} + u_t \quad \text{.....(3.5)}$$

The equation for both intercept and trend is,

$$\Delta Y_t = \alpha_0 + \gamma Y_{t-1} + \alpha_2 t + \sum_{i=1}^{P} \beta_i \Delta Y_{t-1} + u_t \quad \text{.....(3.6)}$$

However, the paper have used last two equation to analyze the unit root in the data. The unit root is often denoted by order of integration I(n) (Asteriou & Hall, 2007). The order of integration refers the number of unit roots.

3.5.2 Methods of Lag Length Selection

The Johansen cointegration test requires the selection of appropriate lag length. There are so many ways of selecting the lag length of the model. Some scholars prefer the ad-hoc methods (Gyanwaly, 2012) and some are employing different techniques developed by the econometricians. The one of the most popular methods of selecting the lag length is Schwarz Information Criterion (SIC) (Luo, 2013). In this criterion,

the lower the value, the better the model (Gujarati & Sangeetha, 2007). This study have fixed the lag length of the model based on the SIC.

The SIC is given as (Gujarati & Sangeetha, 2007);

$$SIC = n^{k/n} \frac{\sum \hat{u}^2}{n} = n^{k/n} \frac{RSS}{n} \quad \text{……..(3.7)}$$

or, in log form

$$\ln SIC = \frac{k}{n} \ln n + \ln\left(\frac{RSS}{n}\right)$$

3.5.3 Johansen Cointegration Test

The cointegration refers the existence of a long-run equilibrium relationship between the variables in which an economic system converges over time (Bhusal, 2016). In general, for the cointegration test, the all data series used in the model should be integrated in same order. While testing the cointegration one cannot use the first difference data rather s/he should use the level data. So, cointegration becomes an over-riding need for any econometric modelling occupying the non-stationary time series (Asteriou & Hall, 2007).

The most powerful and reliable method of testing the cointegration between the variables is Johansen Cointegration test. Cointegration only tells about long-run relationship between the series but it does not fix the direction of such relationship (Luo, 2013). For Johansen cointegration test, Trace statistics and Maximal Eigenvalue statistics are used which can be expressed as follows (Luo, 2013), (Asteriou & Hall, 2007);

$$\lambda_{Trace}(r) = T \sum_{i=r+1}^{g} \ln\left(1 - \hat{\lambda}_i\right) \text{ ..... (3.8)}$$

$$\lambda_{Max}(r, r+1) = -T \ln\left(1 - \hat{\lambda}_{r+1}\right) \text{ ..... (3.9)}$$

The bivariate Johnsen cointegration test has been performed in this study. When the data are found to be co-integrated, the study has performed the Vector Error Correction Method for long-run and short-run relation between variables. When the data are not co-integrated, the unrestricted Vector Autoregressive Model has been used for short-run relationship.

3.5.4 Vector Error Correction Method (VECM)

VECM is used for cointegrating model with first-difference stationary data. It can be used to test the short-run and long-run causality between a dependent and an explanatory variable: the long-run causality (from exaplanatory variable to dependent variable) can be identified in the test of the significance of the error-correction coefficient of the VECM by using ordinary least squares (OLS) estimation of the model (Luo, 2013). For instance, the VECM equation for the RGDP and RM is as follows (Asteriou & Hall, 2007);

For example, the bivariate error correction model as RGDP as dependent and RM as explanatory variable is given as :

$$\Delta RGDP_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta RGDP_{t-1} + \sum_{i=1}^{n} \alpha_{2i} \Delta RM_{t-1} + \sum_{i=1}^{n} \alpha_{3i} \Delta EC_{t-n} + e_i \quad \text{..... (3.10)}$$

For the long run causality form RM to RGDP α_3 must be significant.

3.5.5 Unrestricted Vector Autoregressive (VAR) Model

The models which are not co-integrated has been tested short run causality under unrestricted VAR. As the data are integrated of first order, the first-difference data have been used for the VAR models. The equation of bivariate VAR models are as follows (Asteriou & Hall, 2007);

$$\Delta RGDP_t = \beta_{10} - \beta_{12} \Delta RM_t + \gamma_{11} \Delta RGDP_{t-1} + \gamma_{12} \Delta RM_{t-1} + u_{yt} \quad \text{..... (3.11)}$$

$$\Delta RM_t = \beta_{20} - \beta_{21} \Delta RGDP_t + \gamma_{21} \Delta RGDP_{t-1} + \gamma_{22} \Delta RM_{t-1} + u_{xt} \quad \text{.....(3.12)}$$

3.5.6 Granger Causality Test

The Granger causality/ block exogeneity wald test has been performed under both VECM and VAR for the short-run causality between the variables. For instance, the Granger causality test between real income and real money supply is given as (Gujarati & Sangeetha, 2007);

$$\Delta RGDPt = \sum_{i=1}^{n} bi\ \Delta RM(t-i) + \sum_{j=1}^{n} ci\ \Delta RGDP(t-j) + e2t \quad \text{..... (3.13)}$$

$$\Delta RMt = \sum_{i=1}^{n} gi\ \Delta RM(t-i) + \sum_{j=1}^{n} hi\ \Delta RGDP(t-j) + e3t \quad \text{..... (3.14)}$$

Where e_{2t} and e_{3t} are disturbances and assumed to be uncorrelated to each other.

Unidirectional causality from RM to RI is indicated if $\Sigma b_i \neq 0$ and $\Sigma h_i = 0$. Conversely, unidirectional causality from RI to RM exists if $\Sigma b_i = 0$ and $\Sigma h_i \neq 0$. Feedback or bilateral causality is suggested if both coefficients $\Sigma b_i \neq 0$ and $\Sigma h_i \neq 0$. Finally, independence is suggested if $\Sigma b_i = 0$ and $\Sigma h_i = 0$. (Gujarati & Sangeetha, 2007).

The Granger causality test for other models are also same as above.

3.5.7 Residual Test

The serial correlation is tested by using Breush- Godfrey Serial Correlation LM tests in this study. The heteroscedasticity is checked by using Breush-Pagan Godfrey test. Accordingly Jarque-bera test is used to test the normality of residuals. Similarly, Cumulative Sum test and cumulative sum of square test are used to test the stability of the models.

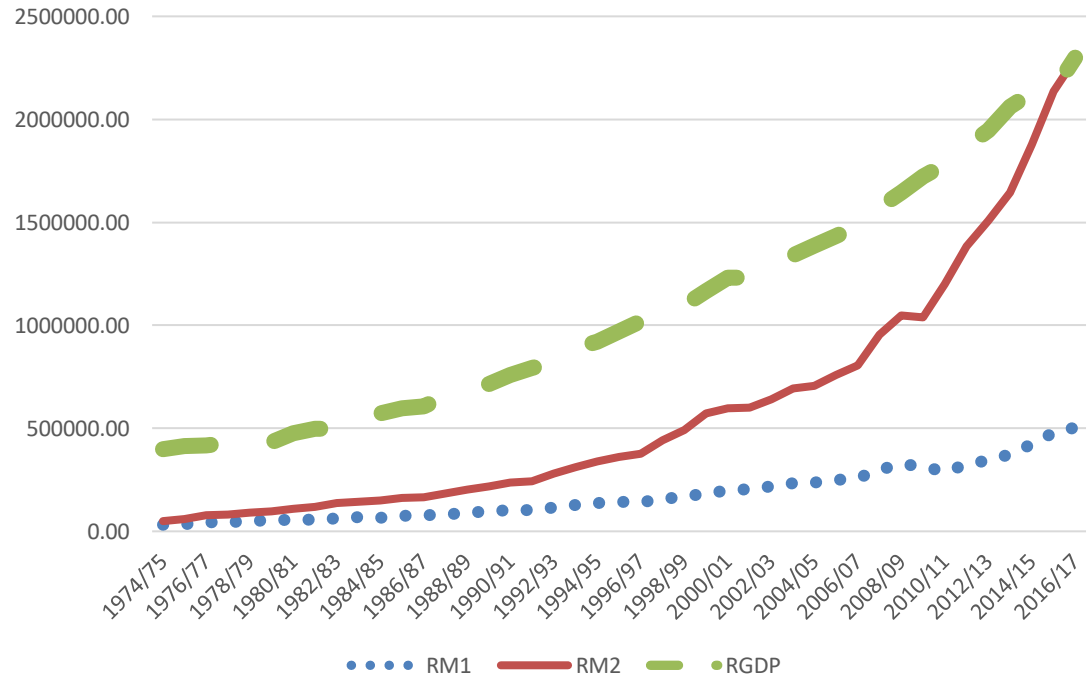
CHAPTER IV
FINDINGS AND ANALYSIS OF RELATIONSHIP BETWEEN MONEY SUPPLY, INCOME AND PRICE LEVEL IN NEPAL

This chapter contains the finding and analysis of the study. The trend, structure and composition of the variables are shown and analyzed with the help of different figures. The inferential statistics results to analyze the relationship between variables are also presented in this chapter through tables.

4.1 Trend and Structure of GDP, M_1, and M_2

As most of the time series data have a nature of increasing trend, our variables are also showing the increasing trend. In figure 4.1, the trends of GDP, M_1 and M_2 has been shown. All of the variables such as real broad money supply (RM2), real narrow money (RM1) and real GDP are in increasing trend over time. The vertical axis provides the figure in Nepalese rupees million whereas the horizontal axis is fiscal year.

Figure 4.1: Trends of GDP, M1 and M2

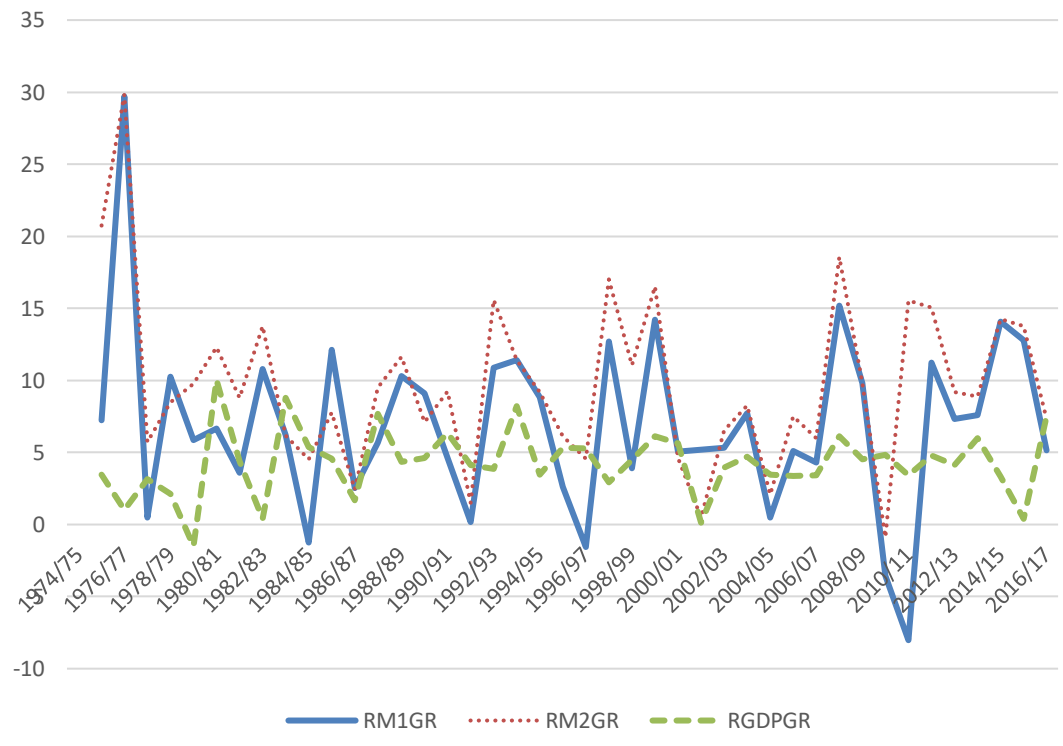


Source: Annex II

The figure 4.1 shows the trends and structure of the real GDP, real broad money supply and the real narrow money supply. The real figures are based on 2014/15 prices. The real GDP has an increasing trend over time. The real GDP has figured Rs 398752.85 million in fiscal year 2074/75 whereas this figure has risen up to Rs 2299352.86 million in the end of the FY 2016/17.

Accordingly, at the end of the fiscal year 1974/75 the real broad money supply figured Rs. 49586.49 million which is only one and half times more than the figure of real narrow money supply (Rs.32131.30 million). But at the end of the fiscal year 2016/17 the real broad money supply has figured Rs. 2292690.11 million which is almost four and half times greater than the figure of real narrow money supply (Rs. 503708.85 million). So, it shows the growth rate of both money supply in real terms are in increasing trend but the growth rate of real broad money supply is higher than that of real narrow money supply.

Figure 4.2: Growth Rates of GDP, M1 and M2



Source: Annex II

The figure 4.2 shows the growth rates of GDP, M_1 and M_2 over time. The GDP have faced negative growth rate in exceptional case throughout the sample period. RGDP has faced a negative growth rate of -1.50 percent in the FY 1979/80. The highest

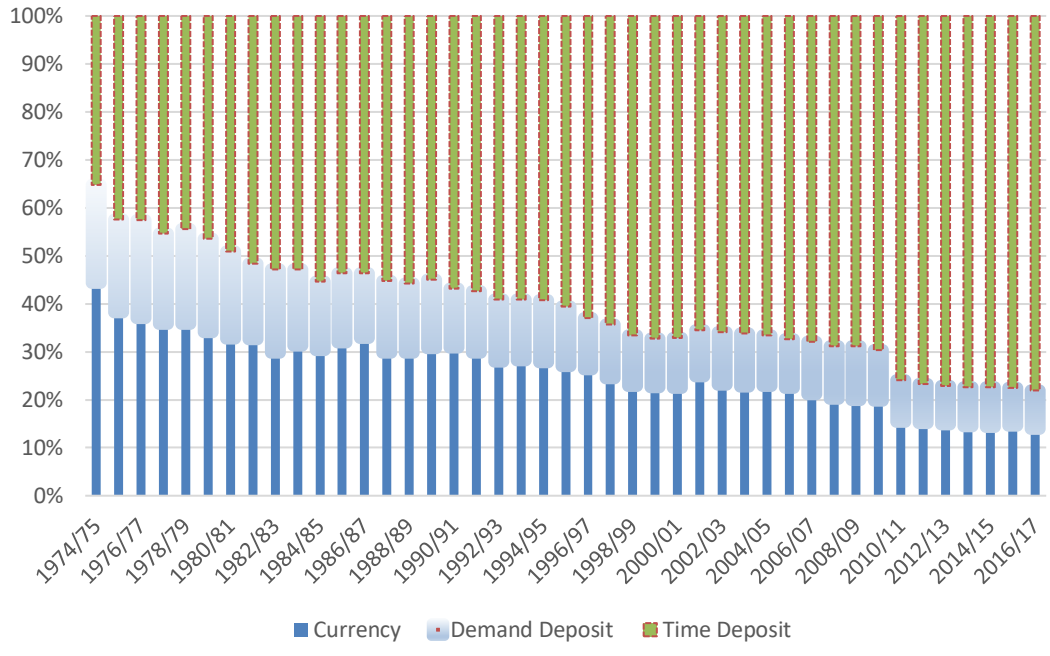
growth rate of RGDP was 10.03 percent in FY 1980/81 followed by 8.80 percent in FY 1983/84 and 7.70 percent in FY 1987/88. Recently in FY 2016/17, it has grown by 7.50 percent which is one of the highest growth rate in the entire series. The average growth rate of RGDP in Nepal for the entire sample period is just 4.29 percent.

Accordingly, the real narrow money supply growth has become negative in four times (in fiscal years 1984/85, 1996/97, 2009/10 and 2010/11) whereas the real broad money supply has declined only in the fiscal year 2009/10. Observing throughout the sample period, the real broad money supply has grown highest at the rate of 29.83 percent in the fiscal year 1975/76 followed by 20.74 percent in FY 1974/75 and 18.58 percent in FY 2007/08. Likewise, the real narrow money supply has grown highest at the rate of 29.70 percent in FY 1975/76 followed by 15.17 percent in 2007/08 and 14.22 percent in FY 1999/00. The average growth rate of real broad money supply and real narrow money supply in the sample period was 9.71 and 6.95 percent respectively.

4.2 Composition of Money Supply

The composition of money supply has been explained with the help of figure 4.3.

Figure 4.3: Composition of Money Supply



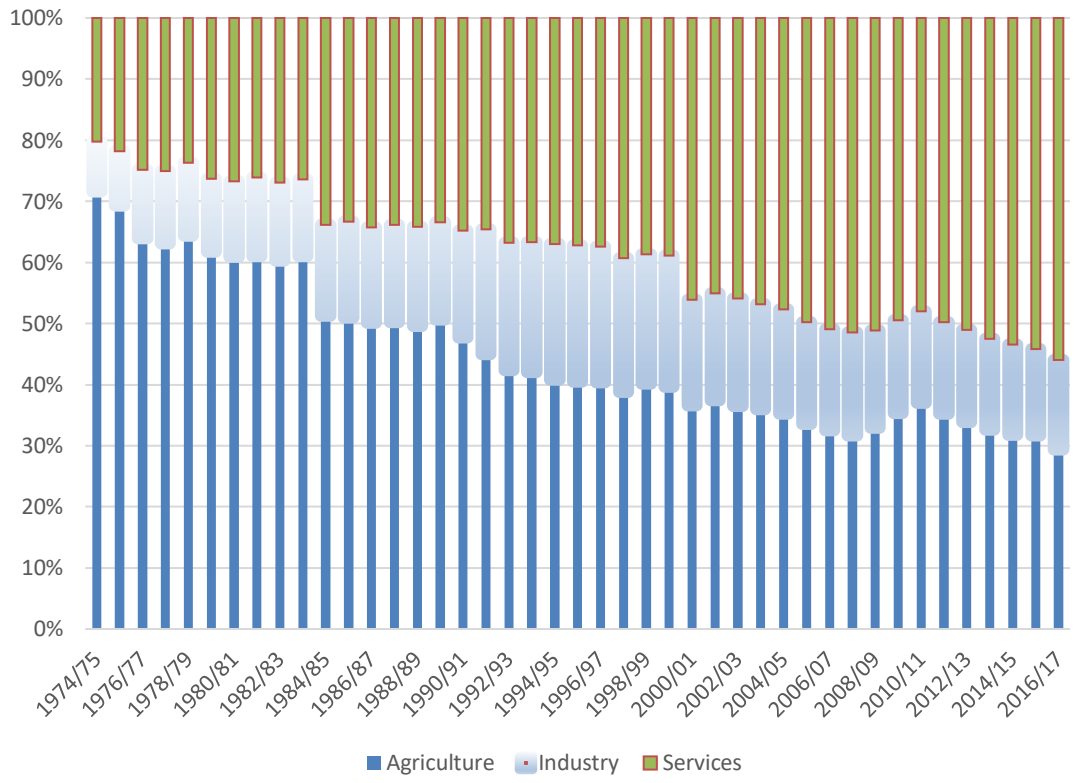
Source: Annex III

The figure 4.3 tells us that the composition of money supply has been changing over time. The percentage of currency and demand deposit has been decreasing whereas the percentage of time deposit is increasing sharply over time. So, we can also deduct the fact that the increment of narrow money supply is slower than that of broad money supply.

4.3 Composition of GDP

The composition of GDP has been presented with the help of figure 4.4.

Figure 4.4: Composition of GDP



Source: Annex IV

In figure 4.4 shows the composition of GDP in Nepal. The GDP of Nepal comprises three major sectors in the economy which are agriculture, industry and services. The Figure shows that the share of agriculture, industry and services were 71.6, 8.2 and 20.2 percent respectively in the FY 1974/75. The share had become 40.5, 22.3 and 37.2 percent respectively in the FY 1995/96. In the FY 2016/17 it has become 29.4, 14.6 and 56.0 percent respectively.

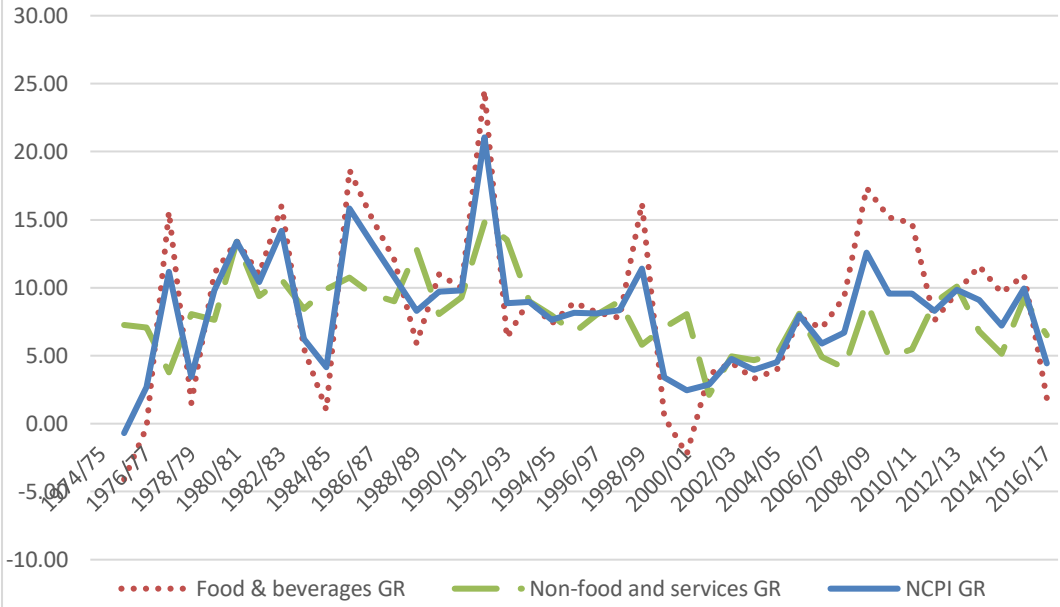
The study can have the conclusion that the Nepalese economy is becoming service oriented in recent time. The share of agriculture is in decreasing trend throughout the sample period whereas the share of services sector is in increasing trend. But the interesting fact is that the share of industry sector tended to increase until FY1995/95 and again has tendency to decrease until FY 2015/16. In the FY 2016/17, it is slightly grown, having 14.6 percent share of GDP compared to 14.2 percent of FY 2015/16.

4.4 Trend, Structure and Composition of NCPI

The trend, structure and composition of NCPI in Nepal has been analyzed with the help of figure 4.5. The NCPI is based on the 2014/15 price. The NCPI was 4.2 in the FY 1974/75, 14.7 in FY 1989/90, 36.3 in FY 1999/2000, 65.6 in FY 2009/10 and it became 114.8 in FY 2016/17. Seemingly, the NCPI is in increasing trend throughout the sample period except the FY 1975/76 when the variable is decreased by -0.69. The NCPI has positively grown throughout the sample period except 1975/76. The highest growth rate gathered by NCPI is 21.05 percent in FY 1991/92 followed by 15.84 percent in FY 1985/86 and 14.17 percent in FY 1982/83. In the fiscal year 2016/17 it is increased by 4.46 percent which is quite lower than the average of entire sample period, that is, 8.29 percent. The lowest positive growth rate achieved by NCPI was 2.43 percent in FY 2000/01 followed by 2.70 percent in FY 1976/77 and 2.89 percent in FY 2001/02.

The NCPI of Nepal is composed by an amalgam of consumer price index of food and beverages as well as the non-food and services. It is the weighted average of these both indexes. The line diagram shows the comparable trend of food and beverages, non-food and services and overall indexes.

Figure 4.5: Growth Rate of NCPI and Its Components



Source: Annex V

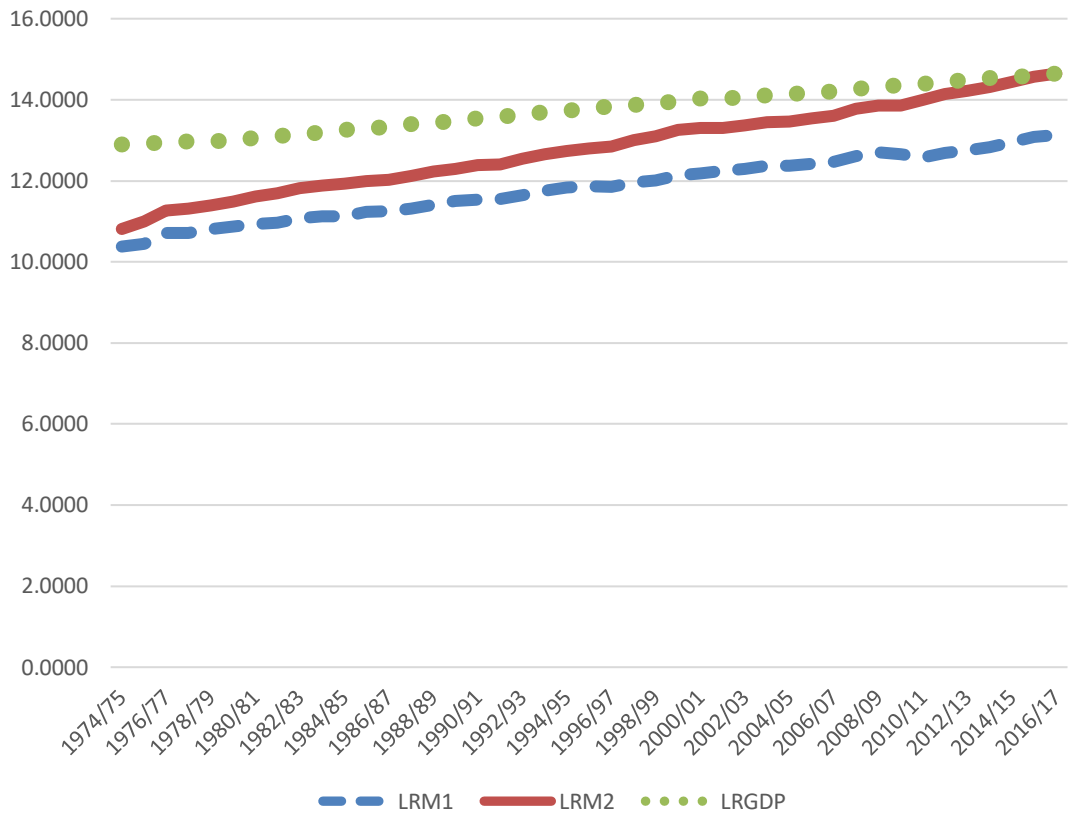
The figure 4.5 expresses the comparative growth rate between overall NCPI growth rate and its components' growth rate over time. It is clearly shown that the NCPI is a weighted average of the two indexes so that its growth rate passes through in between these two growth rate. Throughout the sample period, sometimes the growth rate of food and beverages index is more than that of non-food and services index whereas sometimes the non-food and services index is higher than that of food and beverages. But the NCPI is always in the middle of these two. On an average, the growth rate of food and beverages index is 8.76 percent which is slightly more than that of NCPI (8.29 percent). Likewise, the average growth rate of non-food and services index is 7.97 percent which is less than that of overall NCPI.

4.5 Trends of Logarithmic Variables

On the one hand, the time series data usually have a problem of unit root using its original level data. But in our case, the original data are non-stationary even in the second difference. On the other hand, the time series data are too large. So, to avoid these problem in some extent, the natural logarithm has been used to all variables for

inferential analysis. The natural logarithm can ease these problem by keeping the nature of variables unchanged.

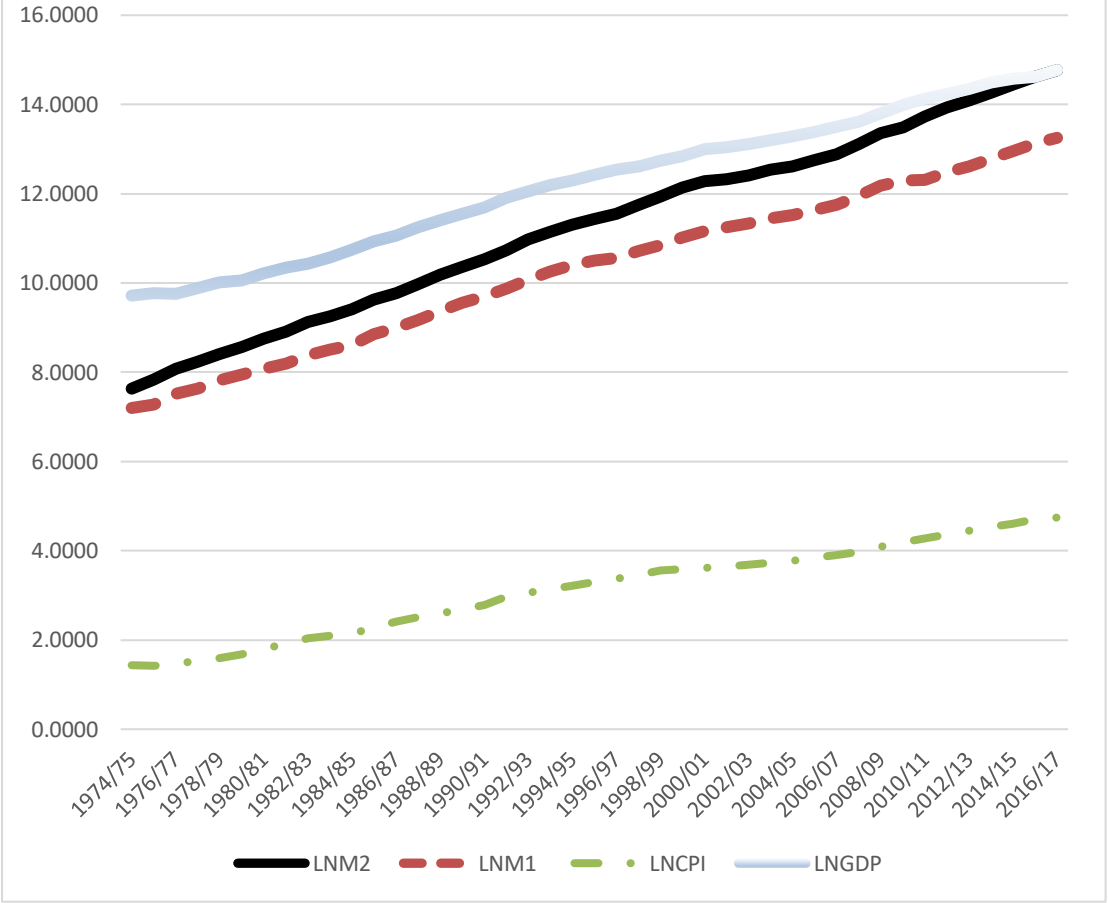
Figure 4.6: Trends of Logarithmic Real Variables



Source: Annex VII

In the figure 5.6, the trend of logarithmic real variables has been presented. It seems that all real variables used in the study (real GDP, real narrow money supply and real broad money supply are in increasing trend. It suggests that the variables are not stationary.

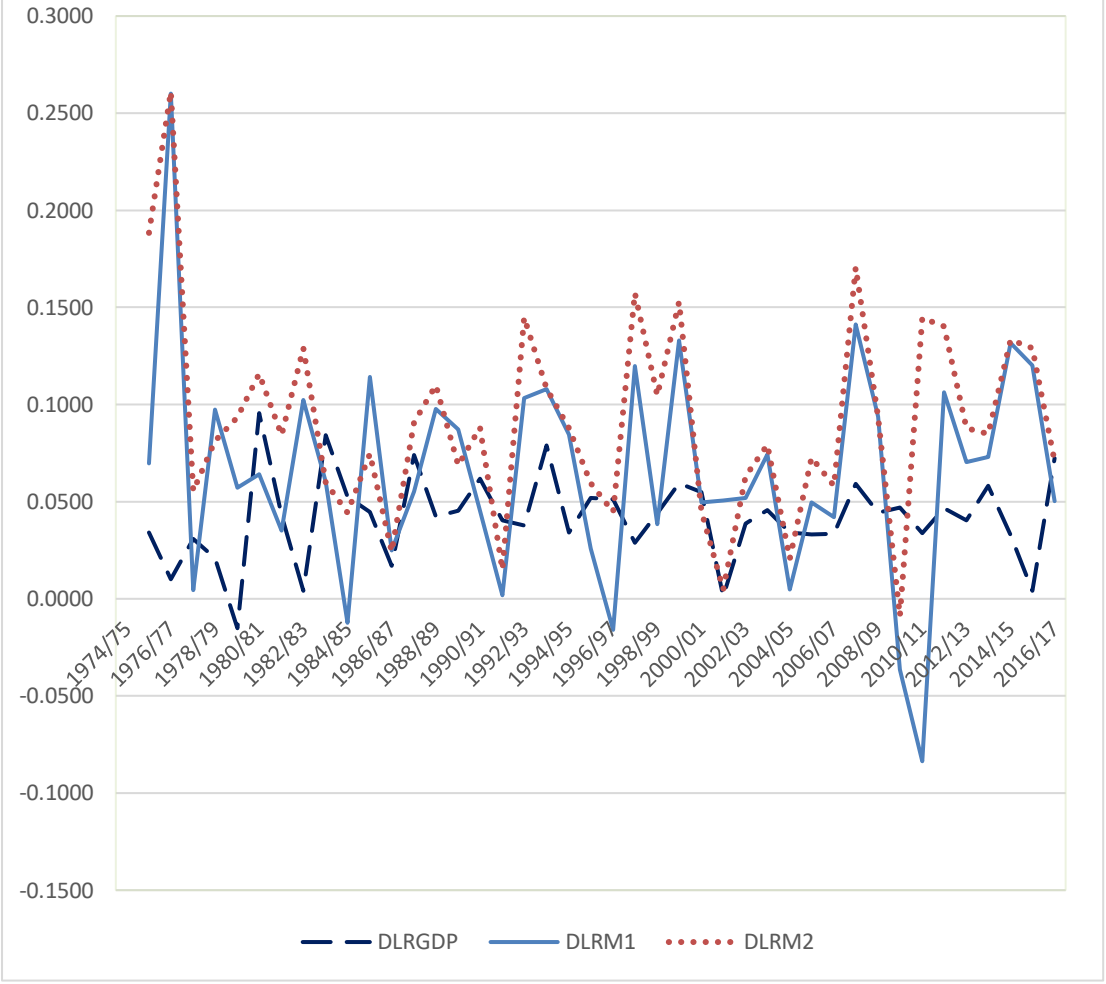
Figure 4.7: Trends of Logarithmic Nominal Variables



Source: Annex VII

The trends of LNGDP, LNM_1, LNM_2 and LNCPI have been shown in the figure 4.7. It is obvious as most of the time series variables nominal GDP, nominal narrow money supply, nominal broad money supply and the national consumer price index are in increasing trend. It also suggests that the variables are not stationary in its level form.

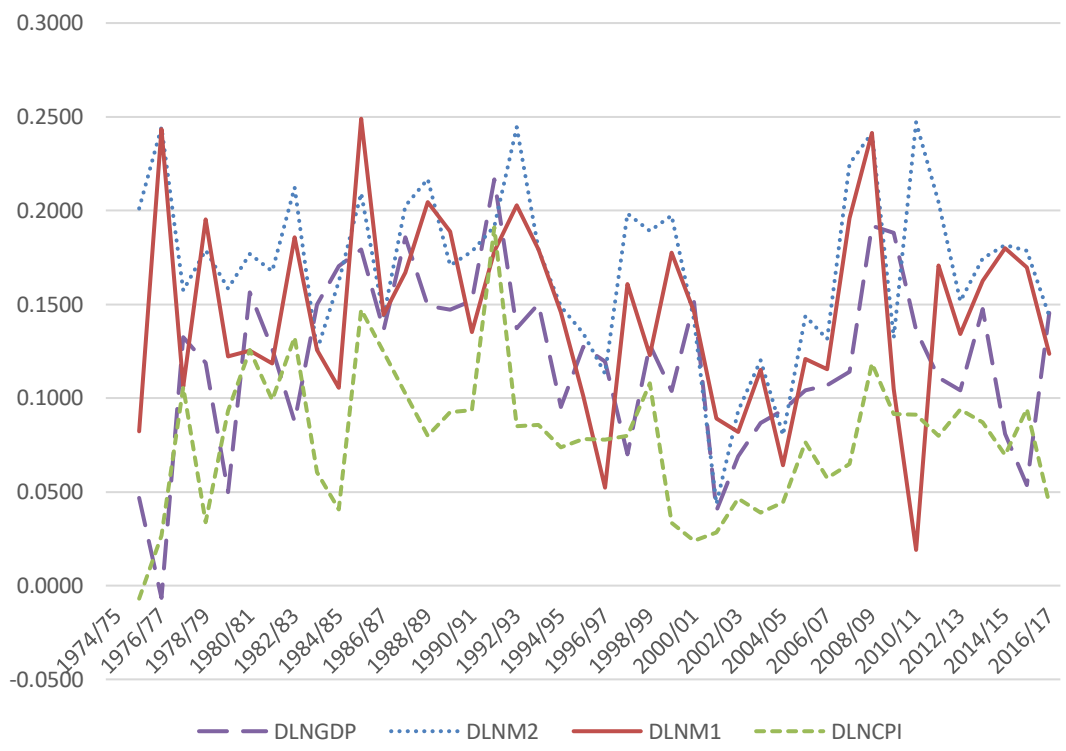
Figure 4.8: Trends of First difference of Logarithmic Real Variables



Source: Annex VIII

The figure 4.8 shows the trends of first difference of LRGDP, LRM_1 and LRM_2. It seems that the first difference of logarithmic real variables are fluctuating around the average. So, there is possibility of being stationary of the first differenced real data.

Figure 4.9: Trends of First difference of LNGDP, LNM1, LNM2 and LNCPI



Source: Annex VIII

Accordingly, the figure 4.9 shows the trends of first difference of LNGDP, LNM_1, LNM_2 and LNCPI. It seems that the first difference of logarithmic nominal variables are also fluctuating around the average. So, there is possibility of being stationary of the first differenced nominal data.

The unit root test has been performed extensively in the next section which gives a clear sight that whether the variables are stationary or not.

4.6 Results of Unit Root Test

The Augmented Dickey-Fuller (ADF) is used to test the unit root of the dependent and explanatory variables. The table 4.1 shows the results of Augmented Dickey-Fuller tests of the time series variables used in this study.

Table 4.1: Results of Augmented Dickey-Fuller Tests

Variable	Level		First Difference		Order of Integration
	Intercept without trend	Intercept with trend	Intercept without trend	Intercept with trend	
LNGDP	0.002 [0.9533]	-1.338 [0.8642	-4.640* [0.0005]	-4.590* [0.0036]	I(1)
LRGDP	-0.197 [0.9691]	-3.116 [0.1159]	-7.807* [0.0000]	-6.415* [0.0000]	I(1)
LNCPI	-0.597 [0.8606]	-1.387 [0.8501]	-4.979* [0.0002]	-5.050* [0.0010]	I(1)
LNM1	-0.957 [0.7597]	-1.506 [0.8118]	-6.143* [0.0000]	-6.879* [0.000]	I(1)
LRM1	-0.933 [0.7679]	-4.094 [0.0128]	-6.891* [0.0000]	-6.879* [0.0000]	I(1)
LNM2	-0.730 [0.8278]	-2.066 [0.5488]	-4.535* [0.0007]	-4.542 [0.0041]	I(1)
LRM2	-0.983 [0.7506]	-4.020 [0.0155]	-5.900* [0.0000]	-5.816* [0.0001]	I(1)

Source: writer's own calculation using e-views 9

Note:

1. H0: has a unit root (non-stationary)
   H1: does not has a unit root (stationary)
2. Star * shows 1 percent level of significance
3. The p-values are based on MacKinnon (1996) one-sided p-values

The table 4.1 shows that LNGDP, LRGDP, LNCPI, LNM_1, LRM_1, LNM_2 AND LRM_2 have unit root at 1 percent level of significance in both intercept with trend and without trend in the form of level data. So, the variables are not stationary at level. However, all these variables are stationary at 1 percent level of significance with first differenced form in both intercept with trend and without trend. It means all the variables are integrated of order 1. i.e. I(1). Hence, the variables can be used for Johansen Cointegration test.

4.7 Lag Length Selection

The table 4.2 has presented the lag length selection of different models under Swartz Information Criterion (SIC).

Table 4.2: Optimal Lag Length Selection for Johansen Cointegration Tests

Model		Lag length selection	
Dependent	**Explanatory**	**Lags**	**SIC**
LRGDP	LRM1	1	-7.702*
LRGDP	LRM2	1	-7.767*
LNCPI	LNM1	1	-7.053*
LNCPI	LNM2	1	-7.258*
LNGDP	LNCPI	1	-7.559*

Source: writer's own calculation using e-views 9

Note: *shows the minimum SIC value, where the corresponding lag length is optimal for the particular model.

The table 4.2 shows that all five models in this study can be tested by using lag length 1 which is suggested by Swartz Information Criterion (SIC).

4.8 Results of Johansen Cointegration Tests

Since all the variables used are I (1), cointegration test can be done for the models. The lag length for all the models is uniformly one. There are five models in this study. Now, the next task is to perform Johansen Cointegration tests for all bivariate models in this study one by one.

Table 4.3: Results of Johansen Cointegration Tests for LRGDP and LRM1

Hypothesized No. of CE(s)	Trace Statistics	p-value for trace statistics	Max-Eigenvalue statistics	p-value for Max-Eigenvalue
None	26.798*	0.0007	26.798*	0.0003
At most 1	0.001	0.9806	0.001	0.9806

Source: writer's own calculation using e-views9

Notes:

1. Star * denotes the rejection of hypothesis at 1 percent level of significance
2. The p-values are MacKinnon-Haug-Michelis (1999) p-values

The table 4.3 presents the results of Johansen cointegration tests for the model 1 where there are two variables LRGDP and LRM1. The both trace statistic and max-eigenvalue tests show one cointegrating equation at 1 percent level of significance. It shows that there is long run association between real GDP and real narrow money supply. So the VECM is performed in the next section.

Likewise, the table 4.4 shows the results of Johansen cointegration tests for the model with LRGDP and LRM2. The Maximum Eigenvalue statistic suggests that there are only one cointegrating equation at 10 percent level of significance. So we can say that there may be a long run relationship between RGDP and RM2.

Table 4.4: Results of Johansen Cointegration Tests for LRGDP and LRM2

Hypothesized No. of CE(s)	**Trace Statistics**	**p-value for trace statistics**	**Max-Eigenvalue statistics**	**p-value for Max-Eigenvalue**
None	13.379	0.1016	13.333*	0.0698
At most 1	0.046	0.8304	0.046	0.8304

Source: writer's own calculation using e-views9

Notes:

1. Star * denotes the rejection of hypothesis at 10 percent level of significance
2. The p-values are MacKinnon-Haug-Michelis (1999) p-values

Similarly, the results of Johansen cointegration tests for the model with LNCPI and LNM1 have been shown in the table 4.5. The both statistics suggest that there is one cointegrating equation at 10 percent level of significance. So the study has found that there is a long run association between RGDP and RM2.

Table 4.5: Results of Johansen Cointegration Tests for LNCPI and LNM1

Hypothesized No. of CE(s)	Trace Statistics	p-value for trace statistics	Max-Eigenvalue statistics	p-value for Max-Eigenvalue
None	9.296	0.3387	6.517	0.5478
At most 1	2.779*	0.0955	2.779*	0.0955

Source: writer's own calculation using e-views9

Notes

1. Star * denotes the rejection of hypothesis at 10 percent level of significance
2. The p-values are MacKinnon-Haug-Michelis (1999) p-values

In the table 4.6, the results of Johansen cointegration tests for the model with LNCPI and LNM2 has been shown. The both statistics suggest that there is no cointegrating equation at 10 percent level of significance.

Table 4.6: Results of Johansen Cointegration Tests for LNCPI and LNM2

Hypothesized No. of CE(s)	Trace Statistics	p-value for trace statistics	Max-Eigenvalue statistics	p-value for Max-Eigenvalue
None	4.071	0.8977	3.482	0.9096
At most 1	0.589	0.4428	0.589	0.4428

Source: writer's own calculation using e-views9

Notes:

1. Star * denotes the rejection of hypothesis at 10 percent level of significance
2. The p-values are MacKinnon-Haug-Michelis (1999) p-values

So, there is no long run relationship between NCPI and NM2. So the unrestricted VAR Granger causality is performed for the short run causality of the model in next section.

Table 4.7: Results of Johansen Cointegration Tests for NGDP and NCPI

Hypothesized No. of CE(s)	Trace Statistics	p-value of trace statistics	Max-Eigenvalue Statistics	p-value for max-eigenvalue
None	8.850	0.3795	8.309	0.3481
At most 1	0.540	0.4623	0.540	0.4623

Source: writer's own calculation using e-views9

Notes:

1. Star * denotes the rejection of hypothesis at 10 percent level of significance
2. The p-values are MacKinnon-Haug-Michelis (1999) p-values

In the table 4.7, the results of Johansen cointegration test for the model with LNGDP and LNCPI is presented. The both statistics suggest that there is no long run association between NGDP and NCPI in Nepal. So the unrestricted VAR Granger causality has been performed for the short run causality of the model in next section.

4.9 Results of VECM Results

The long-run causality of cointegrating variables has been tested with the help of Vector Error Correction Model (VECM) framework. It is found that the bivariate models with LRGDP and LRM1, LRGDP and LRM2 as well as LNCPI and LNM1 have the long-run cointegrating relationship.

Table 4.8: Results of VECM long run causality of the cointegrating model

Model	Dependent variable	Explanatory variable	Coefficient of CE	Standard error	t-statistics	p-value	Direction of causality
1	LRGDP	LRM1	-0.176**	0.0705	-2.4988	0.0147	Bi-directional long-run causality
	LRM1	LRGDP	-0.564*	0.1147	-4.9208	0.0000	
2	LRGDP	LRM2	-0.173**	0.0766	-2.2631	0.0266	Bi-directional long-run causality
	LRM2	LRGDP	-0.262*	0.0910	-2.8827	0.0052	
3	LNCPI	LNM1	-0.164***	0.0972	-1.6830	0.0966	Uni-directional long-run causality from NM1 to NCPI
	LNM1	LNCPI	-0.115	0.0852	-1.3523	0.1804	

Source: writer's own calculation by using e-views9

Note:

1. Star * indicates the rejection of null hypothesis at 1% level of significance, ** indicates the rejection of null hypothesis at 5% level of significance and *** indicates the rejection of null hypothesis at 10% level of significance.
2. CE stands for cointegrating equation.

The table 4.8 shows the results of the VECM long-run causality tests of the cointegrationg model. In the model 1, the study has found the bidirectional causal relationship between real GDP and the real narrow money supply in the long-run at 5 percent level of significance. Similarly, in the model 2, there is long-run bidirectional causal relationship between real GDP and real broad money supply at 5 percent level of significance. But in the model 3, there is a unidirectional causal relationship between NCPI and the narrow money supply in nominal term in the long-run at 10 percent level of significance.

Now, the short-run causality between the variables in these three models is presented in the table 4.9 where the results of Vector Error Correction Granger Causality/ Block Exogeneity Wald tests have been shown.

Table 4.9: Results of VEC Granger Causality/ Block Exogeneity Wald tests for short-run causality

Model	Dependent variable	Explanatory variable	Chi-square statistics	p-value	Direction of causality
1	DLRGDP	DLRM1	0.7530	0.3855	No short-run causality
	DLRM1	DLRGDP	1.8436	0.1745	
2	DLRGDP	DLRM2	0.0003	0.9854	No short-run causality
	DLRM2	DLRGDP	1.3838	0.2395	
3	DLNCPI	DLNM1	0.3874	0.5337	No short-run causality
	DLNM1	DLNCPI	0.0313	0.8595	

Source: writer's own calculation by using e-views9

Note: Star *** indicates the rejection of null hypothesis at 10% level of significance.

Table 4.9 shows that there is no short-run causation between variables in all three cointegrating models. In this test, chi-square statistics is used and the p-values of the all models which are more than even 10% suggest that the null hypothesis of there is no short-run causality cannot be rejected.

So in a nutshell, the study infers that there are bidirectional causality between real GDP and both form of real money supply. And there is a unidirectional causality runs from nominal money supply to NCPI.

4.10 Results of Unrestricted VAR Results

In this heading, the short-run causal relationship between the variables of the bivariate models which are found to be not cointegrated in the long-run are investigated. While testing the long-run association of the variables in the section 4.8, the model with NCPI and nominal broad money supply as well as nominal GDP and NCPI do not have the long-run relationship. However, it is mandatory task for this study to go for the short-run causality investigation of the variables.

Table 4.10: Results of VAR Granger Causality/Block Exogeneity Wald tests

Model	Dependent variable	Explanatory variable	Chi-square statistics	p-value	Direction of causality
4	DLNCPI	DLNM2	1.5766	0.2092	No short-run causality
	DLNM2	DLNCPI	1.5400	0.2146	
5	DLNGDP	DLNCPI	5.5282**	0.0187	Unidirectional short-run causality from NCPI to NGDP
	DLNCPI	DLNGDP	0.2453	0.6204	

Source: writer's own calculation by using e-views9

Note: Star ** indicates the rejection of null hypothesis at 5% level of significance.

In table 4.10, the results of Vector Auto Regressive (VAR) Granger Causality/Block Exogenity Wald tests for short-run causality has been performed. It is found that there is no short-run causal relationship between NCPI and the nominal broad money supply. However, the test shows that the unidirectional causality runs from NCPI to nominal GDP in the short-run at 5% level of significance.

4.11 Results of Residual Diagnostic of the Models

a) Results of Serial Correlation Test

The results of Breusch-Godfrey Serial Correlation LM Test to test the serial correlation are presented in Annex IX (a). The results in Annex IX (a) shows that there is not any serial correlation problem in the all models used in this study as the p-value are more than 5 percent.

b) Results of Heteroscedasticity Test

The results of Breush- Pagan Godfrey tests are presented in Annex IX (b). There is not any problem of Heteroskedasticity found in all models used in this study as the p-values are more than 5 percent. So the residuals have equal variance.

c) Results of Normality Test

As the sample period is just 43 which may not be sufficient for time series analysis. So the residuals are not found normally distributed except model 5 which is presented in Annex IX (c).

d) Results of Stability Test

The stability of the model is tested by using CUSUM and CUSUM square tests which is shown in Annex (d). The test shows that the models are more or less stable though in some model the red line is crossed which violets the 5 percent critical bound.

CHAPTER V

SUMMARY, CONCLUSSIONS AND RECOMMENDATIONS

This chapter consists of major summary of findings, conclusions and recommendations of the study.

5.1 Summary of Findings

The major findings of the study from chapter IV are summarized in this section. First of all, the trend, structure and composition of GDP, M_1, M_2 and NCPI were analyzed. Then the inferential statistics were used to analyze the causal relationship between variables.

This study found that GDP, narrow money and broad money are in an increasing trend over time. However, the increment rates of these variables are not stable. All these variables have faced negative growth rates as well. The average growth rate of RGDP, RM_1 and RM_2 are 4.29%, 6.95% and 9.71% respectively.

The money supply is composed mainly with the currency, demand deposit and time deposit. Narrow money supply comprises the former two whereas the broad money supply compiles all of these components. The share of these components is also changing over time. The share of time deposit is in increasing trend whereas the share of currency and demand deposit are declining.

The GDP is composed by the agriculture, industry and services sectors. The contribution of agriculture sector on GDP is in decreasing trend over the sample period whereas the share of services sector is increasing continuously. The share of industry sector was increasing till fiscal year 1995/96 but after that it is declining.

The NCPI is growing throughout the sample period. The average rate of inflation in the sample period is 8.29%. The NCPI is composed with the CPI of food and beverages as well as the CPI of non-food and services. The average inflation rate of these categories are 8.76% and 7.97% respectively.

The original data are too large to analyze through inferential statistics. So, the data are converted into natural logarithms form so that the data are easy to handle. The all

variables such as LNGDP, LRGDP, LNCPI, LNM_1, LRM_1, LNM_2 and LRM_2 are found to be integrated of order 1 i.e. I (1). So the Johansen Cointegration test was performed. For that the appropriate lag length were selected for different models. The SIC criterion suggested the lag length of 1 for all five models.

The Johansen cointegration test shows the long-run relationship between variables in first three models. So, VECM was used for the long-run and short-run causality test for these models. Accordingly, the unrestricted VAR have been used for the short-run causality test for other two (fourth and fifth) non-cointegrating models.

The VECM results show the bidirectional long- run causality between RGDP and RM_1 as well as RGDP and RM_2 at 5% level of significance. But there is unidirectional long-run causality runs from NM_1 to NCPI at 10% level of significance. In these all three models the VEC Granger causality/ block exogeinity wald test shows no evidence of short- run causality between the variables.

For the non-cointegrating models, the VAR Granger causality/ block exogeinity wald tests was performed by using the first differenced stationary data. No short run causality was found between NCPI and NM_2. However, there found an evidence of unidirectional short- run causality runs from NCPI to NGDP at 5% level of significance.

5.2 Conclusions

In this section, the conclusions of the study are drawn. The major conclusions of the study are as follows;

The increment of GDP and money supply suggests that the Nepalese economy is expanding over sample period. But the growth rate of money supply and inflation are a way too much higher than that of real income growth rate. It suggests that the economy of Nepal faced the inflationary pressure for the overall sample period.

Accordingly, the narrow money supply growth rates are quite lower than the broad money growth rate. It means that the growth rate of time deposit is higher than that of currency and demand deposit. It suggests that the financial institutions are growing

and the public prefer the more share of interest earning assets than the liquid money from their wealth portfolio.

Likewise, the food and beverages inflation is growing rapidly than the non-food and services inflation.

The main goal of this study was to find out the short-run and long-run causal relationship between the money supply, income and price level in Nepal. At the end, the paper is able to find out some inferences from the study. We found that there are bidirectional long-run casualty between the RGDP and RM1 as well as the RGDP and RM2. So, it is to conclude that in the long-run the real money supply causes the real income and real income also reciprocates the real money supply (without causing in the short-run) in Nepal. In other words, the money supply causes the income in the long-run with strong feedback effect.

But there is no evidence of short run causation between these two variables. It means the growth rate of money supply and income in Nepal is not associated.

Likewise, the study has found the unidirectional long-run relationship runs from NM1 to NCPI. However, there is no short-run relationship from either side. Here, it is to conclude that, the nominal narrow money supply causes the general price level of the country in the long-run without feedback.

However, there is no evidence of long-run as well as short-run relationship between NCPI and NM2. It concludes that there is no association between general price level and broad money supply of Nepal in both short and long run.

From the both short-run results between money supply and inflation, it can be inferred that there is no evidence of short-run relationship between the growth rate of money supply and inflation in Nepal.

Accordingly, there is no evidence of long-run causality between NGDP and NCPI. But, the study found the unidirectional short-run causality from NCPI to NGDP. It means that the growth rate of general price level affects the growth rate of nominal income of the nation.

At the end, the conclusions of our study do not support the monetarists' point of view which suggests that there is causal relationship runs from money supply to income and price in the short-run. They also postulate that the causality disappears in the long-run. Contrary to that our conclusion in the Nepalese context suggests that the money supply causes to national income with the same feedback and also causes to price level without feedback in the long-run.

This study also denied the early Keynesians' ignorance to the important role of money supply in the economy. However, this study supports the Keynesian view of indirect (long-run) relationship between the money supply, real income and prices. So, the conclusion of this study suggests that the money supply has significant role in the long-run rather than short- run for Nepalese economy.

5.3 Recommendations

This study intends to make some inferences which may be useful for the policymaker to make the appropriate policies for the nation. The major recommendations of this study have been prescribed as folows;

1. The inflationary pressure in Nepal is so high. As this study suggests, the nominal narrow money supply causes the general price level in the long-run but broad money supply does not. So, the monetary policy should be focused to increase the time deposit rather than the currency and demand deposit in the economy.
2. In this study, it is found that both real money supply causes the real income of the nation and real income also causes the both real money supply in the long-run. So, this paper suggests that the policymakers have to maintain an appropriate growth rate of money supply in real term to achieve the certain level of real income growth.
3. On the one hand, the main cause of the growth of nominal income of Nepal is the growth rate of the general price level. On the other hand, the nominal narrow money causes the price level in the long-run. It means that the policymakers can infer that the nominal narrow money supply causes the nominal income of the nation indirectly. Hence, the

narrow money supply can be an instrumental to handle the inflation and nominal growth rate in the long-run.

4. From the results of this study, the policymakers can view that the broad money supply is more appropriate than the narrow money supply because both causes the real income in the long-run but narrow money causes inflation as well. So, the increment in broad money supply is healthier than narrow money supply for the Nepalese economy.

ANNEX I: RAW DATA OF BASE VARIABLES

Figures are Rs. in million

Year	Narrow money supply (M1)	Broad money supply (M2)	NGDP	RGDP at 2001 price	NCPI at 2014/15 price	GDP deflater at 2014/15 price
1975	1337.70	2064.40	16601.00	143079.64	4.17	4.16
1976	1452.50	2524.00	17394.00	148042.04	4.14	4.22
1977	1852.90	3223.00	17280.30	149537.68	4.26	4.15
1978	2060.60	3772.10	19727.00	154214.78	4.73	4.59
1979	2504.90	4511.40	22215.00	157499.99	4.89	5.06
1980	2830.40	5285.30	23351.00	155131.18	5.37	5.40
1981	3207.80	6307.70	27307.00	170692.72	6.09	5.74
1982	3611.50	7458.00	30988.00	178222.77	6.73	6.24
1983	4348.90	9222.40	33821.00	178948.97	7.68	6.78
1984	4931.50	10455.20	39290.00	194692.06	8.16	7.24
1985	5480.00	12296.60	46587.03	205170.15	8.50	8.15
1986	7029.30	15159.00	55734.31	214537.71	9.84	9.32
1987	8120.20	17498.20	63864.50	218184.32	11.15	10.50
1988	9596.60	21422.60	76906.12	234977.21	12.35	11.74
1989	11775.40	26605.10	89269.62	245146.32	13.38	13.07
1990	14223.00	31552.40	103415.83	256508.94	14.68	14.47
1991	16283.60	37712.50	120370.27	272839.40	16.12	15.83
1992	19457.70	45670.50	149487.14	284047.87	19.51	18.88
1993	23833.00	58322.50	171491.89	294974.49	21.24	20.86
1994	28510.40	69777.10	199272.00	319219.15	23.14	22.40
1995	32985.40	80984.70	219175.00	330291.09	24.92	23.81
1996	36498.00	92652.20	248913.00	347920.76	26.94	25.67
1997	38460.30	103720.60	280513.00	366224.75	29.12	27.48
1998	45163.80	126462.60	300845.00	376999.38	31.55	28.63
1999	51062.50	152800.20	342036.00	393902.98	35.14	31.16
2000	60979.70	186120.80	379488.00	417992.15	36.33	32.58

2001	70577.00	214454.20	441518.55	441518.49	37.21	35.88
2002	77156.20	223988.30	459442.55	442048.99	38.29	37.29
2003	83754.10	245911.20	492230.78	459488.31	40.11	38.44
2004	93973.70	277310.10	536749.05	481004.32	41.70	40.04
2005	100205.80	300440.00	589411.67	497738.96	43.59	42.49
2006	113060.80	346824.10	654084.13	514485.63	47.06	45.62
2007	126887.99	395518.22	727826.97	532038.16	49.84	49.09
2008	154343.90	495377.10	815658.20	564516.90	53.18	51.84
2009	196459.38	630521.17	988271.53	590107.20	59.87	60.09
2010	218159.02	719599.12	1192773.57	618529.15	65.60	69.19
2011	222351.30	921320.10	1366954.07	639694.08	71.87	76.68
2012	263705.70	1130302.29	1527343.57	670279.36	77.85	81.76
2013	301590.19	1315376.28	1695011.10	697954.23	85.51	87.14
2014	354830.03	1565967.16	1964539.58	739754.36	93.27	95.29
2015	424744.63	1877801.53	2130149.57	764335.70	100.00	100.00
2016	503287.11	2244578.57	2247426.57	767491.58	109.90	105.07
2017	569402.39	2591701.99	2599233.71	825048.86	114.80	113.04

Source: various issues of economic survey, MOF and quarterly economic bulletin, NRB

Note: the GDP deflator is author's own calculation by using the formula [GDP deflator= (RGDP at 2014 price / NGDP)*100].

ANNEX II: RAW DATA OF REAL VARIABLES OF 2014 PRICES

Rs. In million

Year	RM1	RM2	RGDP
1975	32131.30	49586.49	398752.85
1976	34453.05	59868.85	412582.71
1977	44686.60	77729.45	416750.94
1978	44893.62	82181.51	429785.70
1979	49493.77	89139.77	438941.36
1980	52404.36	97856.40	432339.65
1981	55882.30	109884.89	475708.54
1982	57887.29	119541.30	496694.26
1983	64128.07	135991.79	498718.14
1984	68103.78	144385.81	542593.00
1985	67259.82	150924.66	571794.72
1986	75408.28	162621.34	597901.44
1987	77313.74	166603.20	608064.28
1988	81716.21	182416.02	654864.89
1989	90120.44	203616.30	683205.46
1990	98317.91	218109.13	714872.28
1991	102864.19	238231.46	760384.12
1992	103039.84	241851.87	791621.35
1993	114247.19	279577.97	822073.05
1994	127283.44	311516.84	889641.20
1995	138533.10	340122.05	920497.94
1996	142176.49	360922.91	969630.56
1997	139937.25	377385.91	1020642.50
1998	157729.99	441657.80	1050670.63
1999	163887.37	490419.04	1097779.76
2000	187189.43	571335.16	1164914.59
2001	196693.09	597668.62	1230480.82
2002	206888.32	600607.12	1231959.29
2003	217890.22	639749.52	1280561.46

2004	234698.31	692579.02	1340525.05
2005	235831.45	707076.84	1387163.31
2006	247843.57	760282.28	1433835.10
2007	258500.34	805762.57	1482752.74
2008	297703.65	955499.85	1573268.70
2009	326928.93	1049253.10	1644587.07
2010	315283.53	1039965.04	1723797.03
2011	289990.68	1201586.15	1782782.20
2012	322525.89	1382418.92	1868021.20
2013	346096.79	1509490.42	1945149.13
2014	372368.62	1643370.01	2061643.12
2015	424744.63	1877801.53	2130149.57
2016	478993.78	2136234.26	2138944.79
2017	503708.85	2292690.11	2299352.86

Source: Author's own calculation using excel

Note: the real values are deflated by the GDP deflator of 2014/15 price from ANNEX I.

ANNEX III: COMPOSITION OF MONEY SUPPLY

Rs. In million

Year	Currency	Demand Deposit	Time Deposit
1975	916.50	421.20	726.70
1976	963.50	489.00	1071.50
1977	1193.20	659.70	1370.10
1978	1351.90	708.70	1711.50
1979	1615.20	889.70	2006.50
1980	1799.30	1031.10	2454.90
1981	2065.70	1142.10	3099.90
1982	2436.70	1174.80	3846.50
1983	2752.00	1596.90	4873.50
1984	3273.40	1658.10	5523.70
1985	3737.30	1742.70	6816.60
1986	4842.90	2186.40	8129.70
1987	5746.10	2374.10	9378.00
1988	6374.60	3222.00	11826.00
1989	7946.60	3828.80	14829.70
1990	9718.20	4504.80	17329.40
1991	11654.50	4629.10	21428.90
1992	13639.70	5818.00	26212.80
1993	16313.00	7520.00	34489.50
1994	19659.70	8850.70	41266.70
1995	22493.90	10491.50	47999.30
1996	25046.40	11451.60	56154.20
1997	27333.70	11126.60	65260.30
1998	30893.20	14270.60	81298.80
1999	34984.30	16078.10	101737.70
2000	42143.00	18836.80	125141.10
2001	48295.10	22281.80	143877.20
2002	55658.30	21497.60	146832.10
2003	56885.22	26868.90	162157.10

2004	63218.90	30750.70	183336.40
2005	68784.10	31421.60	200234.20
2006	77780.40	35280.30	233763.30
2007	83553.30	43334.40	268630.23
2008	100175.20	54168.70	341033.20
2009	125758.49	70700.83	434061.79
2010	142114.54	76044.81	501440.10
2011	141931.50	80419.86	698968.80
2012	170491.69	93214.01	866596.59
2013	195874.24	105715.94	1013786.08
2014	227537.39	127292.65	1211137.13
2015	270080.36	154664.23	1453056.90
2016	327482.68	175804.43	1741291.46
2017	361745.91	207656.44	2022299.61

Source: Various quarterly economic bulletin, NRB

ANNEX IV: COMPOSITION OF GDP

Figures are in percentage

Year	Agriculture	Industry	Services
1975	71.62	8.16	20.22
1976	69.29	8.86	21.85
1977	63.91	11.20	24.88
1978	63.06	11.91	25.03
1979	64.32	11.98	23.70
1980	61.77	11.92	26.31
1981	60.90	12.36	26.73
1982	61.01	12.86	26.14
1983	60.30	12.80	26.90
1984	60.99	12.60	26.41
1985	51.22	14.96	33.82
1986	50.99	15.71	33.30
1987	50.09	15.63	34.29
1988	50.23	15.96	33.81
1989	49.60	16.28	34.12
1990	50.62	15.92	33.46
1991	47.68	17.53	34.79
1992	44.96	20.44	34.60
1993	42.38	20.80	36.81
1994	42.06	21.21	36.73
1995	40.75	22.21	37.04
1996	40.48	22.35	37.18
1997	40.36	22.27	37.38
1998	38.82	21.88	39.30
1999	40.11	21.19	38.70
2000	39.63	21.48	38.89
2001	36.58	17.29	46.13
2002	37.40	17.53	45.06
2003	36.49	17.64	45.87

2004	35.93	17.26	46.81
2005	35.19	17.13	47.68
2006	33.59	16.67	49.74
2007	32.53	16.57	50.91
2008	31.71	16.80	51.49
2009	32.97	15.86	51.17
2010	35.38	15.14	49.48
2011	37.06	14.95	47.99
2012	35.22	14.98	49.80
2013	33.82	15.18	51.00
2014	32.63	14.91	52.46
2015	31.74	14.82	53.44
2016	31.64	14.16	54.20
2017	29.37	14.64	55.99

Source: various issues of economic survey, MOF

ANNEX V: COMPOSITION OF INFLATION

Figures are in 2014/15 price

Year	Overall	Food and Beverages	Non-Food and Services
1975	4.2	3.5	4.7
1976	4.1	3.4	5.0
1977	4.3	3.4	5.4
1978	4.7	3.9	5.6
1979	4.9	4.0	6.1
1980	5.4	4.4	6.5
1981	6.1	5.0	7.4
1982	6.7	5.5	8.1
1983	7.7	6.4	8.9
1984	8.2	6.8	9.7
1985	8.5	6.9	10.6
1986	9.8	8.1	11.8
1987	11.2	9.4	12.9
1988	12.4	10.5	14.1
1989	13.4	11.1	15.9
1990	14.7	12.3	17.2
1991	16.1	13.6	18.8
1992	19.5	16.9	21.5
1993	21.2	18.0	24.4
1994	23.1	19.6	26.7
1995	24.9	21.0	28.8
1996	26.9	22.9	30.7
1997	29.1	24.8	33.1
1998	31.5	26.7	36.1
1999	35.1	31.0	38.2
2000	36.3	31.2	40.9
2001	37.2	30.5	44.2
2002	38.3	31.6	45.2
2003	40.1	33.0	47.4

2004	41.7	34.1	49.7
2005	43.6	35.4	52.2
2006	47.1	38.2	56.4
2007	49.8	40.9	59.2
2008	53.2	44.7	61.6
2009	59.9	52.4	67.2
2010	65.6	60.4	70.4
2011	71.9	69.3	74.3
2012	77.8	74.6	80.9
2013	85.5	81.7	89.1
2014	93.3	91.2	95.1
2015	100.0	100.0	100.0
2016	109.9	110.9	109.2
2017	114.8	113.0	116.3

Source: various issues of quarterly economic bulletin, NRB

ANNEX VI: GROWTH RATES OF THE VARIABLES

Figures are in percentage

Year	M1 GR	RM1 GR	M2 GR	RM2 GR	RGDP GR	NGDP GR	NCPI GR
1975	-	-	-	-	-	-	-
1976	8.58	7.23	22.26	20.74	3.47	4.78	-0.69
1977	27.57	29.70	27.69	29.83	1.01	-0.65	2.70
1978	11.21	0.46	17.04	5.73	3.13	14.16	11.17
1979	21.56	10.25	19.60	8.47	2.13	12.61	3.44
1980	12.99	5.88	17.15	9.78	-1.50	5.11	9.78
1981	13.33	6.64	19.34	12.29	10.03	16.94	13.39
1982	12.58	3.59	18.24	8.79	4.41	13.48	10.42
1983	20.42	10.78	23.66	13.76	0.41	9.14	14.17
1984	13.40	6.20	13.37	6.17	8.80	16.17	6.24
1985	11.12	-1.24	17.61	4.53	5.38	18.57	4.14
1986	28.27	12.11	23.28	7.75	4.57	19.63	15.84
1987	15.52	2.53	15.43	2.45	1.70	14.59	13.27
1988	18.18	5.69	22.43	9.49	7.70	20.42	10.79
1989	22.70	10.28	24.19	11.62	4.33	16.08	8.31
1990	20.79	9.10	18.60	7.12	4.64	15.85	9.70
1991	14.49	4.62	19.52	9.23	6.37	16.39	9.81
1992	19.49	0.17	21.10	1.52	4.11	24.19	21.05
1993	22.49	10.88	27.70	15.60	3.85	14.72	8.86
1994	19.63	11.41	19.64	11.42	8.22	16.20	8.95
1995	15.70	8.84	16.06	9.18	3.47	9.99	7.66
1996	10.65	2.63	14.41	6.12	5.34	13.57	8.13
1997	5.38	-1.57	11.95	4.56	5.26	12.70	8.09
1998	17.43	12.71	21.93	17.03	2.94	7.25	8.33
1999	13.06	3.90	20.83	11.04	4.48	13.69	11.38
2000	19.42	14.22	21.81	16.50	6.12	10.95	3.39
2001	15.74	5.08	15.22	4.61	5.63	16.35	2.43
2002	9.32	5.18	4.45	0.49	0.12	4.06	2.89
2003	8.55	5.32	9.79	6.52	3.95	7.14	4.75

2004	12.20	7.71	12.77	8.26	4.68	9.04	3.96
2005	6.63	0.48	8.34	2.09	3.48	9.81	4.54
2006	12.83	5.09	15.44	7.52	3.36	10.97	7.96
2007	12.23	4.30	14.04	5.98	3.41	11.27	5.90
2008	21.64	15.17	25.25	18.58	6.10	12.07	6.70
2009	27.29	9.82	27.28	9.81	4.53	21.16	12.58
2010	11.05	-3.56	14.13	-0.89	4.82	20.69	9.58
2011	1.92	-8.02	28.03	15.54	3.42	14.60	9.56
2012	18.60	11.22	22.68	15.05	4.78	11.73	8.32
2013	14.37	7.31	16.37	9.19	4.13	10.98	9.84
2014	17.65	7.59	19.05	8.87	5.99	15.90	9.08
2015	19.70	14.07	19.91	14.27	3.32	8.43	7.21
2016	18.49	12.77	19.53	13.76	0.41	5.51	9.90
2017	13.14	5.16	15.46	7.32	7.50	15.65	4.46
average	15.65	6.95	18.63	9.71	4.29	12.90	8.29

Source: author’s own calculation using excel

ANNEX VII: LOGARITHMIC LEVEL DATA

Figures are in natural logarithms

Year	LNGDP	LRGDP	LNM1	LRM1	LNM2	LRM2	LNCPI
1975	9.71722	12.89610	7.19871	10.37759	7.63259	10.81147	1.42871
1976	9.76388	12.93019	7.28104	10.44735	7.83360	10.99991	1.42176
1977	9.75732	12.94024	7.52451	10.70743	8.07807	11.26099	1.44844
1978	9.88974	12.97104	7.63075	10.71205	8.23539	11.31669	1.55430
1979	10.00852	12.99212	7.82600	10.80960	8.41436	11.39796	1.58809
1980	10.05840	12.97697	7.94817	10.86675	8.57268	11.49126	1.68141
1981	10.21490	13.07256	8.07334	10.93100	8.74953	11.60719	1.80703
1982	10.34136	13.11573	8.19188	10.96625	8.91704	11.69142	1.90614
1983	10.42884	13.11980	8.37768	11.06864	9.12939	11.82035	2.03864
1984	10.57873	13.20411	8.50340	11.12879	9.25485	11.88024	2.09915
1985	10.74908	13.25654	8.60886	11.11632	9.41708	11.92454	2.13974
1986	10.92835	13.30118	8.85784	11.23067	9.62635	11.99918	2.28682
1987	11.06452	13.31804	9.00211	11.25563	9.76985	12.02337	2.41144
1988	11.25034	13.39218	9.16916	11.31101	9.97220	12.11405	2.51391
1989	11.39942	13.43455	9.37377	11.40890	10.18886	12.22399	2.59378
1990	11.54651	13.47986	9.56262	11.49596	10.35940	12.29275	2.68638
1991	11.69833	13.54158	9.69791	11.54116	10.53775	12.38100	2.77998
1992	11.91497	13.58184	9.87600	11.54287	10.72921	12.39608	2.97105
1993	12.05229	13.61958	10.07883	11.64612	10.97374	12.54104	3.05597
1994	12.20243	13.69857	10.25802	11.75417	11.15306	12.64921	3.14169
1995	12.29763	13.73267	10.40382	11.83886	11.30202	12.73706	3.21547
1996	12.42486	13.78467	10.50501	11.86482	11.43661	12.79642	3.29368
1997	12.54438	13.83594	10.55738	11.84895	11.54946	12.84102	3.37148
1998	12.61435	13.86494	10.71805	11.96864	11.74770	12.99829	3.45145
1999	12.74267	13.90880	10.84081	12.00693	11.93689	13.10302	3.55922
2000	12.84658	13.96816	11.01830	12.13988	12.13415	13.25573	3.59259
2001	12.99798	14.02292	11.16446	12.18940	12.27585	13.30079	3.61665
2002	13.03777	14.02412	11.25359	12.23993	12.31935	13.30570	3.64513
2003	13.10670	14.06281	11.33564	12.29175	12.41273	13.36883	3.69153

2004	13.19329	14.10857	11.45077	12.36606	12.53289	13.44818	3.73040
2005	13.28688	14.14277	11.51498	12.37087	12.61300	13.46889	3.77479
2006	13.39099	14.17586	11.63568	12.42055	12.75657	13.54145	3.85140
2007	13.49782	14.20941	11.75106	12.46265	12.88795	13.59954	3.90873
2008	13.61175	14.26867	11.94694	12.60385	13.11307	13.76999	3.97362
2009	13.80371	14.31300	12.18821	12.69750	13.35430	13.86359	4.09213
2010	13.99179	14.36004	12.29298	12.66123	13.48645	13.85470	4.18358
2011	14.12810	14.39369	12.31201	12.57760	13.73356	13.99915	4.27487
2012	14.23904	14.44039	12.48259	12.68394	13.93800	14.13935	4.35475
2013	14.34320	14.48085	12.61682	12.75447	14.08963	14.22728	4.44859
2014	14.49077	14.53901	12.77939	12.82764	14.26401	14.31226	4.53551
2015	14.57170	14.57170	12.95924	12.95924	14.44561	14.44561	4.60517
2016	14.62530	14.57582	13.12892	13.07944	14.62403	14.57456	4.69957
2017	14.77073	14.64814	13.25234	13.12975	14.76783	14.64524	4.74319

Source: author's own calculation using excel

ANNEX VIII: LOGARITHMIC FIRST DIFFERENCED DATA

Figures are in natural logarithms

Year	DLNGDP	DLRGDP	DLNM1	DLRM1	DLNM2	DLRM2	DLNCPI
1975	-	-	-	-	-	-	-
1976	0.04666	0.03409	0.08233	0.06977	0.20101	0.18844	-0.00694
1977	-0.00656	0.01005	0.24347	0.26008	0.24447	0.26108	0.02668
1978	0.13242	0.03080	0.10625	0.00462	0.15732	0.05570	0.10587
1979	0.11878	0.02108	0.19525	0.09755	0.17898	0.08128	0.03378
1980	0.04987	-0.01515	0.12217	0.05714	0.15832	0.09330	0.09333
1981	0.15650	0.09559	0.12517	0.06426	0.17684	0.11593	0.12562
1982	0.12646	0.04317	0.11854	0.03525	0.16752	0.08423	0.09911
1983	0.08748	0.00407	0.18580	0.10238	0.21235	0.12893	0.13250
1984	0.14989	0.08432	0.12572	0.06015	0.12546	0.05989	0.06050
1985	0.17035	0.05242	0.10546	-0.01247	0.16222	0.04429	0.04059
1986	0.17927	0.04465	0.24898	0.11435	0.20927	0.07464	0.14708
1987	0.13617	0.01685	0.14427	0.02495	0.14350	0.02419	0.12462
1988	0.18582	0.07415	0.16705	0.05538	0.20235	0.09067	0.10247
1989	0.14908	0.04237	0.20460	0.09789	0.21666	0.10995	0.07987
1990	0.14710	0.04531	0.18885	0.08706	0.17055	0.06876	0.09260
1991	0.15181	0.06172	0.13530	0.04520	0.17834	0.08825	0.09360
1992	0.21664	0.04026	0.17808	0.00171	0.19146	0.01508	0.19106
1993	0.13733	0.03775	0.20283	0.10325	0.24454	0.14496	0.08492
1994	0.15013	0.07899	0.17920	0.10805	0.17932	0.10817	0.08572
1995	0.09520	0.03410	0.14580	0.08469	0.14895	0.08785	0.07379
1996	0.12723	0.05200	0.10119	0.02596	0.13459	0.05936	0.07821
1997	0.11952	0.05127	0.05237	-0.01588	0.11285	0.04460	0.07780
1998	0.06998	0.02900	0.16067	0.11969	0.19825	0.15727	0.07997
1999	0.12832	0.04386	0.12275	0.03829	0.18918	0.10472	0.10777
2000	0.10391	0.05936	0.17749	0.13294	0.19726	0.15272	0.03336
2001	0.15140	0.05476	0.14616	0.04952	0.14170	0.04506	0.02406
2002	0.03979	0.00120	0.08913	0.05053	0.04350	0.00490	0.02849
2003	0.06893	0.03869	0.08205	0.05181	0.09338	0.06314	0.04640

2004	0.08658	0.04576	0.11513	0.07431	0.12017	0.07935	0.03887
2005	0.09359	0.03420	0.06421	0.00482	0.08011	0.02072	0.04439
2006	0.10411	0.03309	0.12070	0.04968	0.14357	0.07255	0.07661
2007	0.10683	0.03355	0.11538	0.04210	0.13138	0.05810	0.05733
2008	0.11393	0.05926	0.19588	0.14120	0.22512	0.17045	0.06489
2009	0.19196	0.04433	0.24127	0.09364	0.24123	0.09360	0.11851
2010	0.18808	0.04704	0.10477	-0.03627	0.13215	-0.00889	0.09145
2011	0.13630	0.03365	0.01903	-0.08362	0.24711	0.14446	0.09130
2012	0.11095	0.04671	0.17058	0.10633	0.20443	0.14019	0.07987
2013	0.10416	0.04046	0.13424	0.07054	0.15164	0.08794	0.09384
2014	0.14757	0.05817	0.16257	0.07317	0.17438	0.08498	0.08692
2015	0.08093	0.03269	0.17985	0.13160	0.18160	0.13335	0.06967
2016	0.05359	0.00412	0.16967	0.12020	0.17842	0.12894	0.09440
2017	0.14543	0.07232	0.12343	0.05031	0.14380	0.07068	0.04362

Source: author’s own calculation using excel

ANNEX IX: E-VIEWS REPORTS OF RESIDUAL DIGNOSTICS

a) Serial correlation test

Breusch-Godfrey Serial Correlation LM Test for model 1

F-statistic	1.517924	Prob. F(1,36)	0.2259
Obs*R-squared	1.658804	Prob. Chi-Square(1)	0.1978

Breusch-Godfrey Serial Correlation LM Test for model 2

F-statistic	0.475033	Prob. F(1,36)	0.4951
Obs*R-squared	0.533965	Prob. Chi-Square(1)	0.4649

Breusch-Godfrey Serial Correlation LM Test for model 3

F-statistic	0.706571	Prob. F(1,36)	0.4061
Obs*R-squared	0.789216	Prob. Chi-Square(1)	0.3743

Breusch-Godfrey Serial Correlation LM Test for model 4

F-statistic	0.479350	Prob. F(1,37)	0.4930
Obs*R-squared	0.524378	Prob. Chi-Square(1)	0.4690

Breusch-Godfrey Serial Correlation LM Test for model 5

F-statistic	2.359329	Prob. F(1,37)	0.1330
Obs*R-squared	2.457677	Prob. Chi-Square(1)	0.1170

b) Heteroscedasticity

Heteroskedasticity Test: Breusch-Pagan-Godfrey test for model 1

F-statistic	1.162336	Prob. F(4,36)	0.3436
Obs*R-squared	4.689452	Prob. Chi-Square(4)	0.3207
Scaled explained SS	5.465029	Prob. Chi-Square(4)	0.2428

Heteroskedasticity Test: Breusch-Pagan-Godfrey test for model 2

F-statistic	1.406651	Prob. F(4,36)	0.2514
Obs*R-squared	5.541905	Prob. Chi-Square(4)	0.2361
Scaled explained SS	7.639717	Prob. Chi-Square(4)	0.1057

Heteroskedasticity Test: Breusch-Pagan-Godfrey test for model 3

F-statistic	0.425005	Prob. F(4,36)	0.7895
Obs*R-squared	1.848829	Prob. Chi-Square(4)	0.7635
Scaled explained SS	3.097754	Prob. Chi-Square(4)	0.5416

Heteroskedasticity Test: Breusch-Pagan-Godfrey test for model 4

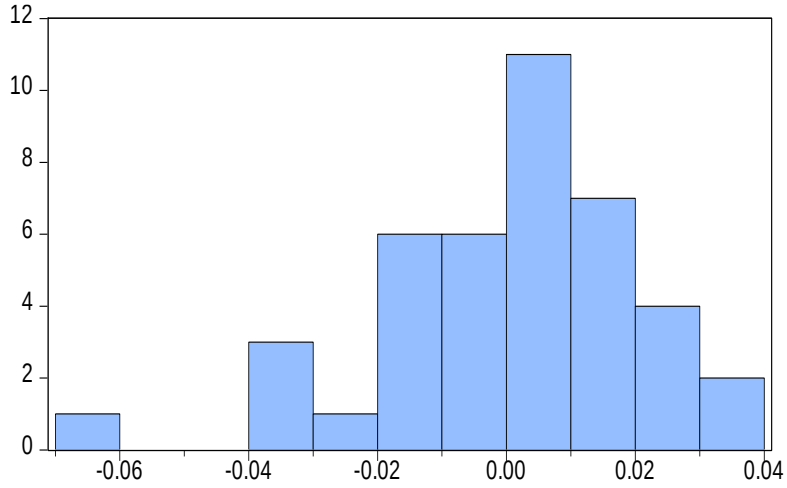
F-statistic	0.115798	Prob. F(2,38)	0.8910
Obs*R-squared	0.248365	Prob. Chi-Square(2)	0.8832
Scaled explained SS	0.365008	Prob. Chi-Square(2)	0.8332

Heteroskedasticity Test: Breusch-Pagan-Godfrey test for model 5

F-statistic	3.170909	Prob. F(2,38)	0.0533
Obs*R-squared	5.863868	Prob. Chi-Square(2)	0.0533
Scaled explained SS	3.584775	Prob. Chi-Square(2)	0.1666

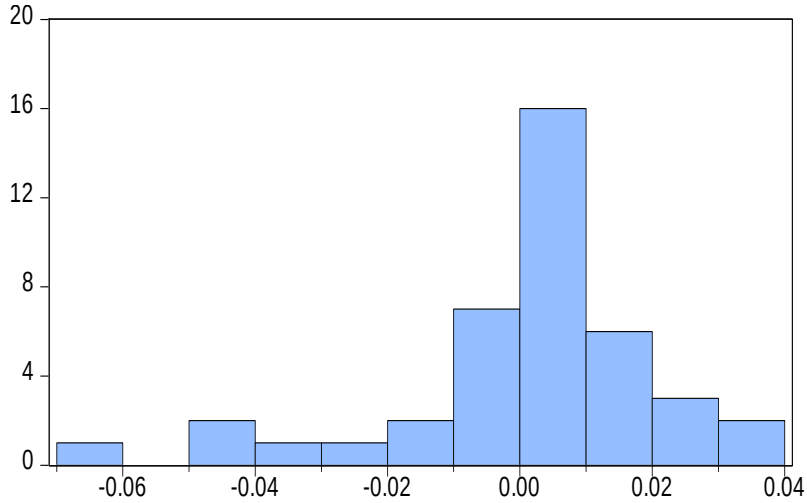
c) Normality test

i.Normality test for model 1



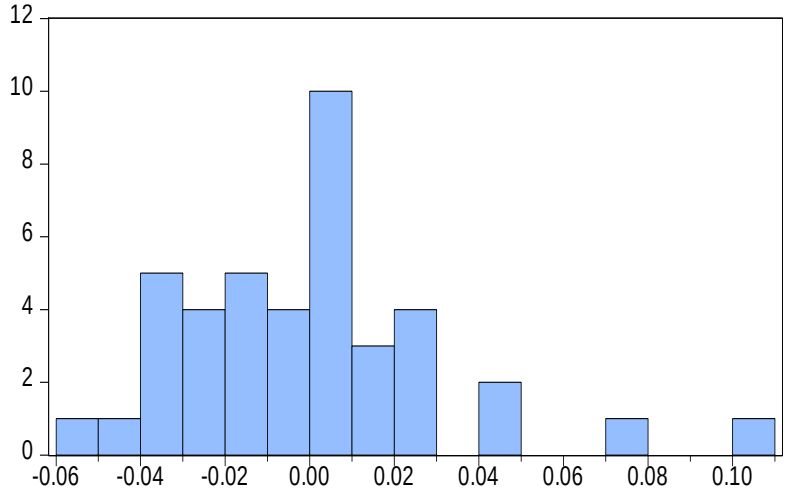
Series: Residuals	
Sample 1977 2017	
Observations 41	
Mean	4.27e-18
Median	0.003057
Maximum	0.038704
Minimum	-0.060670
Std. Dev.	0.020307
Skewness	-0.821277
Kurtosis	3.861967
Jarque-Bera	5.878325
Probability	0.052910

ii.Normality test for model 2



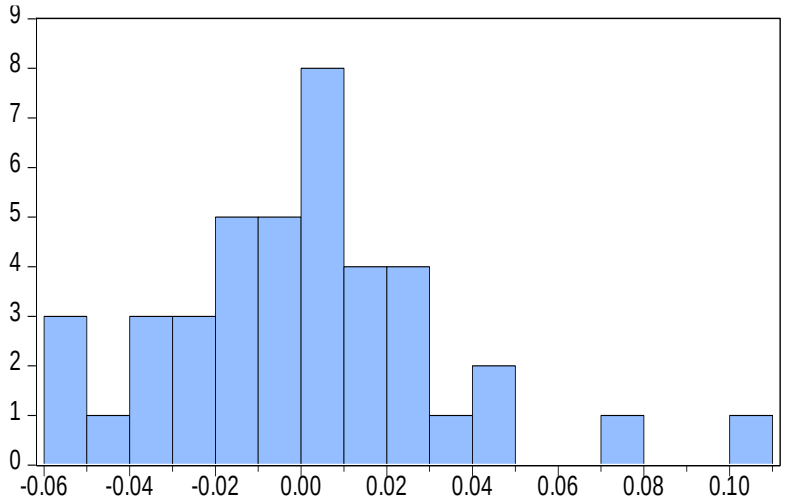
Series: Residuals	
Sample 1977 2017	
Observations 41	
Mean	-9.37e-17
Median	0.003961
Maximum	0.038411
Minimum	-0.060910
Std. Dev.	0.020568
Skewness	-1.050060
Kurtosis	4.385419
Jarque-Bera	10.81357
Probability	0.004486

iii.Normality test for model 3



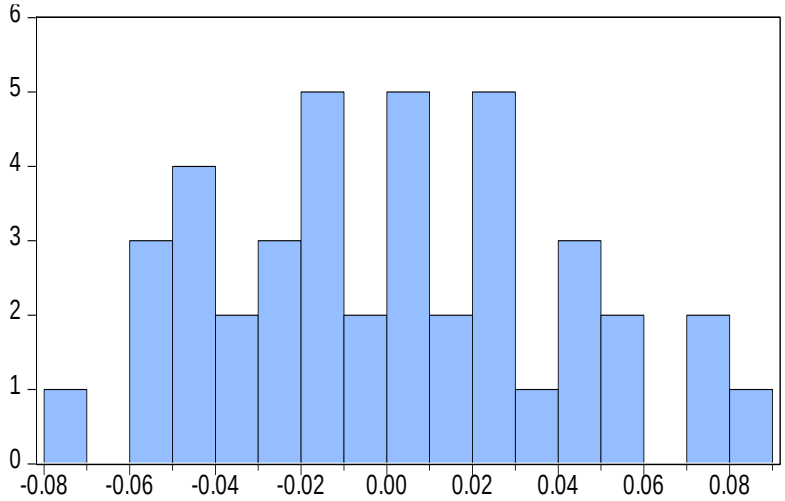
Series: Residuals	
Sample 1977 2017	
Observations 41	
Mean	-4.45e-17
Median	0.003716
Maximum	0.107541
Minimum	-0.059064
Std. Dev.	0.032009
Skewness	1.047684
Kurtosis	5.114760
Jarque-Bera	15.14058
Probability	0.000516

iv.Normality test for model 4



Series: Residuals	
Sample 1977 2017	
Observations 41	
Mean	-5.14e-17
Median	0.001914
Maximum	0.105679
Minimum	-0.056945
Std. Dev.	0.033005
Skewness	0.812035
Kurtosis	4.421697
Jarque-Bera	7.958832
Probability	0.018697

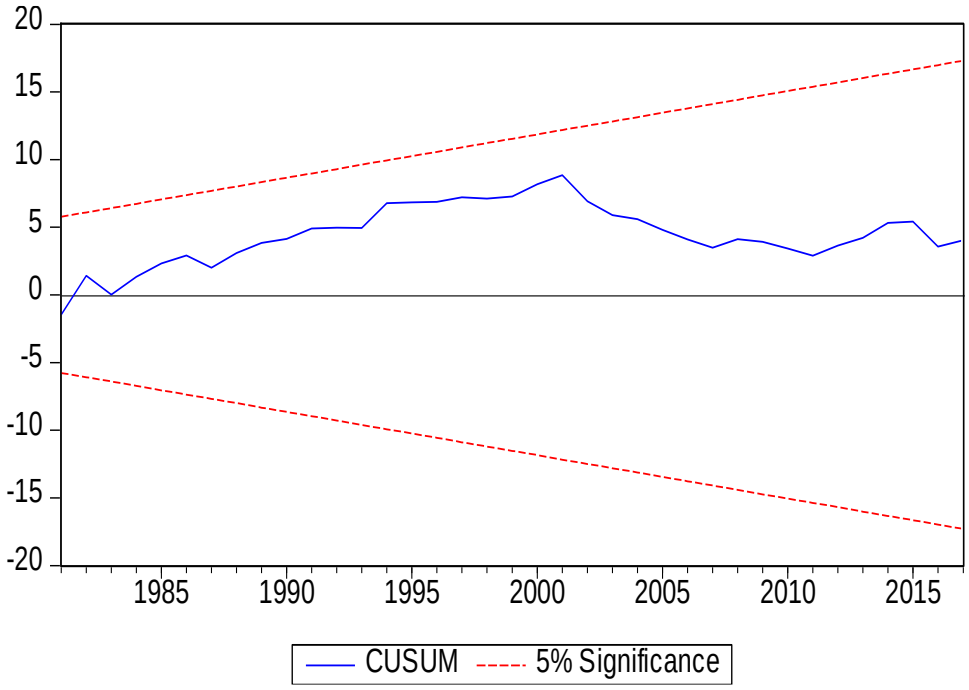
v.Normality test for model 5

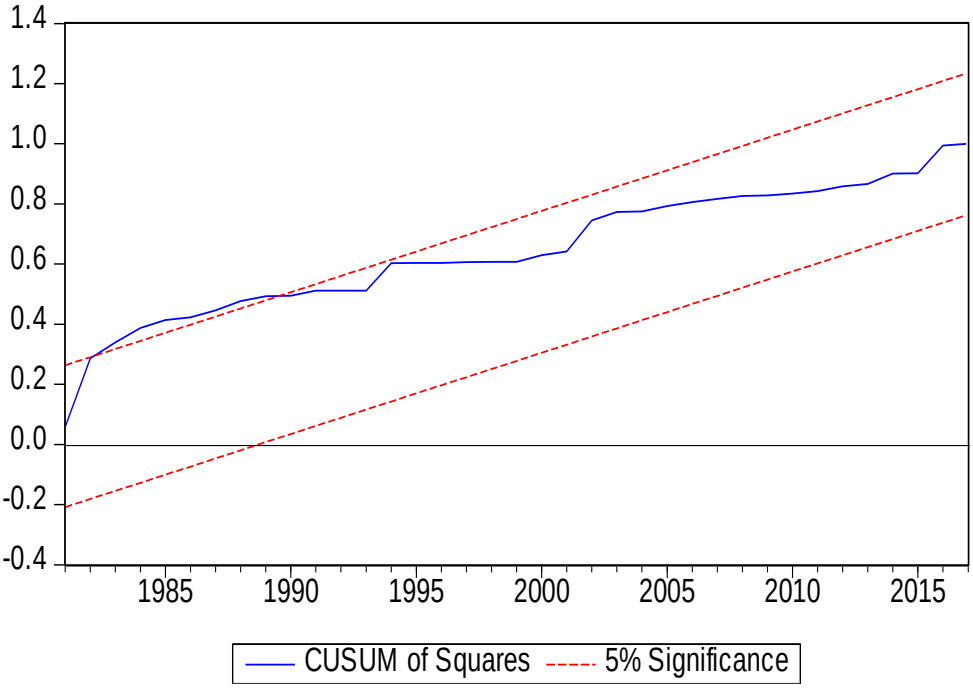


Series: Residuals	
Sample 1977 2017	
Observations 41	
Mean	8.61e-16
Median	0.001861
Maximum	0.084651
Minimum	-0.079117
Std. Dev.	0.039864
Skewness	0.200285
Kurtosis	2.423338
Jarque-Bera	0.842200
Probability	0.656324

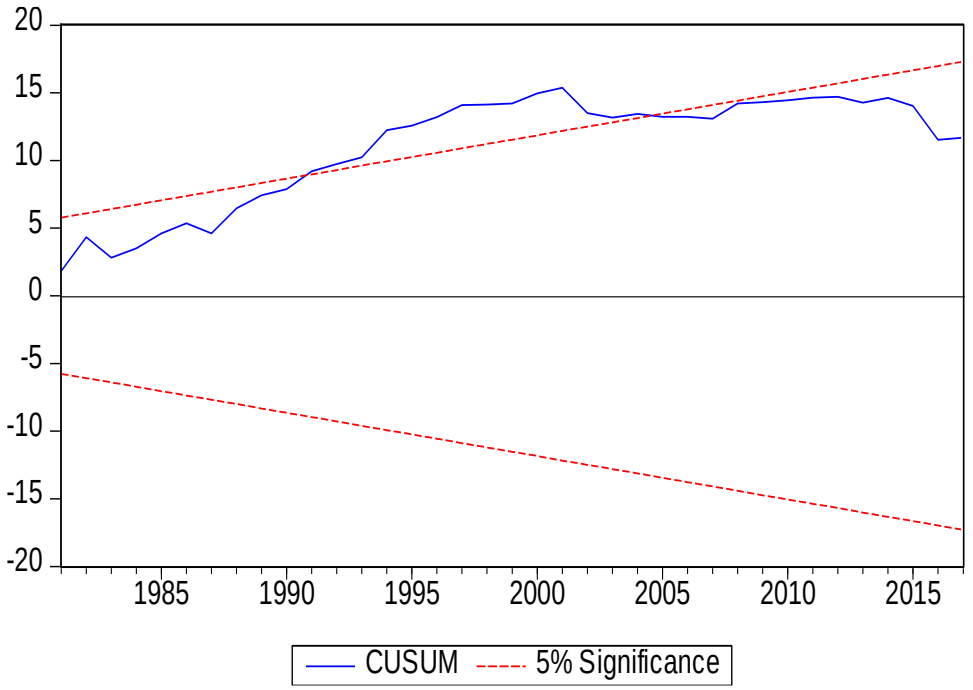
d) Stability test

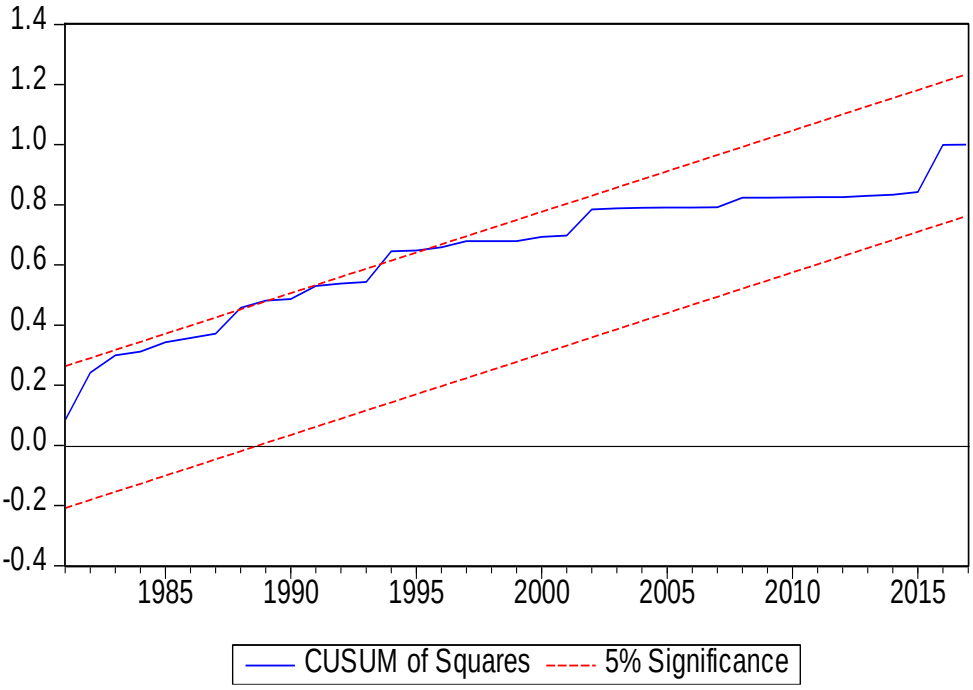
i.CUSUM and CUSUM square test for model 1



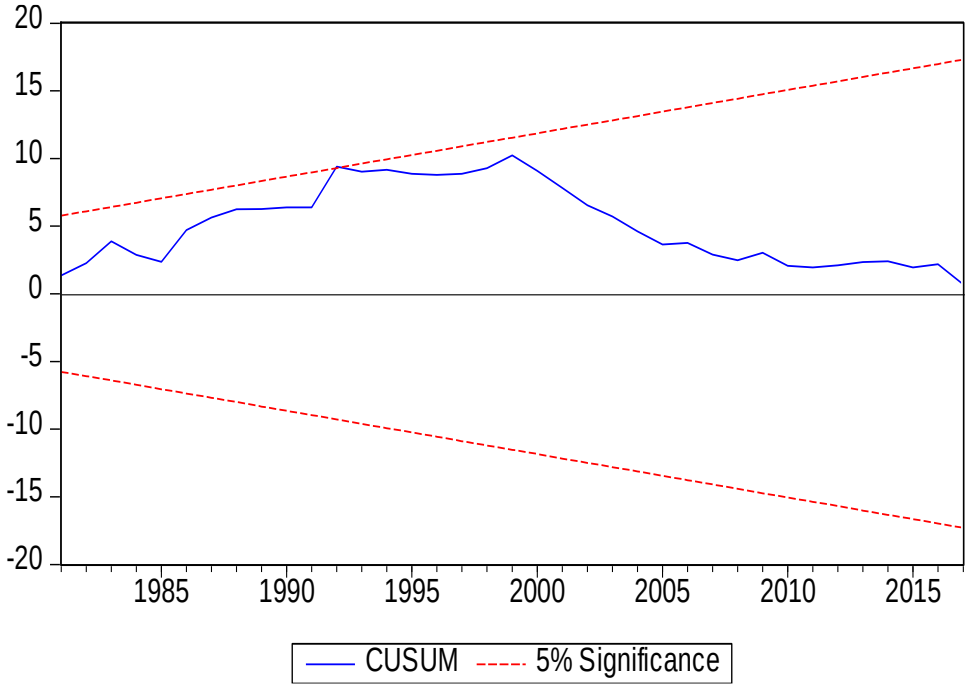


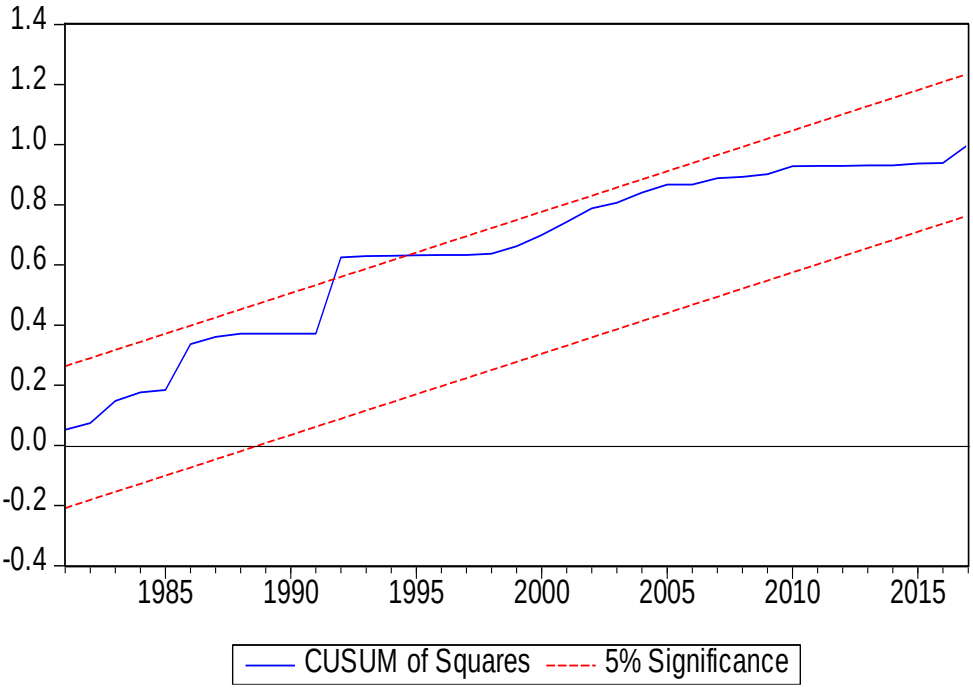
ii.CUSUM and CUSUM square test for model 2



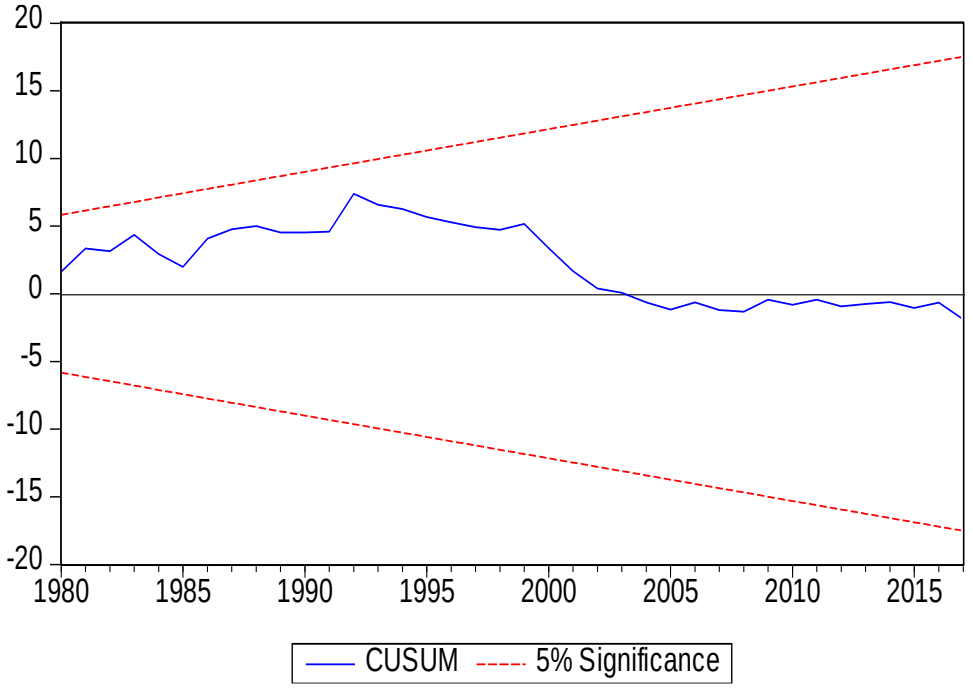


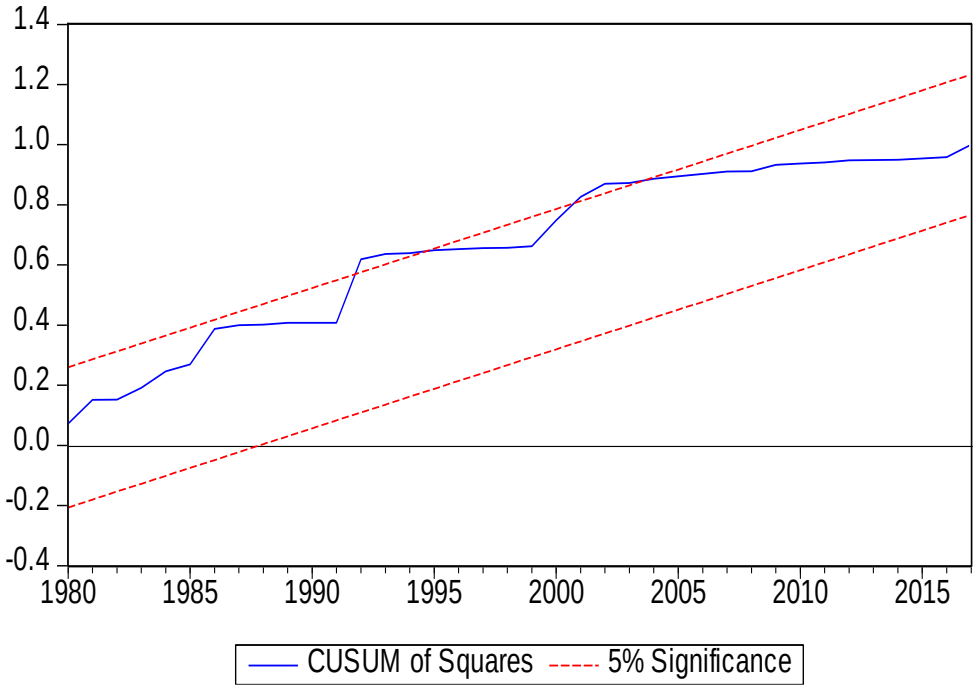
iii.CUSUM and CUSUM square test for model 3



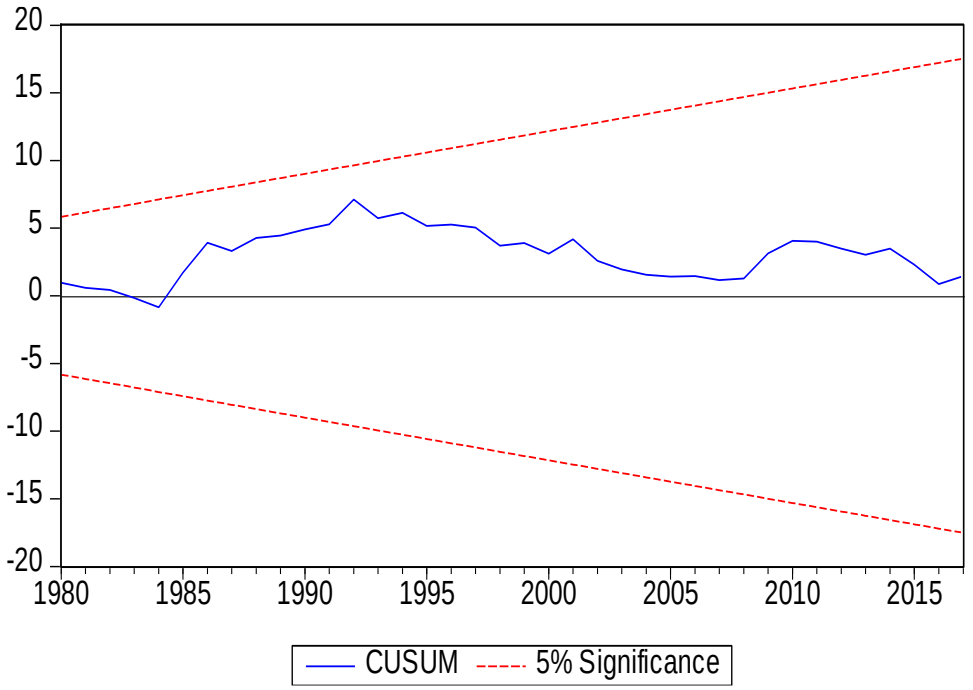


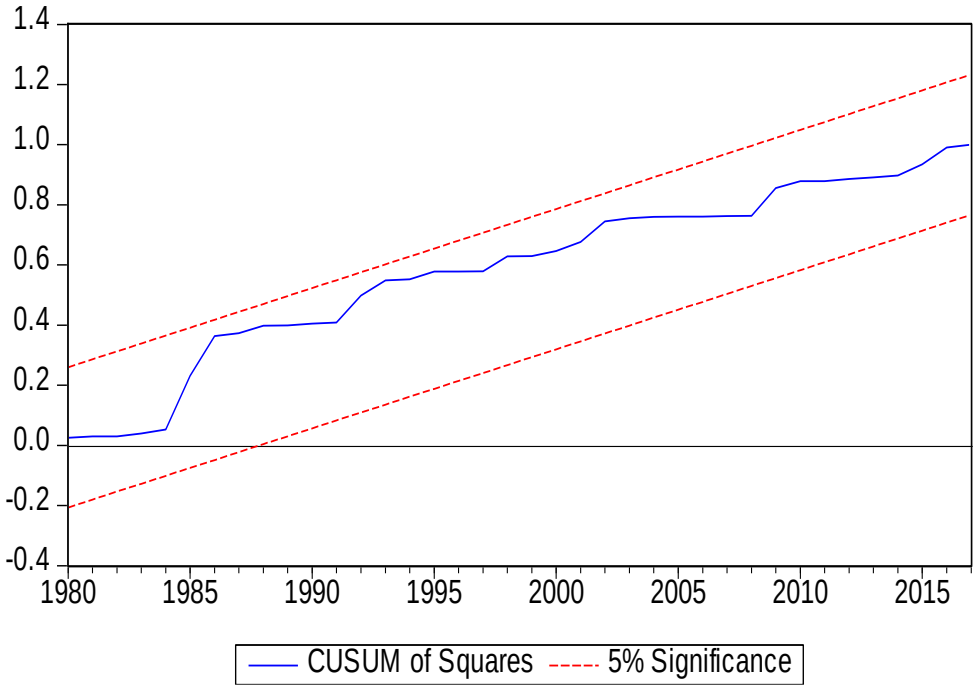
iv.CUSUM and CUSUM square test for model 4





v.CUSUM and CUSUM square test for model 5





REFERENCES

Ackley, G. (2007). *Macroeconomic theory* (first Indian reprint ed.). Delhi: Surjeet Publications.

Ahmad, N., Asad, I., & Hussian, Z. (2008). Money, Prices, Income and Causality: A case study of Pakistan. *The Journal of Commerce, 4*(4).

Al-Jarrah, M. (1996, summer). Money, Income and prices in Saudi Arabia : a cointegration and causality analysis. *Pakistan Economic and Social Review, 34*(01), 41-53.

Asteriou, D., & Hall, S. G. (2007). *Applied econometrics* (first revised ed.). New York: Palgrave Macmillan.

Bhusal, T. P. (2016). *Basic econometrics* (revised ed.). Kathmandu: Dreamland Publication (P) Ltd.

Blinder, A. S. (1988). The fall and rise of Keynesian economics. *Economic Record*, 278-294.

Branson, W. H. (2005). *Macroeconomic theory and policy* (first East-West press ed.). New Delhi: East-West Press.

Coddington, A. (1976). Keynesian economics: The search for first Principle. *Journal of Economic Literature*, 1258-73.

Current Macroeconomic and Financial Situation. (2017, ugust). Nepal Rastra Bank.

Economic Survey. (n.d.). *(various issues)*. Ministry of Finance, Government of Nepal.

Enders, W. (2010). *Applied econometric time series* (third ed.). New Jersey: willy.

Friedman, M., & Schwartz, A. (1963). *A monetary history of the United States 1867-1960.* Princeton Univercity Press.

Froyen, R. T. (2014). *Macroeconomics, theories and policies* (tenth ed.). Noida: Pearson India Education Services.

Gordon, R. J. (1990). What is New-Keynesian Economics? *Journal of Economic Literature*.

Gujarati, D. N., & Sangeetha. (2007). *Basic econometrics* (fourth ed.). New Delhi: The McGraw-Hill Companies.

Gyanwaly, R. P. (2012). causal relationship between money, price and incme in Asian countries (1964-2011). *The Economic Journal of Nepal, 35*(1), 12-31.

Holod, D. (2000). *The relationship between price level, money supply and exchange rate in Ukraine*. Unpublished Master's theSis. National university of Kiev-Mohyla Academy.

Ihsan, I., & Anjum, S. (2013). Impact of money supply (M2) on GDP of Pakistan. *Global Journal of Management and Business Research Finance, 13*(6).

Intelligent Economist. (n.d.). Retrieved from www.intelligenteconomist.com.

Investopedia. (n.d.). Retrieved from www.investopedia.com.

Khatiwada, Y. R. (1994). *Some aspects of monetary policy in Nepal*. New Delhi: South Asian Publishers.

Koti, C. S., & Bixho, T. (2016, Jan- Apr). Theories of Money Supply: The Relationship of Money Supply in a Period of Time T-1 and Inflation in Period T- Empirical Evidence from Albania. *European Journal of Multidisciplinary Studies, 1*(1).

Laidler, D. (1981). Monetarism: an Interpretation and an Assessment. *Economic Journal*, 1-28.

Luo, P. (2013, november). *Money supply behaviour in 'BRICS' economies*. unpublished bachelor thesis. Jonkoping University.

Maddock, R., & Carter, M. (1982). A Child Guide to Rational Expectations. *Journal of Economic Literature*, 39-51.

Mayer, T. (1975). The Structure of Monetarism. *Kredit and Kapital*.

Norikazu, T. (2011). Managing the Loss: How Pigou Arrived at the Pigou Effect. Hope Center Working Paper.

NRB . (2001, April). Money and Price Relationship in Nepal: A Revisit. *Economic Review: Occasional Paper*, *13*(1), 50-65.

Quarterly Economic Bulletin. (2017, Mid- July). Nepal Rastra Bank.

Salih, M. A. (2013). Money, Income and Prices in Saudi Arabia. *Global Journal of Management and Business Research*, *13*(1), 33-42.

Shapiro, E. (2001). *Macroeconomic Analysis* (fifth ed.). New Delhi: Galgotia Publications Pvt. Ltd.

Singh, C., Rohan, D., & Jafar, B. (2015, November). Money, Output and Prices in India. *IIMB- Working Paper*(497).