CHAPTER- I

INTRODUCTION

1.1Background of the Study

Inflation is a macroeconomic variable that is paid close attention by almost all the countries around the world. Mild inflation is considered to be desirable for economic growth. However, high and variable inflation distorts the smooth functioning of the economy (NRB, 2007). High inflation leads to uncertainties in income and expenditure decisions of the people in the society because there are different groups in the society. Some are poor and some are rich. Inflation hurts the poorest of the poor who have the fixed level of income. So the inflation widens the income inequality in the society. Therefore, it is necessary to control the high inflation in economy. The price stability preserves the integrity and purchasing power of currency. When prices are stables, the economic growth and stability can be achieved. If there are the stable prices in the market, it promotes the efficiency of market participants. By looking the prior experiences of developed countries, it can be said that the low and stable inflation is not only beneficial for growth and employment in the long run but also it contributes the greater stability of output and employment in the short run (Marahatta, 2013). Hence, to control the inflation many countries have given the authority to the central banks by keeping the objective of price stability. Thus, the one of the major function of central bank of the any country is to control the inflation. Nepal is also no different in this regard. Nepal Rastra Bank which is the central bank of Nepal has the responsibility of maintaining the price stability in the Nepalese economy.

There are different economics schools of thought, who view inflation differently. For the classical economists, inflation is the only monetary phenomenon. In the classical and neo-classical economic analysis, inflation is viewed as proportionate to money supply. The classical and neo-classical economic analysis of inflation is based on the assumption of constant money demand function. So that in their sense, general price level is determined proportionately to nominal money supply. Thus, quantity theory of money states that the central bank which controls the money supply has ultimate control over inflation. If the central bank keeps the money supply stable, the price level remains stable and vice versa (Mankiw, 2004).

Keynesians argue that there is trade-off between inflation and unemployment as postulated by the Phillips curve, and policy makers have options for specific combination of inflation and unemployment.Therefore, the effect of changes in money supply is distributed between inflation and output. So Keynes in his theory argued that the level of income and expenditure are as the main determinates of the price level. Keynes talks about short-run macroeconomics issues under less than full employment situation in an economy. However, in the long run, in a full employment economy, money supply is still considered as the major single determinant of the price level. Therefore, the reason for inflation is a full employment economy (Koirala,2006). However the monetarist's model of inflation assumes that there is a unidirectional causality from money supply to inflation. There is no long run effect of money supply on output. If the monetary policy affects output and employment, it is only in the short-run transitory effect, not the permanent (Friedman, 1970).

Similarly, the structuralists argue that the rise in inflation can be attributed to the basic structural constraints experienced in the process of industrialization and development. Various structural factors such as demand shift, export instability, agricultural bottleneck, foreign ex-change scarcity and relative price changes result in inflation (Pethe,1994). In such a situation demand management policies are inoperative and inflation is determined independent of market forces. Structuralists argue that inflation in a developing economy is not only a monetary phenomenon, in the sense that it is a result of a structural disequilibrium in the growth process and as such cannot be control by monetary regulation.

The different approaches of inflation analysis have significant important in monetary policy formulation. All the approachesexplain the different sources of inflation. The classical and neo-classical economists claimed that money supply is the main determinants of the inflation which has proportionate relationship but the Keynesian economists showed that the inflation occurs in an economy due to the inflationary gap (Koirala, 2006). So, in this sense only the money supply can't determine the inflation some additional factors as cost of production, increase in wage, shortage of goods and services in the market be also the sources of inflation. Similarly monetarist theory of inflation which is the improved version of classical theory of inflation proved that the inflation expectation of the people can be incorporate as sources of inflation but the structuralist approach which is more applicable in the context of developing countries

which claims that the inflation occurs in the economy due to the structure of the economy or geo-graphical condition of the country. So that, all the theories of inflation helps to understand the different sources of inflation. Classical and Neo-Classical economists talk about money supply as a leading explanatory variable of inflation in a closed economy. Keynesian argues about the factors of aggregate demand having impact on both the inflation and output in the short-run. It gives some guidelines to incorporate budget deficit, money supply as well as GDP variables in inflation equation and to examine validity thereof. Monetarists suggest introducing inflation expectation as an additional explanatory variable in inflation equation. Structuralists' model gives some additional sources of inflation for developing countries like Nepal, where money supply is not completely exogenous, suggesting the incorporating of additional structural variables in the monetarists model. Inflation determination in an open economy suggests international inflation as an additional variable to understand international influence on domestic inflation. Because it is the age of Globalization in which the economy of the any country is opened for free trade without any tariff across the broader. The labor market is being wider and labor can be sent from one country to another. Due to the free trade and wider labor market there must be the provision of ex-change rate. In the present world all most all the countries around the world whether they are developed or developing and least developed, they have accepted the terms and conditions of liberalization and privatization. Due to this the market of goods and services is wider now. There is the free flow of goods and services in international market. Due to this not only classical theory of inflation just to find out the major determinants of inflation but also it is needed the theories of inflation from classical to structural to incorporate the variables which can be the major determinants of the inflation in the economy of any country.

There isalso availability of many empirical studies which attempt to measure and understand and the causes of inflation have been conducted in both international and national level. Most of the studies revealed that for developing countries with just started financial sectors, a monetarist, demand-pull or structuralist theory of inflation may be more appropriate.

In the national level the studies are by Fry (1974), and Pant (1978). These studies showed a weak association between money and prices using basic statistical analysis in Nepal. In fact, Pant (1978) showed that inflation in Nepal is not much explained by

the movement of monetary aggregates, rather it is mainly due to structural changes in the economy. These conclusions contrast with the observation of Sharma (1987) who identified the influencing factor of India and was also shown empirically by Khatiwada (1981).

In a mature economy the monetary policy of the central bank plays a big role in determining the level of inflation. If there is excess supply of money in the market and the price of goods and services rises, the bank injects liquidity into market to prevent inflation. But in an underdeveloped country like Nepal, where according to the World Bank, the informal economy is around 40 percent of GDP, the monetary policies have limited impact on market prices (WDR, 2017). High and persistent inflation and low economic growth have been major characteristics of Nepalese economy in the recent years. In the last five years, the average inflation rate was recorded at 8.8 percent which was higher than the projected inflation by 1.3 percent. Inter-country comparison of inflation in the SAARC countries also shows that Nepal has highest rate of inflation except Bhutan and Pakistan. So that it is necessary to study about the trend, structure and pattern of inflation in Nepal in the present. It is also necessary to examine the major determinants of Inflation in Nepal. Because today's Nepalese economy is not the closed economy (Economic Survey 2016/17).

1.2 Statement of the Problem

Inflation which is not only the present issue but also it is being the major issue from the classical era to the present era. Classical and neo-classical economists have shown the validity of quantity theory of money while Keynesian, monetarists and structuralits economists go for structural theory, cost push theory and others. Thus, it is very important to know the trend, structure and pattern of inflation with its determinants for policy implication as well. Inflation is seen one of the major challenges in the country like Nepal which affects the welfare and the development of the people and the country itself. Nepalese economy has abundant of natural resources as well as geo-graphical diversity. Even though Nepal has huge potentiality of accelerating its economic growth by promoting social welfare, Nepal is only in developing phase. There are many indicators available which shows the economic status of Nepal in the World. Inflation is one of them. In Nepal, inflation isregarded as consumer price index that reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or

changed at specified intervals, such as yearly. In Nepal, rising inflation has been a serious concern to the government. The inflation rate in Nepal was recorded at 3.40 percent in May of 2017. Inflation rate in Nepal averaged 8.33 percent from 1964 until 2017, reaching an all time high of 30.42 percent in may of 1966 and a record low of -11.54 percent in May of 1967. The rate of Inflation is seen fluctuated in Nepal since long time (Economic Survey 2016/17). Similarly, the gross domestic product (GDP) at basic price is estimated to grow by 6.94 percent in the FY 2016/17. Such growth rate was remained 2.97 percent in FY 2014/15 and 0.01 percent in 2015/16. Economic growth rate has averaged 4.2 percent in the last ten years. The growth rate remained low in most of the fiscal year. Like that, it is seen that the exchange rate of Nepalese currency has been gradually increasing from Rs. 10.5 of 1 dollar in 1975 to Rs. 106.05 of 1 dollar in 2016. It can be also observed that the trend of government expenditure has been increasing year by year. The growth of recurrent expenditure and capital expenditure is recorded 48.2 percent and 148.5 percent respectively in FY 2016/17 as compared to the FY 2015/16. The government expenditure was recorded Rs. 2,072 millions in 1975 and it is observed Rs. 701171.7 millions in 2016 (Economic Survey, 2017). So it is seen that there is huge increasing in the government expenditure from 1975 to 2016. The volume of total imports is also recorded high in the recent years. It was recorded only Rs. 1841.60 millions in 1975 but it is increased by 773599.1. Similarly, the money supply (M_2) was also low in the FY 1974/75 which was only Rs. 2064.4 millions but it has also increasing trend since 1975. It is recorded Rs. 22, 44,579 million at the end of the 2016 (Quarterly Economic Bulletin, 2017). Hence, it can be said that all macroeconomics variables like money supply, government expenditure, total imports, exchange rate have increasing trend from the past. So, it is concerned matter that these variables can attribute to bring inflation in Nepal. In the present, it is also claimed that there is the crucial role of Indian inflation to increase the inflation in Nepal due to open border and huge trade dependency with Indian. The increase in consumer price index in Indian results to increase in inflation in Nepal. The data of Indian inflation is also seen that fluctuating inflation in India. So, it is next matter to know whether Indian inflation has significant impact on inflation in Nepal or not.

The recent data of Nepal shows that the inflation has remained low in FY 2016/17 as compared to last few years. In this Fiscal year the CPI stood at 5 percent on an average. Such rate was 9.7 percent in the corresponding period of the previous fiscal years. Food inflation has remained negative by 0.4 percent while non-food inflation grew by 5.6 percent in FY 2016/17. Such inflation rates were 10.3 percent and 10.2 percent respectively in the corresponding period of the previous fiscal years. The rate of inflation can be seen region wisely. It can be also seen different. CPI in Kathmandu has remained at 1.9 percent, 5.9 percent in hills, 3.7 percent in the mountains and 2.8 percent in Terai (Economic Survey 2016/17). These data show different CPI rate in different regions. It is necessary to know the cause of it. Without knowing the cause of it, the policies to control the inflation may not be effective.

High inflation distorts the optimal allocation of resources and retards growth, weakens the external competitiveness and lowers the domestic financial savings and others. It also exacerbates the inflation expectations and creates inflationary spiral in the economy. Therefore, there is a consensus now that high inflation is bad for the economy and central banks around the world strive to fight against the high inflation and maintain it at low level. The one of the main objectives of monetary policy in Nepal is to control the inflation. But due to the various difficulties to find out the determinants of inflation at a point of time, it is important issue for the conduct of monetary policy. Thus the studies regarding the trend, structure and pattern of inflation and its determinants are required that helps in predicting the behavior of the inflation and policies can be framed accordingly. So, this study which is empirical study provides the trend, pattern and structure of inflation from the date of1975 to 2016 and also this study examines the various economic variables like Real GDP, broad money supply, government expenditure, ex-change rate, total imports and Indian annual inflation rate as determinants of inflation in Nepal by answering the following research questions.

1. What are the trend, pattern and structure of inflation in Nepal?

2. What are the major determinants of inflation in Nepal?

1.3 Objective of the Study

The general objective of thisis to find out the relationship between inflation and its factor determinantsin Nepal using the data for the periodfrom 1975 to 2016. The specific objectives of this study are as below.

1. To examine thestructure, trend and pattern of inflation in Nepal over the period 1975-2016.
2. To explore the major determinants of inflation in Nepal.

1.4Significance of the Study

Economic development has been one of the most popular slogans in almost all the developing countries all over the world. Similarly, achievement of high rate of economic growth rate, reduction of income inequality and poverty and improvement of living standard of people are some of the development strategies toward which most of the government's efforts have been directed in developing countries.

It is known that the government must be able to manage the environment of social welfare by minimizing those factors which creates the disturbances to provide state welfare.

Inflation is the one of the macroeconomics factors which can creates the disturbances in an economy to run smoothly. Nepal is experiencing all time high inflationary situation. In this context, least empirical and theoretical studies have been conducted to examine the trend of inflation in Nepal and its determinants. The study is directly beneficial to policy maker, entrepreneurs, researcher and general people. Policy maker will be able to identify the cause of inflation in Nepal and also the effect of Real GDP, broad money supply, government expenditure, ex-change rate, total imports, and Indian inflation on Nepalese inflation. It helps the re-searcher to carry out their research a step ahead about inflation and its determinants in Nepal. It also helps the common people to know the trend, pattern and structure of inflation during the study period.

1.5 Limitation of the Study

Even though there are various factors determinants of inflation, this study takes only Real GDP, broad money supply, ex-change rate, total imports, government expenditure, and Indian inflation as macroeconomic variables to examine the effect of these on inflation in Nepal. And this study covers only the period from 1975 to 2016, 42years.

1.6 Organization of the Study

The study is organized into five main chapters with each chapter further divided into sections and sub-sections. The first chapter deals with the general introduction to the study that contains background of the study, statement of the problem with research questions, objectives of the study, significant of the study, limitations and organization of the study. Chapter two reviews both the theoretical and empirical literature on inflation. Chapter three focuses on the research methodology including specification of the empirical model used for the study. The results of the data collected for the study will be analyzed and discussed in fourth chapter. The final chapter presents the summary of findings, recommendations and conclusion of the study.

CHAPTER-II

REVIEWOF LITERATURE

A variety of theoretical and also empirical literature exists on the determinants of inflation based on different techniques and time periods that attempts to identify the determinants of inflation and try to measure the level of inflation. Firstly, this chapter attempts to review of different theories relating to inflation which helps to understand and identify the determinants of inflation. Secondly, this chapter attempts to review of the existing empirical studies on Nepalese as well as international inflation. Moreover the chapter follows to review various statistical methodologies which are applied to analyze the factors determinants of the inflation.

2.1 Theoretical Review

Classical, Neoclassical, Keynesian, Monetarist, Cost push, Rational Expectation, New Political Economy, and Structuraltheories of inflation are discussed under this section. These different theories of inflation are important to analyze the sources of inflation. These theories provide basic guidelines to understand the sources of inflation in an economy.

2.1.1 Classical and Neoclassical Theories

The classical school of thought or classical system is concerned in general for period from 1750 to 1870 though some significant work published after the date will be considered as falling with in subject matter of classical era. The classical economists like David Hume, Adam Smith, David Ricardo, John Stuart, etc. and neo-classical economist like Leon Walras, Alfred Marshal, Arthur C. Pigou, etc. used the quantity theory of money to explain the theories of inflation (Paudyal, 2011). The classical economist, they used transaction version of Quantity theory of money formulated by Fisher (1922) and also they used income version of quantity theory of money to explain the inflation.

The transaction version of quantity theory of money has been used by an American Economist Irving Fisher (1922) at first. The Fisherian quantity theory of money can be written as:

$$MV = PT \dots \dots \dots \dots \dots (1)$$

Where,

M = supply of the money

V = Velocity of the money

P = General Price level

T = Total Volume of transaction

$$\text{Or, } P = \left(\frac{\bar{v}}{\bar{T}}\right) M \quad \dots \dots \dots \dots \dots (2)$$

Equation (2) states that there is direct and proportional relationship between the level of money supply and general level of price because the velocity of the money and total volume of transaction are kept as constant. It means that the increase in money supply leads to increase in price level at the same rate. Thus, in classical system price is purely monetary phenomena.

Cambridge "cash balance" equation uses a microeconomics explanation of the theory of inflation (Frisch 1983). The Cambridge focus on a theory of money demand leads to an answer to the question about the way money affects the price level (Froyen, 2003). The individual demand for money can be aggregated into a macroeconomics demand for money.

The equation of ex-change has been stated by Cambridge economists, Marshall and Pigou in a form different from Irving Fisher. Thus, the neo-classical money demand function can be written as:

$$M^d = k\,(PY) \dots \dots \dots \dots (1)$$

$$M^s = M \dots \dots \dots \dots \dots (2)$$

In equation (1), **M^d** is the demand for money and **k** is proportionality constant. A fixed proportion of nominal income will be kept by people as the demand for money. As, money supply (M^s) in equation (2) is exogenously determined.

The equilibrium condition of money market is,

$$M^d = M^s$$

$$k\,(PY) = M \dots \dots \dots \dots (3)$$

$$P = \left(\frac{1}{k.Y}\right) M \dots \dots \dots \dots (4)$$

Now, the Cambridge economists also assumed that **k** remains constant. Further, due to their belief that wage price flexibility ensures full employment of resources, the level of real national income is also fixed. Thus, from equation (4), it follows with k and Y reaming constant price level (P) is determined by the quantity of money (M); changes in the quantity of money will cause proportionate changes in the price level. Thus in neo-classical system there also price is purely monetary phenomena.

After the natural log transformation equation (3) can be written as:

$$\ln M + \ln \frac{1}{k} = \ln P + \ln Y$$

$$M^* + 0 = P^* + Y^*$$

$$P^* = M^* - Y^* \dots\dots\dots\dots\dots\dots.. (5)$$

Here also, if the money supply grows at the faster rate than the real output growth, it will result in inflation. If the money supply grows at the same rate as the output, Price level will be almost stable or there will be zero rate of inflation.

2.1.2 Keynesian theory

Keynes gave secondary importance to the problem of inflation rather than to the problem of other macroeconomic variables because the time was depression. Policy makers tried to focus their attention to achieve the target level of output and unemployment by adjusting inflation as postulated by the Phillips curve. Keynes argued that inflation is the caused by increase in the aggregate demand. According to Keynes, the aggregate demand might increase due to increase in real factors like increase in demand of goods and services, increase in government expenditure, and so on.So, Keynes in his theory argued that the level of income and expenditure are as the main determinates of the price level (Ball & Doyle, 1969).

Keynes talks about short-run macroeconomics issues under less than full employment situation in an economy. However, in the long run, in a full employment economy, money supply is still considered as the major single determinant of the price level. Therefore, the reason for inflation isa full employment economy (Koirala, 2006).

Keynes introduced a theory namely 'Inflationary gap model' which means a dynamic situation in which the total monetary value of aggregate planned demand for output is higher than the total monetary of available output in the market at given market price

at the full employment economy. According Keynes, inflationary process ultimately rise in general price level and the percentage change in the price level depends upon the given size of inflationary gap which is not good for a sound economy as well as economic growth, development and socio-economic progress of the society.Thus, according to Keynes, the size of inflationary gap is considered as the factors of determining inflation (Paudel, 2011).

If C+I+G = Y, it is neither inflationary nor deflationary situation.

If C+I+G>Y, it is for the inflationary situation.

If C+I+G< Y, it is for the deflationary situation.

2.1.3 Monetarist Theory

The monetarist theory of inflation was propounded by Milton Friedman through the publication of'Studies in the Quantity Theory of Money' in 1956. So, it is the improved version of the classical theory of inflation. After World War II, a central issue became the behavior of price level in general and a revival of interest in the classical quantity theory in particular (Laidler&Parkin, 1975). Milton Friedman argued that when money supply in an economy is increased then there needs of excess supply of real money balances with the public over the demand for money. Monetarist holds that inflation is a purely monetary phenomenon that can only be produced by expanding the money supply at a faster rate than the growth of capacity output. Thus at any given time the actual rate of inflation is seen as reflecting current and past non-monetary explanations of inflation. i.e. those that attribute rising prices to such alleged causes as shifts in autonomous private expenditures, government fiscal policies, cost push influences, food and fuel shortages, etc. On the grounds that an increased stock of money per-unit of output is required in all cases and therefore constitutes the true cause of inflation.

In short, according to monetarist, the sole necessary and sufficient condition for the generation of inflation is said to be excessive monetary growth.

2.1.4 Cost-push Inflation

The cost-push inflation is a consequence of a drop in aggregate supply. According to this theory, inflation is not caused by the demand side factors alone. There are numerous instances of inflation rise prices which could not be fully explained by

demand side factor. During 1958, recession in western countries is a famous instance. During this period of recession, aggregate demand had declined. Therefore, the general price level should have decreased but it did not. Such types of condition creates puzzle in 1958 and leads to the emergence of supply side theories of inflation, popularly known as cost-push theory of inflation (Humphrey, 1998).

The cost push inflation is also known as monopoly inflation, it is due to caused by monopoly power of various monopoly groups or society such as labour union. There is a trend of strong labour union that they always able to increase their money wages by forcing. If the money wage of a labor is higher than that the rise in the productivity of the labor then it causes to raise in general price level. Similarly, due to the monopoly power, the investors have the tendency of seeking higher profit. So, they always find the ways to raise the price of their goods and services. Like that, due to the supply shock, there occurs cost-push inflation in the economy. The supply shock inflation occurs generally due to the natural disasters, sudden increased prices of inputs, and so on.

Some causes of increase in the cost:

    a. Increase in wages by enforcement of the labor unions.

    b. Higher profit seeking behavior of producers by using monopoly powers in the market.

    c. Due to the imports of raw materials or semi-finished goods from the international market with high cost.

    d. Due to the change in ex-change rate, it affects the imports prices of the inputs.

    e. Due to the increase in indirect taxes.

    f. Due to the natural calamities.

2.1.5 Rational Expectation theory of Inflation

This theory of inflation was propounded by John Muth and later is popularized by new classical economists such as Robert E. Lucas, Thomas J. Sergeant, Neil Wallac (Lucas, 1973). According to this theory, the economic agents look like rationally into the future when trying to maximize their well-bring and do not respond solely to immediate opportunity costs and pressures.

Economic agents make their expectations rationally based on all past and current relevant information available in the economy even though their expectations are totally independent from each others.

According to this theory, the central bank cannot systematically surprise the economic agents if the economic agents have rational expectations. The basic point is that the economic agents' forecasts of various economic variables, including money supply, the price level and, the GDP are based on reasoned and intelligent examination of available economic data. If the economic agents have rational expectations they will eventually understand the central banks' general pattern of behavior. If expectations are rational, purely random changes in the money supply may be unanticipated and non-neutral. Thus, the central bank can affect the real output and employment only if it able to find a way to create a price surprise.

2.1.6 New Political Economy Theory of Inflation

The new political economy theory of inflation deals about those non-economic factors of inflation which are not explained by other theories of inflation. The non-economic factors such as institutions, political process, and culture have the major role in the process of inflation. Political forces, not the social planner, choose the economic policy in the real world. Economic policy is the result of a decision process that balances conflicting interests so that a collective choice may emerge. According to this theory, there is the positive relationship between timing of elections, performance of policy maker, political instability, policy credibility and reputation and the process of inflation (Drazen, 2000).

2.1.7 Structural Theory of Inflation

According to structuralist view (school of thoughts developed by Myrdal, Streeten and others Latin American Economists, 1960s) inflation is inevitable in the less developed countries embarking on ambitious development programs and is mainly caused by structural imbalances in such economies. They argued that an inflationary situation is attributable to the basic structural constraints experienced in the process of industrialization and development by an economy. The structuralist approach to inflation, which has gained rapid acceptance in developing countries, originated mainly from the economic events in Latin American countries. This school maintains that there are basic socio-economic and institutional differences between developed

and developing countries. Structuralists argue that the inflation, under developing countries, is the result of structural rigidities and bottlenecks of the economy (Pethe, 1994). Structural bottlenecks and such types of characteristics availability in the economy are major responsible for inflation. According to this theory, the inflation arises due to the structural maladjustment in the economy or business environment.

2.2 Empirical Review

2.2.1. International Context

Lucas (1973)analyzed the real output-inflation tradeoff of eighteen developed countries using annual time-series from 1951 to 1967. The main objective of his study was to see whether the terms of the output inflation 'trade-off' vary across countries rather than to explain output and price level movements with in a country.

He uses the following model:

$$Y_{ct} = -\pi \delta + \pi \Delta X_t + \aleph Y_{c,t-1}$$

$$\Delta P_t = -\beta + (1 - \pi)X_t + \pi \Delta X_{t-1} - \aleph Y_{c,t-1}$$

He found that growth promoting policies tend to have a large initial effect on real output combined with a small impact on inflation in a country like the United States where inflation found to be almost stable.

Blejar (1977) examined the short run behavior of prices and the balance of payments behavior of Mexico over the sample period 1950-73. The model is based on the monetary approach to the balance of payments in a small open economy with a fixed ex-change rate. He had used the following model:

$$P_t = \frac{1}{1 + \aleph (1 - \beta)} (\dot{P_T}) + \frac{\aleph (1 - \beta)}{1 + \aleph (1 - \beta)} \left[D \left(\frac{Dc}{H} + \dot{a} - \dot{m_d} \right)_t \right]$$
$$+ \frac{\aleph (1 - \beta)}{1 + \aleph (1 - \beta)} \dot{P_{t-1}}$$

Here, rate of inflation is expressed as function of world rate of inflation $\dot{P_T}$ (assumed to be equal to the rate of change in the price of traded goods), the rate of change of the ex-ante flow supply of money (second term) and the past period's rate of inflation $\dot{P_{t-1}}$ (reflecting lagged values of the former exogenous variables), $\aleph$ is elasticity of relative price with respect to the excess flow of supply of money and β is the share of

traded goods in expenditure. Two dummy variables are introduced to account for the effects of the devaluation for the year 1954. All the estimated coefficients are highly significant except D_1.

Spitaller (1978) analyzed the determinants of inflation in the case of seven major industrial countries (Canada, France, The Federal Republic of Germany, Italy, Japan, The UK, and the US). He used the simultaneous equation model for the analysis with data covering 1950 to 1967.

The model used in his study is:

$$\dot{P} = \dot{P}\left[Constant\ t, \dot{M}, \frac{Y}{\bar{Y}}, \left(\frac{Y}{\bar{\bar{Y}}}\right)_{-1}, M\dot{P}, \dot{P}_{-1}\right] and$$

$$\dot{P} = \dot{P}\left[Constant\ t, \dot{M}, \dot{W}\bar{Y}, (W\dot{Y})_{-1}, M\dot{P}, \dot{P}_{-1}\right]$$

Here, $\dot{P}$ is measured by the rate of change in consumer prices; $\frac{Y}{\bar{Y}}$, $W\dot{Y}$ are current output gap and current output changes respectively, and are expected to have theoretically positive sign. $M\dot{P}$ is import prices which are measured in import unit values. $\dot{M}$ is money stock is expressed in terms of narrow money M_1. This applies to all countries in the sample expect for Japan, where institutional characteristics make it preferable to define inflation on terms of wholesale prices and to define the money stock in terms of broad money. The price equation assumes that the rate of price changes is the function of the rate of changes in money stock, output gap, import price and lagged value of itself. The study found that the changes in money supply affect the rate of inflation in all countries except Italy. The demand pressure effect on inflation as measured by the output gap is found in all the countries expect France and Italy. The demand pressure effect as measured by the lagged percentage change in output is borne out for Canada, the United Kingdom, and the United states. For Japan, the same effect appears to operate through the current rather than the lagged output changes. For France, a similar tendency may be noted, but the effect is statistically not significant.

Lim and Papi (1997)tried to shed some light on the determinants of inflation in Turkey by analyzing price determination within the framework of a multi-sector macroeconomic model during the period 1970 to 1995. They used the OLS technique to find the major determinants of the inflation in Turkey. Their findings were that the

monetary variables (initially money, more recently the ex-change rate) play a central role in the inflationary process and also public sector deficits contribute to inflationary pressure and that inertial factors are quantitatively important policymaker' commitment to active on several occasions in the past 15 years has also contributed to the inflationary process.

Gerlach and Svensson (2003) attempted to examine the relationship between inflation, money and interests rates in the euro area using data from 1980 to 2001 using log linear model. The central finding is that both the output gap and real money gap (the difference between the real money stock and the long run equilibrium real money stock) contain considerable information regarding future inflation. The gradual decline in inflation can be interpreted as corresponding to a fall in the average (implicit) inflation objective of the central banks in the Euro area.

Metin-ozcan, Berunment and Neyapati (2004)examined inflation dynamics in Turkey between 1988 and 200 by using univariate techniques. They found that CPI inflation and all their selected price inflations have strong inertia. They also found significant positive correlations between the dynamics of housing rents and the CPI, and both US Dollar and German Mark ex-change rates and CPI.

Al-Omar (2007)attempted to study the factors affecting the behavior of domestic inflation in Kuwait for the period from 1972 to 2004. To achieve this goal, he used three variables believed to influence inflation in a small open economy, namely foreign inflation, domestic money supply and domestic real GDP. He found that the domestic inflation and money supply are first difference stationary while foreign inflation and domestic income are stationary in their level. So he argued that there is no evidence of a long run relationship between domestic inflation and its foreign counterpart. After this, he tested the co-integration between domestic inflation and domestic money supply. The results indicate the existence of long run relationship between inflation and the broad measure of money supply. Then he examined the possibility of short-run relationship between domestic inflation and the rest of the variables using Granger causality test which indicates the lack of such relationship. He concluded that domestic inflation is influenced mainly by the development of domestic liquidity which overwhelmed the theoretically expected effect of imported inflation.

Vsalian&Gopakumar (2008) examined the relationship between inflation and GDP growth in India. It is obtained from the Co-integration and error correction models using annual data of 1972/73 to 2007/08 collected from Reserve Bank of India. They found that there is a long-run negative relationship between inflation and GDP growth rate in India. They also found that inflation is harmful rather than helpful to growth with the help of both models and also it is possible to examine the short-run and long-run relationship between two variables. The Engle-Granger (1987) two step co-integration proceduresare used to test the presence of co-integration between the two variables. The sensitivity of inflation to change in growth rates is higher than that of growth to change in inflation rates. Their important conclusion is that any increase in inflation from the previous period negatively affects growth.

Bashir and Nawaz (2011)examined demand side and supply side determinants of inflation in Pakistan on economic and econometric criterion and also investigated causal relationship among some macroeconomic variables by using the time series data for the period from 1972 to 2010. Long-run and short-run estimates have been investigated using Johanson co-integration and vector error correction approach and causal relationship have been observed using Granger causality test. The findings of their study revealed that in the long-run consumer price index has found to be positively influenced by money supply, gross domestic product, imports and government expenditures on the other side government revenue is reducing overall price level in Pakistan. Long-run elasticity of price level with respect to money supply, gross domestic product, government expenditures, government revenue and imports are 0.61, 0.73, 0.32, -1.37 and 0.41 respectively. In the short-run last year consumer price index and two years before government revenue are directly involved in enhancing CPI of current year.

Adeyeye and Kola (2012)examined the cause and effects of inflation in Nigeria between 1969 and 2009 by using the time series data of that period. Analytical as well as descriptive methodology was employed to investigate the effect of Money supply, real gross domestic product, ex-change rate and budget deficit on Nigerian inflation. They have used Log linear multiple regression model to find out the effect of given variables in Nigerian inflation. ADF test is employed to check the stationary of the data from 1969 to 2009. They found that the ratio of government expenditure to income and money supply growth rate have the greatest impact on inflation than other

variables. Co-integration between inflation and all variables which indicates the variables can be used for forecasting of inflation growth rate. They also revealed that there is a positive relationship between inflation and ex-change rate of dollar to naira and money supply growth rate while negative relationship exists between inflation and gross domestic product growth rate and ratio of government expenditure to income. This implies that while increase in money supply lead to inflation, a monetary expansion that is truly based on productivity of the economy may not be inflationary especially when such expansion is predicted on actual increase in government revenue.

Kabundi (2012) conducted the study to identify the main factors underlying inflation in Uganda, both in the long-run and short run using monthly data from January 1999 to October 2011. He used a single-equation Error Correction Model (ECM) based on the quantity theory of money including bother external and domestic variables. The main finding is that both external and domestic factors explain dynamics in inflation in Uganda. Over the long-run, monetary aggregate, world food prices, and domestic supply and demand effects in agricultural sector are main determinants of inflation in Uganda. While money growth, world food prices, energy prices, combined with domestic food prices have short-term impact on inflation. Thus, he concluded that the evidence of inflation inertia which can be attributed to expectations of agents or inflation persistence. Maryam et al (2014) empirically analyzed the determinants of inflation in Malaysia by using multiple regression analysis over the period 1980-2012 based on Malaysian economic performance over the 33 years. They used Malaysian CPI as dependent variables and GDP, money supply, interest rate, import goods & services, and government expenditure as explanatory variables on their study. Their results showed that all the explanatory variables have different relationship towards inflation (CPI) which is positive, negative or not related. Overall it can be concluded that GDP, interest rate and government expenditure have negative relationship towards CPI whereas money supply (MS) is positively related and imported goods and services are not significant.

Kirimi (2014) analyzed the main determinants of inflation in Kenya over the period 1970-2013 by using OLS technique to explain the process of inflation causation in Kenya. He observed the effect of money supply, central bank rates, Ex-change rates, wages, food prices, oil prices, political instability and corruption on annual inflation

rates in Kenya. He found that there was a negative relationship between food price and inflation level, Central bank rates was found to be statistically significant at 5 percent level of significance in causing the variation in inflation rate. Money supply and ex-change rate had a positive relation rate while GDP growth rate and corruption perception had a negative relationship with inflation. Wage rate coefficient was found insignificant in causing the changes in inflation with political instability having no effect on inflation.

Baze (2014)investigated the determinants of inflation in the Egyptian economy using annual data covering the period of 1991-2012. He employed Vector Autoregressive model (VAR). The results of his empirical study were that inflation rate responds positively in the first period following shocks to itself. Domestic liquidity growth rate, output gap, ex-change rate depreciation, and world food prices also expectations seemed to play an important role as inflation rate responds positively to a shock in itself in the first year following the shock, which re-enforce the idea that inflationary expectations will generate more inflation. In the short run inflation is explained mostly by its own fluctuations followed by output gap, domestic liquidity growth rate, and nominal depreciation of the Egyptian pound against the US Dollar while in a 5 years horizon about 56 percent of inflation dynamics can be attributed to factors other than inflation expectations itself.

Saxena and Singh (2015)sought to shed some light on the impact of selected variables on inflation in India by covering the quarterly data series for the financial years $2002Q_1$ to $2012Q_1$. The collected data is analyzed using ADF unit test, Ganger causality test, and the ordinary least square (OLS) technique. They used CPI as dependent variable and GDP, money supply, Deposit rate, prime lending rate, ex-change rate, trade volume, and crude oil prices as explanatory variables in their model. They suggested that deposit rate, trade volume, money supply and oil prices have the negative impact on CPI while other variables have the positive impact on CPI. Thus, they concluded that the identified independent variables have significant impact on the inflation and also there are some other variables which may have impact on inflation.

Wang (2015) examined the inflation and inflation determinants in china using econometric method to have empirical test on different variables that have relationship with inflation which include ex-change rate, money supply and Shanghai

interbank offered rate. By set up VAR model, unit root test, co-integration test, Granger causality test, variance decomposition and impulse response analyze data examined the main determinants of Chinese inflation taking Chinese inflation as dependent variable and ex-change rate CNY/USA, money supply (M_2) and interest rate as explanatory variables. He found that in short term inflation is the largest factor can affect itself, interest rate, money supply have influence to inflation. Ex-change rate has also effect to inflation but not so much. The reason might because the appreciation of Chinese currency increased the assets price and therefore induced foreign capital flow into Chinese market and the capital inflow force central bank to intervene foreign currency market.

Alam and Alam (2016)examined the sources of inflation in India both in the long run and in the short run by using the co-integration method developed by Pesaran et al. (2000). They examined the relationship between domestic price levels, money supply, ex-change rate, world price and GDP gap in the country during the period 1989/90 to 2012/13. The empirically findings suggested that in the long run money supply (MS), depreciation of the rupee and supply bottlenecks puts a pressure on the domestic price level by causing inflation to rise in the country. The analysis revealed that in the long run domestic factors as monetary growth and supply bottlenecks dominate the external factors for a rise in the domestic prices in the economy. The short-run analysis revealed that domestic factor MS and supply bottlenecks dominate the external factor as a measure cause for a persistent rise in the price level. Thus, the supply bottlenecks are through a significant factor in the short-run, but its importance in the long-run is relatively small. They also suggested that the elasticity of coefficient of positive MS and negative ex-change depreciation and supply-bottlenecks on the domestic price level in the country. The long-run estimated elasticity coefficient shows that increased MS, depreciation of the rupee and lower actual output than potential output puts a pressure on the domestic price level by causing inflation to rise in the country.

Bawa, et al(2016) examined the dynamics of inflationary process in Nigeria over the period 1981-2015 using the bound testing approach to co-integration (autoregressive distributed log approach). They argued that this approach has some econometric advantages over the Engle Granger (1987) and maximum likelihood based approach proposed by Jhonsen and Juselius (1990) and Johansen (1991) co-integration

techniques. They showed that inflation in Nigeria proxies by CPI exhibited a strong degree of inertia. The econometric results showed that past inflation and average rainfall appeared to have been the main determinants of inflationary process in Nigeria over the study period. They also found that there was a strong evidence of the importance of money supply in the inflation process, lending credence to the dominance of the monetarist proposition on inflation dynamic in Nigeria.

2.2.2 National Context

Chaudhary and Dowling (1982) analyzed inflation and different aspects of the macroeconomic variables of Nepal covering the data from 1964 to 1979. They established a relationship between money supply and price level. The estimated regression equation of consumer price index (CPI) on M_1 monetary aggregate is as: $CPI_t = 34.7 + 0.491 M_1$; $R^2 = 0.94$. It is found that, in the long run monetary model gives the best fit with R^2 close to unity.

Neupane (1992) obtained the appropriate model for Nepal and examined both monetarist and structuralist approaches to the inflation process in Nepal over the period 1965 and 1988 by using ordinary least square techniques. He found that the monetary policy is an important instrument to control the inflation. An increase in money supply in line with the growth of per capita GDP could help to control inflation.

Khatiwada (1994) investigated the magnitude and stability of relationship between money supply and inflation using annual data from FY 1965/1966 to FY 1989/90. He analyzed the quantity theory and structural approach to inflation in Nepal. He examined the monetary factors determining inflation individually as well as jointly with structural factors. The study found that Import Price Index (IPI) is consistently significant and suggested that inflation in Nepal is influenced by open economy forces.

Pandey (2005)analyzed the inflation in Nepal by using econometric model is based on the period of analysis from FY 1973/74 to FY 2003/04. M_1, IWPI and ex-change rate (NRS/IRS) are found to be important determinants on inflation in Nepal. Besides these quantitative factors, several other qualitative factors affecting inflation were administered prices, supply bottleneck due to market imperfection; underdeveloped

transportation and communication network are artificial shortage of commodities. It examined the relationship between inflation and its determinants using ECM.

NRB (2006) in a very quick and simple study using open economy monetary model has found that Indian inflation to have a significant and near unitary effect on inflation in Nepal. This interpretation resulted from empirical regression utilizing Ordinary Least Square (OLS) on annual time series data over 1975 to 2006.

NRB (2007) conducted the factors determining inflation in Nepal by using the time period from 1978 to 2006 in which the co-integration technique and error correction model have been applied. The study found that the Nepalese inflation was mainly determined by Indian inflation with narrow money supply only having an effect in the short run.

Koirala (2008) analyzed the inflation expectations in Nepal using 33 annual observations of actual inflation from 1973 to 2006. The forecastibility of the model has been examined on the basis of minimum root mean squared error (RMSE). He found that there is a significant positive relationship between inflation and inflation expectations in Nepal. It was found that 1 percent increase in inflation expectations has 0.83 percent impact on contemporaneous inflation.

Thapa (2010) tried to analyze the determinants of inflation in Nepal by using the data from 1977/78 to 2005/06. He has used OLS regression analysis on the variables CPI as dependent variable and money supply, wage rate, interest rate, real GDP, and Indian inflation as explanatory variable. His finding was that the Nepalese inflation is highly affected by the money supply and Indian inflation with open boarder. It is also concluded that the rate of interest has affected inflation in the long run.

Koirala (2010) examined the welfare losses arising from the currently rising inflation rate of Nepal using the method introduced by Bailey (1956) i.e. Semi log model of demand for real money balance. He used the annual time series data ranging from 1973 to 2009. He obtained the result that the rise in inflation is leading to decrease in real balance and hence increase in welfare loss. He also found that the rate of increases in welfare cost as a result of significant rise in inflation is sluggish. Further, he concluded that the significant fraction of real income as welfare cost in the year 2010 corresponds to other factors affecting real balance rather than anticipated inflation.

Gyanwaly (2012) attempted to examine the direction of causality between money, price and income in Asian countries: Nepal, India, Sri Lanka, Myanmar and Korea for the period of 1964-2011. There was used of Bivariate Granger causality test for both non co-integrated and co-integrated variables. He used error correction model and Granger F test to examine the direction of causality between money, price and income in Asian countries. He found that money supply is endogenous variable in all the countries but the extent of endogeneity of price and income variables slightly differs from one to another. Money causes both price and income and is receiving the feedback effects either from price or income or both.

Paudyal (2014) examined short term and long term effects of the macroeconomics variables on the inflation in Nepal during 1975-2011. The variables considered are budget deficits, Indian prices, broad money supply, ex-change rate and real GDP. The regression result from WickensBreusch Single Equation Error Correction model suggest that all variables considered are significant in long run implying that these variables are the determinants of inflation in Nepal. However, only budget deficit, money supply and Indian prices cause inflation in the short run. The result is consistent with monetarists' hypothesis of money matters and inflationary gap theory of Keynesian as well as supply constraints approach to inflation.

Koirala, et al. (2014)attempted to examine the impact of trade deficit with India on inflation of Nepal using secondary data of 2001 to 2013. They have applied the concept of co-integration and vector error correction model (VECM) has been used. They found that there is the existence of long run relationship between inflation in Nepal and trade deficit with India.

Koirala (2014) analyzed whether inflation in Nepal is fully home-made or does Nepal borrow (Significant) portion of its inflation from India applying Co-integration and VECM approach. He used monthly time series data of 2001:01 -2013:07. He found that there is strong positive long term relationship between inflation in Nepal and trade dependency in India.

2.3 Research Gap

This Study has attempted to carry out distinctly from other previous Studies in terms of sample size and Research Methodology. The Study has covered the data of 42 years. Thus, it is believed that this study is different from earlier studies of Nepalese Context. The Importance of this study may be viewed from its contribution to fill the gap between the previous studies and also finding of this study can add value to the existing body of the literature.

CHAPTER-III

RESEARCH METHODOLOGY

This chapter explains he detailed methodology of the study. This chapter deals with the research design, nature and sources of data, population and sample and methods of analysis of data.

3.1 Conceptual Framework

This section aimed at giving a description between inflation, broad money supply, exchange rate and real gross domestic product. Moreover the government expenditure, activities in imports and Indian inflation have also contributed to inflation causation. Inflation in Nepal has been attributed to an expanded of Indian trade in Nepal and further causing an increase in money supply, government expenditure have also led to a rapid increase in price in the economy. The factors have been shown in the diagram below.
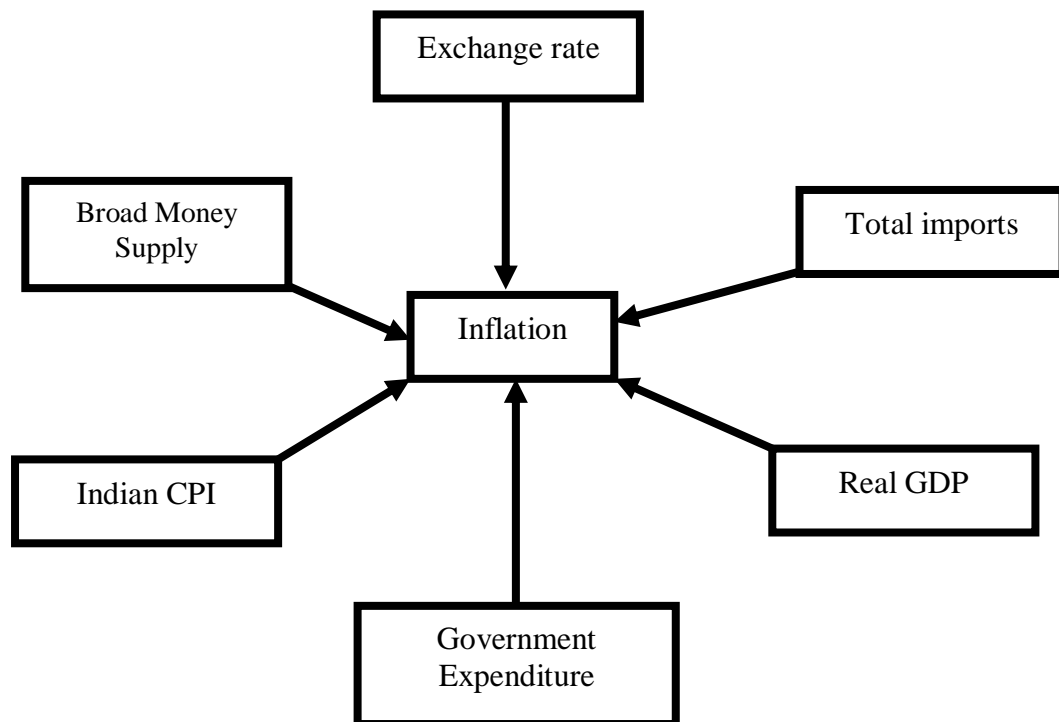
Figure 3.1: A Framework for inflation and its determinants

Source: Own representation from previous literature reviewed

The study aimed to analyze these factors by using both econometric and descriptive evidence, in which inflation as the dependent variable is regressed on the explanatory variables. The study has used Ordinary least squares (OLS) for estimation and this is because it is easy to use, straight forward and it is able to give us the best linear unbiased estimates. It is also preferred because of its ability to explain the effects of one variable resulting from changes of other several variables. This regression is done using e-views version 10 as it is the most preferred and recent econometric software.

3.2 Research Design

This study has employed descriptive as well as analytical research design in order to find out and identify the trend and structure of inflation in Nepal and also its major determinants. In addition, multivariate regression analysis and a causal comparative research design are alsoused to investigate the relationship between the inflation and its determinants. Furthermore, to analyze the past trends and structures of inflation descriptive methodology is also be added as the tool for this study.

3.3 Nature and Sources of Data

This study is based on the secondary data of various macroeconomics variables of Nepal. The Economic Survey report published by the government of Nepal and Quarterly economic bulletin published by NRB are themain source of data for the study. Apart from this the report on macroeconomic situation published by World Bank (World development Report, 2016 and 2017), Monetary Fund (IMF): World Economic Outlook (WEO), Central Bureau of Statistics (CBS) : Statistical Year Book 2015, Statistical Pocket Book 2016 and Nepal in Figure 2016 and other Nepalese journals of economics and Business are referred to collect the data. Dataon annual inflation rate, broad money supply, Indian inflation, Real GDP, Government Expenditure,domestic credit, ex-change rate, total imports, etc. from the year 1975 to 2016 is used to understand the direction, magnitude, pattern, trends, and structures of the inflation in Nepal. All the secondary data are compiled and tabulated in the time series as per the need to fulfill the objectives of the study.

3.4 Sample Period Covered

The study based on statistical data of selected variables.So, the Study covers the time period 42 years from 1975to 2016 on an annual basis. The period of 42 years is taken because the large numbers of observations helps to increase the reliability and validity of the result obtained from the model. Thus, the number of observations is forty two.

3.5Methods of Data Analysis

The study has used both descriptive and analytical approach of data analysis. Under descriptive analysis of the data different graphs, tables and figures are used to analyze the structure, pattern and trend of inflation in Nepal. Similarly under analytical analysis, different econometric tools such asADFunit root test, t-test, F-test, Granger causality test, autocorrelation test, heteroscedasticity test, normality test and OLS method are applied to analysis the data to find the determination of inflation in Nepal.

3.6 Model Specification

On the basis of theoretical and empirical literature, the study used a hybrid open monetary model utilized by NRB 2006 and 2007 which has tried to capture the major factors determinants of inflation in Nepal. The general model of inflation comprises both monetary factors and structural factors like money supply, exchange rate, real GDP, Government expenditure, total imports, and also as external factor Indian CPI. So the inflation model becomes as:

NCPI = f (M_2, RGDP, GE, ER, ICPI,M)…………………. (1)

Where,

NCPI = Nepal Consumer Price Index

M_2 = Broad Money Supply

RGDP = Real Gross Domestic Product

GE = Government Expenditure

ER = Ex-change Rate

ICPI = Indian Consumer Price Index

M = Total Imports

To examine the effect of broad money supply, Indian inflation, Real GDP, Government Expenditure, ex-change rate, total imports on Nepalese inflation the following multivariate regression equation under OLS technique is used in which the equations comprises inflation in Nepal as dependent variables and broad money supply, Indian inflation, Real GDP, Government Expenditure, domestic credit, ex-change rate, total imports as the explanatory variables. The study has presented two types of equations in which one equation is in level form and then if there is presence of autocorrelation next equation is used in first difference form. The equations specification is given as below:

Equations -1 in level form

$$\ln P_t = \alpha + \beta_1 \ln M_{2t} + \beta_2 \ln RGDP_t + \beta_3 \ln GE_t + \beta_4 \ln ER_t + \beta_5 \ln M_t + \beta_6 \ln IP_t + V_t \quad \dots\dots\dots\dots\dots\dots..1.1$$

Equation- 2 in first difference form

$$\Delta \ln P_t = \alpha + \beta_1 \Delta \ln M_{2t} + \beta_2 \Delta \ln RGDP_t + \beta_3 \Delta \ln GE_t + \beta_4 \Delta \ln ER_t + \beta_5 \Delta \ln M_t + \beta_6 \Delta \ln IP_t + L.V_t \quad \dots\dots\dots\dots\dots\dots..2.1$$

Where,

P_t = inflation in Nepal

$RGDP_t$ = real GDP

GE_t = Government Expenditure

M_2t = Broad Money supply

ER_t = Ex-change rate

M_t = Total imports

IP_t = Indian Inflation.

Δ = First difference

L = first lag of error term

$\alpha, \beta_1, \beta_2, \beta_3 \& \beta_4$ Regression parameters and V_t is stochastic error term.

3.7 Variables Specification

The study attempts to analyze the factors determinations of inflation in Nepal by using the econometric tools as well as different statistical tools in which the following variables are used.

a. Consumer Price Index (CPI)

The CPI is a statistical estimate constructed using the prices of a sample of representative items whose prices are collected periodically. In this study, inflation in Nepal (CPI) is taken as a dependent variable in which log of consumer price index is used as the dependent variable to examine the its relations with others explanatory variables.

b. Broad Money Supply (M_2)

It is the broad definition of money supply which is associated with the modern economist Milton Friedman and his followers. Broad money supply is the sum of currency held by people in their hands/pockets and both demand deposit (DD) and time deposit of people with the banking institutions. i.e. $M_2 = C + DD + TD$.

c. Real Gross Domestic Product (RGDP)

The real gross domestic product is the inflation adjusted money value of all final goods and services which are produced within in the country during a year. It is expressed in base-year prices, and is often referred to as 'constant price'. Here, the real GDP of Nepal is expressed in base-year prices of 2014/15 which is taken as independent variable in the regression model.

d. Government Expenditure (GE)

Government expenditure consists of the purchase of goods and services by the government which includes public consumption and public investment, and transfer payments consisting of income transfer (pensions, social benefits) and capital transfer. It is also taken as independent variables in the regression model.

e. Ex-Change Rate (ER)

Ex-change rate is a value of home currency that has compared to foreign currency. Generally, Ex-change rate is divided into two categories, namely, fixed ex-change rate and flexible exchange rate. Fixed ex-change rate is determined by the central bank

whereas flexible ex-change rate is determined by the demand and supply of the currency in the market. It is also considered as independent variable in the model.

f. Total Imports (M)

Imports are foreign goods and services bought by residents (includes citizens, business and the government) of a country. Total imports include the total imported goods and services classified by the major commodity groups in Nepal. It is also considered as independent variable in the model

g. Indian Consumer Price Index (ICPI)

It measures changes in the price of market basket of goods and services of the consumers. Like that, Indian consumer price index also measures change in the prices of the market basket of goods and services of the consumer in India. It is also considered as major independent variable in the both log run and short run regression model.

3.8 Estimation Method

To estimate the models mentioned above, the ordinary least square regression method is used in the study. Under OLS method, multiple regression analysis is used by considering matrix operation. The variables which are used in this study are transformed into natural logarithms to eliminate the variability of the variables and also to use linear regression model. The estimated coefficient is interpreted as elasticity coefficient. The level of significance is considered at 1 percent or at 5 percent or at 10 percentin this study to test the statistical significance of the estimated coefficients.

To check the reliability of the analysis coefficient of determination (R^2), adjusted coefficient of determination ($\bar{R}^2$), t-test, F-testand D-W test are used in this study.

3.9 Pre-Estimation Test

a. Stationary Test

The data sets must be stationary to be valid that is the mean and the variance of the data set is time independent and they are constant over time. The study has used the order of integration to test the stationary of the data. If a series is integrated of order

(0) then it is stationary but if otherwise it is non-stationary and to test stationary, the study employed the Augmented Dickey FullerUnit Root Test. (Gujarati, 1995).

b. Augmented Dickey Fuller Unit Root Test

The study has employed the augmented dickey fuller test. The test can be used to test the order of integration for a variable generated with a drift from and a deterministic trend. This is because the errors may not be normally and identically distributed and the residual variance may be biased.The null hypothesis may be taken tomean inflation follow a random walk and future inflation cannot be predicted while the alternative may mean economic agents may predict future inflation and do not follow a random walk.

c. Heteroscedasticity

This problem occurs when the variances of the population are not constant or unequal. The problem of heteroscedasticity is tested using Breusch-Pagan-Godfrey test.

If the chi-square value obtained exceeds the critical chi-square value, the null hypothesis of no heteroscedasticity is rejected (Gujarati, 1995).

d. Normality Test

The test tries to prove that the error term is normally distributed and is based on the assumption that U_i is normally distributed. The study has used Jarque-Bera test to test the normality of the residuals.

e. Causality Test

This test is employed to test the causality between inflation and explanatory variables in this study. The Granger Causality has applied to test the causality between the inflation and selected explanatory variables.

CHAPTER – IV

DATA PRESENTATION AND ANALYSIS

This chapter is divided into two sections. The first section provides the necessary information about the first objective of this study. It means that the first section of this chapter deals about the trend, pattern and structure of the inflation in Nepal during the study period. Similarly, the second section provides the key information about the second objectives in which this section deals about the factor determinants of inflation in Nepal during the study period.

4.1 Structure, trend and pattern of inflation in Nepal

4.1.1 Analysis of the Trend, Structure and Pattern of Overall Inflation in Nepal

CPI measures inflation impact which is the final measure of prices on household. The CPI index captures the average household's consumption basket that is determined through National level HBS survey.It is known that the measurement of inflation in Nepal was started form the year of 1973 by using the expenditure weightage of the goods and services of the people obtained from the first household budget survey (1972/73).Prior to that, equal weights were assigned for each and every commodity of the basket. Even though the data of inflation is available from 1973 in Nepal, this study limits the data for the 42 years from 1975 to 2016 to present the inflation figure of the Nepalese economy.

The trend and pattern of CPI inflation in Nepalese economy from the time period 1975 to 2016 is shown in figure 4.1.1.
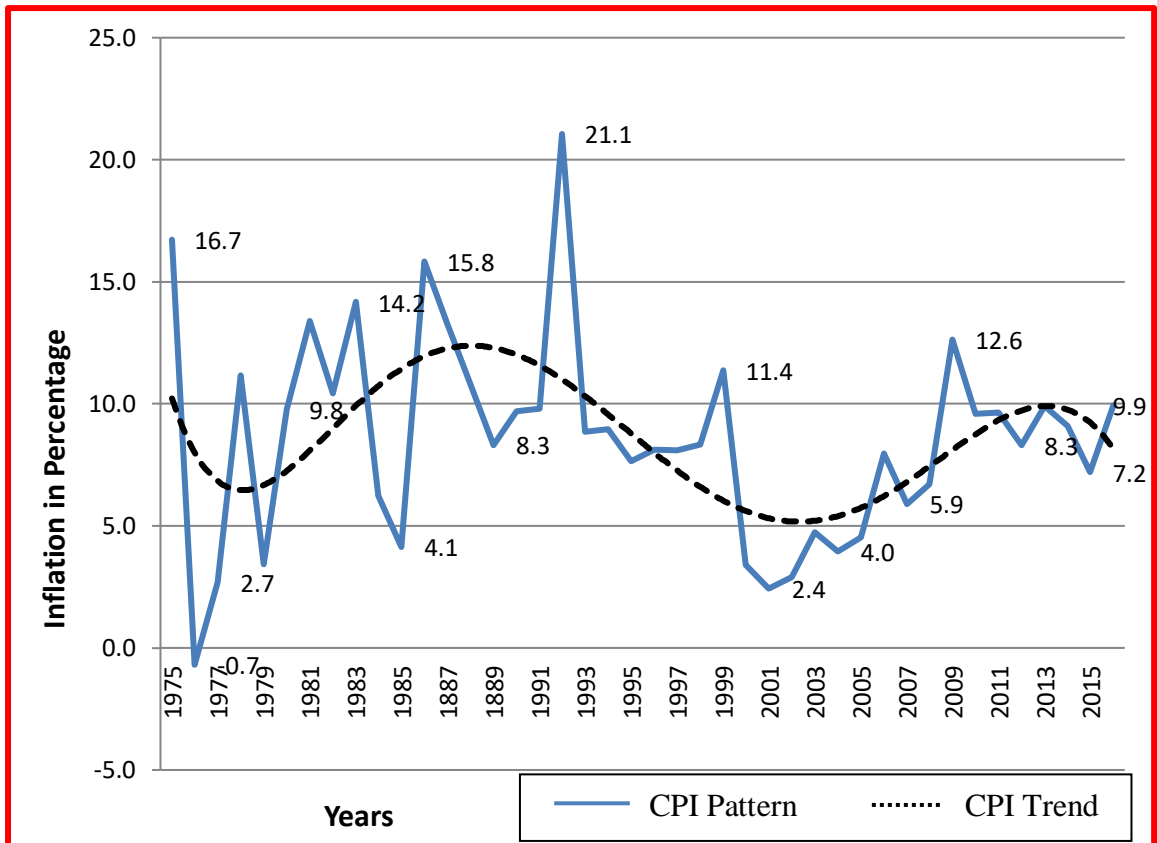
Figure 4.1.1: Trend and pattern of CPI inflation (in percent)

Sources: Calculation using Excel based on Appendix III

Figure 4.1.1 shows the trend and pattern of inflation in Nepal ranging from 1975 to 2016. Figure 4.1.1shows that the inflation started at the study period at around 16 percent and decreased to negative in 1976 at 0.7 percent. Then it has increased to double digit in the decade of 1980s. However it declined at a single digit in 1985 and again it has increased in the years 1986, 1987, 1988 with double digit then it became in single digit until 1991. Again, the inflation rate grew at double digit in 1992 at 21.1 which was the highest inflation rate during the study period. But it declined at 2.4 in 2001 which was the lowest inflation rate during the study period. So, generally, the rate of inflation over the study period (1975-2016) is seen highly fluctuating up to the period 1992 in nature and then it is seen moderate fluctuating after the period 1993. Even though the pattern of inflation in Nepal is volatile in nature, it is hovered around the 5 to 10 percent in most of the study period. The average inflation rate has been recorded at 8.5 percent during the period of 42 years and the trend of inflation varied over time shown in the given table 4.1.1which analyses the trend of inflation from 1975 to 2016 on 6 years average basis.

Period	CPI Inflation
1975-1980	7.2
1981-1986	10.7
1987-1992	12.2
1993-1998	8.3
1999-2004	4.8
2005-2010	7.9
2011-2016	9
Overall average of Inflation during study period	8.5

Table 4.1.1 Separation of overall CPI inflation in percentage based on six years average

Sources: Calculation using Excel based on Appendix III.

The trend of CPI inflation varied over time. In the period of 1975-1980, inflation observed single digit average trend by 7.2 percent while in the period of 1987-1992, inflation observed higher average trend by 12.2 percent.In the period of 1999 to 2004, inflation average rate is observed at low level which was 4.8. So, by looking the inflation averages of different time periods, it can be concluded that Nepal has facing the problem of fluctuating inflation trend over the past 3 decades.

In the period of economic liberalization process over the period 1990s, there was a structural change in the economy. It is seen that the inflationary pressure continued its double-digit level during 1990s, mainly due to structural changes in the economy. Average inflation over the period 1987-1992 was 12.2 percent. Even if there was improved supply situation after structural changes in the economy, the impact of the gulf war, low agricultural production and relatively higher inflation in India, etc. led to upward pressure on inflation during 1990s. The devaluation of Nepalese currency vis-à-vis US dollar and other convertible currencies by 20.9 percent in 1991 was also responsible to increase the rate of inflation over this period. In addition to this, higher

rate of inflation in India in this period was also the major factors cause to rise in the prices of the imported goods from India.

It is also seen that the trend of inflation began to slow down after mid 1990s and there has seen significant improvement in the price situation over the period 1999-2004 with an average inflation rate of 4.8 percent over the period. The improvement came in this period due to low import prices in India, rise in agriculture production, devaluation of home currency and so on. However, Nepal suffered a prolonged episode of conflict followed by a drawn out political transition. The Maoist insurgency from 1996 to 2006 created the obstacle for smooth supplies of goods and services in the remote parts of the country which helped to raise the inflation after 2000. It was increased at 12.6 in 2009 and then decreased sharply and constant rise at 9.6 in 2010 and 2011 and reached to 9.9 in 2016 due to the Earthquakes and Non-official Blockade of India.

4.1.2Analysis of Pattern and Trend of Group Wise Inflation

As already mentioned above, under group wise inflation there are twomajor groups, namely food and beverages groups (FBG) and non-food and services groups (NFSG).Here, the pattern and trend of FBG and NFSG is explained with the help of following table 4.1.2and figure 4.1.2.

Periods	FBGs	NFSGs
1975-1980	6.6	8.8
1981-1986	10.9	10.4
1987-1992	13.1	10.6
1993-1998	7.9	9
1999-2004	4.3	5.5
2005-2010	10.1	6
2011-2016	10.7	7.6
Overall average inflation rate of different groups during the study periods	9.1	8.3

Table 4.1.2 Separation of CPI into its major groups in Percentage (based on six years average)

Source: Calculation using Excel based on Appendix III

It is observed in table 4.1.2 that the overall average inflation rate of food and beverages items remained at 9.1 percent and non-food and services items remained at 8.3 percent during the study period from 1975 to 2016. The inflation trend on FBG and NFSG varied over time. In the period of 1975-1980, the FBG inflation was observed on average at 6.6 percent while NFSG inflation was observed on an average at 8.8 percent. In the period of 1999-2004 lower rate of FBG inflation was observed on an average at 4.3 percent due to the tight monetary policy and better food production in Nepal and price control measures in India as well whereas the NFSG was observed on an average at 5.5 percent in the same period. The average rate of FBG inflation is found higher in several periods than the average rate of NFSG during the period of 1975 to 2016.
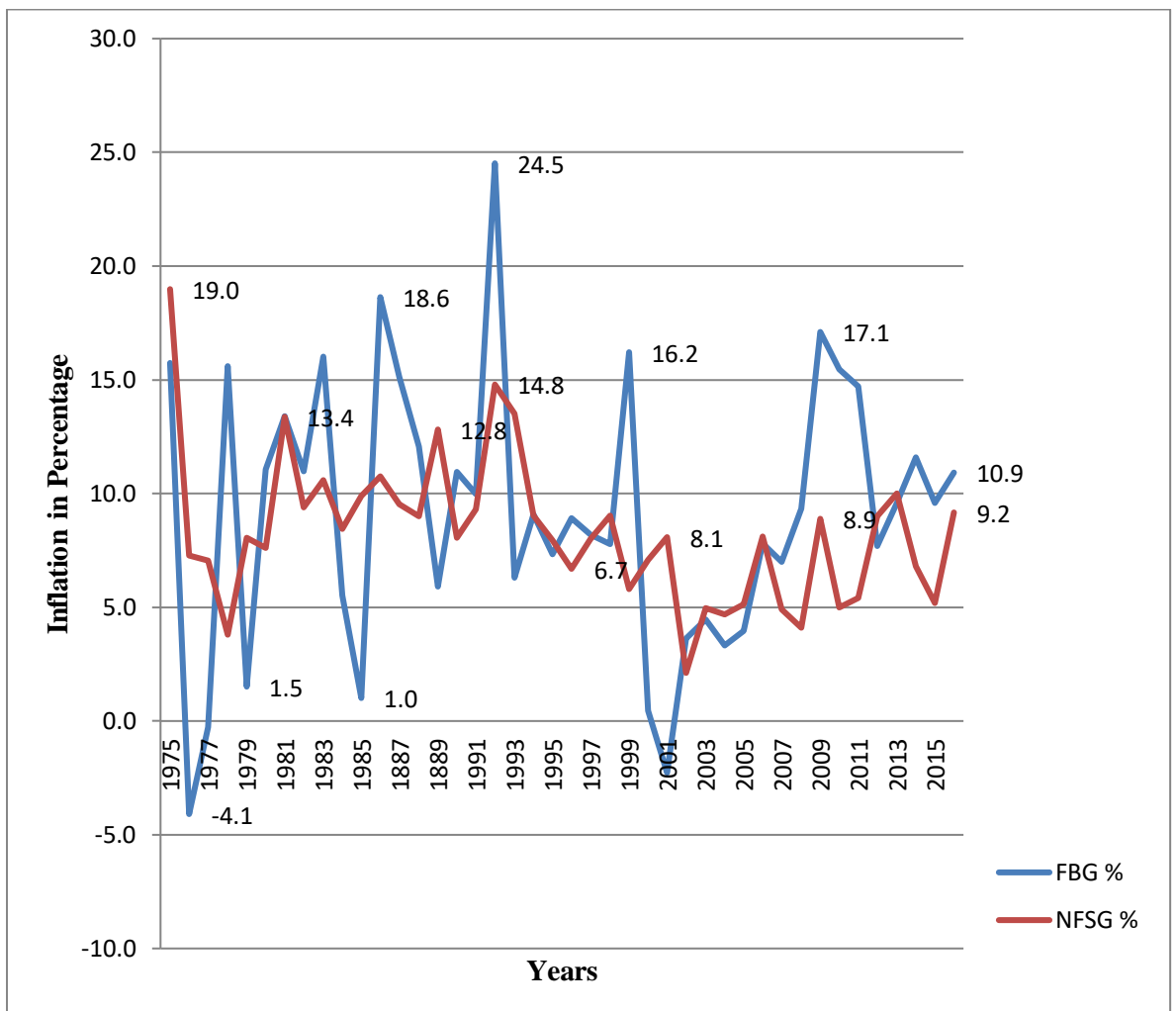
Figure 4.1.2 Trend and Pattern of FBG Inflation and NFGS Inflation

Source: Calculation using Excel based on Appendix III

Figure 4.1.2 shows the inflation in Nepal on the basis of two major groups FGB and NFS group.The horizontal axis (X-axis) represents the time duration and vertical axis (Y-axis) represents the inflation rate in percentage. In the above figure, it is seen that the rate of inflation on both groups is fluctuating and volatile and the rate of fluctuating of both groups is observed relatively high till 1992 at 24.5 percent and 14.8 percent respectively. The lowest rate of inflation of FGB is observed in 2001 at - 2.3 percent whereas that of NFSG is observed at 2.1 in 2002.However, the rate of inflation of FGB is hovered around 5 to 20 percent and that of NFSG is hovered around 5 to 15 percent till 1993 and later it hovered around 5-10 percent.

Even though Nepalese government introduced the SAP to reduce the structural constraints for maintaining desire level of inflation, the programs did not stabilize the price situation. After liberalized the economy of Nepal, there was seen the higher rate of inflation on both FBG and NFSG during the 1990s due to sharp rise in the price of rice product and spices, devaluation of Nepali currency, rise in import prices of raw materials, fertilizers, construction materials and consumer goods, rise in price of petroleum Products, education fees, telephone and electricity charges, higher rate of inflation in India, and so on.

It was only after the mid-1990s that the inflation rate on both FBG and NFSG began to climb down. Especially since 1999 there has been a significant progress in the price situation. The average inflation rate of both FBG and NFSG during the period 1999-2004 was observed at 4.3 and 5.5 respectively compared to the average rate of 7.9 and 9 during the period 1993-1998. Nepal has a long and open border with India, allowing free flow of goods and services across the bordered based on free convertibility of the two currencies. Cross border flows of daily consumption goods help to equalize cross-border prices. As a result, low food prices that have prevailed in India have resulted in depressed food prices in Nepal as well has resulted in low inflation rate of FBG since 2000. The financial sectors reforms and other liberal policies enacted during this period are also the cause to remain inflation rate of FBG in lowest rate.

However, it is seen that inflation rate of both groups has increased during the period 2011-2016. It was increased due to the rise in price of petroleum products, poor supply situation, electricity tariff, and rise in price of fertilizers, earthquake, and non-official blockade of India and so on.

At last, it can be concluded that overall inflation CPI in Nepal is mainly attributed by the inflation in FBG because the inflation rate on FBG is higher than the NFSG in several years during the study periods from 1975 to 2016.

4.1.3 Analysis of Pattern and Trend of Region Wise Inflation

As mentioned above, under region wise inflation there are three major regions, namely Kathmandu Valley, Hills and Terai. The structure, pattern and trend of inflation in these three different regions is explained with the help of following table 4.1.4 and figure 4.1.4.

Periods	KTM Valley Inflation	Hills Inflation	Terai Inflation
1975-1980	7.9	7.6	6.8
1981-1986	10.62	10.75	10.67
1987-1992	12.95	11.01	11.88
1993-1998	9	7.93	7.97
1999-2004	4.4	4.9	4.9
2005-2010	8	7.95	7.77
2011-2016	9.5	9.25	8.48
Overall average Inflation rate of different regions during the study period	8.9	8.5	8.4

Table 4.1.3 Separation of CPI into Different Regions in percentage based on six years average

Source: Calculation using Excel based on Appendix IV

It is seen that the average inflation rate in Kathmandu Valley is observed at 8.9 percent and in Hills and Terai is recorded at 8.5 percent and 8.4 percent respectivelyduring the study period from 1975 to 2016. In the period of 1975-1980, the inflation in Kathmandu Valley was observed on average at 7.9 percent while in

Hills and Terai, it was recorded on an average at 7.6 percent and 6.8 percent respectively. In both the period of 1981-1986 and 1987- 1992, the average rate of inflation in all regions was recorded higher in comparison to others periods. The highest inflation rate in Kathmandu valley was observed in the period of 1987-1992 which as 12.95. Like that it is observed that the higher inflation rate of 11.01 and 11.88 respectively in others two regions namely hills and Terai at that same time period. It was also found that the lowest average rate of inflation in all regions recorded during the period of 1999-2004 by 4.4 percent, 4.9 percent and 4.9 percent respectively.
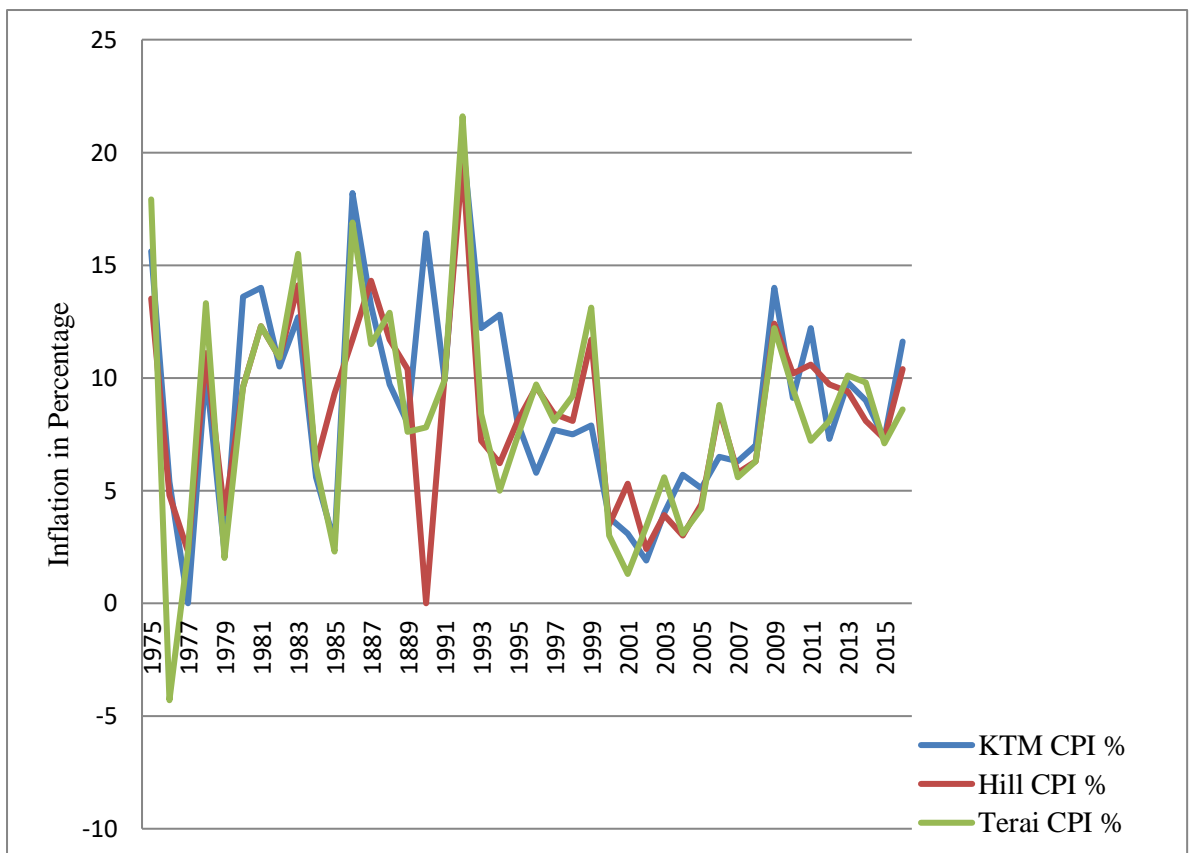
Figure 4.1.3 Trend and Pattern of Inflation in Different Regions

Source: Calculation using Excel based on Appendix IV

The figure 4.1.3 shows the trend and pattern of inflation in different regions such as Kathmandu Valley, Hills and Terai region. By looking the above given figure 4.1.3, it can be said that there is the higher degree of fluctuation in trend of inflation in all the regions upto20s and the degree of fluctuation has climbed down. The highest rate of inflation in all regions was observed in the year 1992 by 20.5 percent in Kathmandu valley, 19.6 percent in Hills and 21.6 percent in Terai region. It is seen that the rate of

inflation is higher in Terai region in comparison to Kathmandu valley and Hills in this period. During this period, Nepal is in BOP crisis, due to this Nepal had just adopted structural adjustment programme in this period to reduce the structural constraints. But, the programme did not stabilize the price level. Due to the BOP crisis in the country, there was a high inflation during the 1990s but later when different policies were formulated that policies helped to reduce the overall inflation after 2000, then inflation in different regions had also decreased in this period. In 2016, the inflation rate of Kathmandu valley stood at 11. 6 percent, hills at 10.4 percent while that of Terai accounted 8.6. Weak road networks and poor supply situation are the main cause to be different inflation rate in different regions.

4.2 Econometric Analysis of Factor Determinants of Inflation in Nepal

Controlling inflation to a single digit has long been a policy objective for the Nepalese Government. The government of Nepal through the central bank does alter monetary aggregates to achieve the policy of price stability. Price stability can play a key role for achieving the target of overall economic growth including that of poverty reduction, income inequality, etc. Higher inflation rates accounted in the past years have been the matter of prime concern of macroeconomic policy. The one of the major objective of monetary policy in Nepal is to control the inflation. But, due to the various difficulties to find out the determinants of inflation at a point of time, the monetary policy is seen ineffective to control the inflation in Nepal in the past. It is necessary to identify the major determinants of inflation which are responsible for growing inflation to increase the effectiveness of monetary policy in Nepal. Thus, the study offactor determinants of inflation in Nepal has been important in the present. However, there are various factor determinants of inflation in Nepal at present, only some major variables are incorporated in this study to test as the factor determinants of the inflation. The variables which are tested as determinants of inflation in Nepal are Real GDP, broad money supply, government expenditure, ex-change rate, Indian CPI inflation,total imports.

4.2.1 Augmented Dickey Fuller Test/Unit Root Test

Here, in this study has applied OLS technique of estimation method. The OLS technique of estimation is based on asymptotic convergence theorem which assumes that the data series are stationary. However, the macroeconomic time series data are generally non-stationary. It is said that if non-stationary data are used and run the model then the result of that model may be biased and lead to failure in predicting outcomes which leads to spurious regressions where R-Squared is approximately unity and t and F statistics become significant and valid. In order to avoid the problem of spurious regression, non-stationary data must be stationary which can be made through differencing the data. For this, Augmented Dickey Fuller test is used. Each variable is tested in both form intercept and intercept with trend with null hypothesis i.e. the variable has a unit root and alternative hypothesis i.e. the variable does not have a unit rootwhich are presented in the given following table 4.2.1.

Variables	Level Form		First Difference		Remarks
	Intercept	Trend and Intercept	Intercept	Trend and Intercept	
LnNCPI	-0.289 (0.91)	-1.493 (0.82)	-5.348 (0.00)*	-5.394 (0.00)*	I (1)
Ln M_2	-0.623 (0.85)	-2.041 (0.56)	-4.482 (0.00)*	-4.463 (0.00)*	I (1)
LnRGDP	-0.038 (0.96)	-3.066 (0.13)	-7.539 (0.00)*	-6.163 (0.00)*	I (1)
LnGE	0.139 (0.96)	-2.036 (0.56)	-5.608 (0.00)*	-5.544 (0.00)*	I (1)
LnDC	-2.288 (0.18)	-1.121 (0.91)	-6.008 (0.00)*	-7.243 (0.00)*	I (1)
LnM	-0.289 (0.91)	-1.4934 (0.82)	-5.348 (0.00)*	-5.3944 (0.00)*	I (1)
LnEr	-1.276 (0.63)	-0.712 (0.97)	-4.890 (0.00)*	-4.853 (0.00)*	I (1)
LnICPI	-1.094 (0.63)	-1.798 (0.69)	-5.121 (0.00)*	-5.096 (0.00)*	I (1)

Table 4.2.1 Augmented Dickey Fuller Tests for Unit Root

Source: Calculation using Eviews10 based on Appendix V and VI

Note: * shows 1% level of significance and numeric value in the parenthesis (….) expresses p-values. The p-values are based on MacKinnon (1996) one-sided p-values.

In the table 4.2.1, all the variables, NCPI, M_2, RGDP , GE, DC, M, Er, ICPI expressed in natural logarithmic shows the presence of unit root in the level form which accepts the null hypothesis. However, all the variables are stationary at the 1% level of significance in first difference which rejects the null hypothesis. Thus, it is concluded that all variables are integrated of order 1, i.e. I(1).

4.2.2 Regression Analysis

If the equation is estimated in level form that will not free from the problem of autocorrelation as the time series data are mostly non-stationary in level form. So, to correct the problem of non-stationary and to obtain the relationship between dependent variable and explanatory variables, here is estimated the regression equation in first difference. The estimated version of the equation is given below:

Equation 2.1

$$\text{Dln} \, P_t = 0.0125 + 0.071 \ln M_{2t} - 0.304 \ln RGDP_t + 0.013 \ln GE_t + 0.142 \ln ER_t$$
$$+ 0.104 \ln M_t + 0.588 \ln IP_t$$

t-value (0.719)   (0.682)   (-1.672)*** (0.288)   (2.366)**

      (2.053)** (5.009)*

$R^2 = 0.6136$ Adjusted $R^2 = 0.5454$ D-W test = 2.3368   F-Statistics = 8.997 N= 41

Note: * significant at 1%

   ** significant at 5%

   *** significant at 10%

The equation 2.1 shows the regression result between dependent variable and explanatory variables after taking their difference. The equation shows that the elasticity coefficients of inflation are very low. Even though the regression coefficients of broad money supply and government expenditure are positive, they are

insignificant at the given level of significance. It means that there is no any impact of broad money supply and government expenditure on Inflation in Nepal. Thus, the broad money supply and government expenditure can't show any impact in determining price level in the country in both the short run and long run. However, the regression coefficients of exchange rate, total imports and Indian inflation are 0.14, 0.10, and 0.59 respectively. It means that one percent increase in exchange rate, total imports, Indian inflation leads to increase 0.14, 0.10 and 0.59 in inflation in Nepal. The calculated t-statistics of these variables are significant at the given level of significance. Thus, the exchange rate, total import and Indian inflation show the impact in determining price level in the country. The negative relationship between inflation in Nepal and real gross domestic product shows that decrease in the RGDP leads to increase the inflation in the country. But the impact of decreasing RGDP on inflation in Nepal is low.

Besides, the F-statistic shows the linearity on the regression equation because it is greater than tabulated value at the given level of significance. Likewise, the Durbin-Watson value is greater than two which shows the absence of autocorrelation in the equation. It also shows that the time series data becomes stationary in first difference.

4.2.4 Granger Causality Test

Granger Causality test is used to test the causality between inflation and its explanatory variables. The causality between inflation and explanatory variables are presented in the following table 4.2.4.

Pairwise Granger Causality Tests			
Smple: 1975-2016			
Lags : 2			
Null Hypothesis :	**Observations**	**F-Statistics**	**Probability Value**
D(LNM2) does not Granger Cause D(LNCPI)	39	1.52487	0.2322
D(LNCPI) does not Granger Cause D(LNM2)		4.84946	0.0140
D(LNRGDP) does not Granger Cause D(LNCPI)	39	1.98965	0.1523
D(LNCPI) does not Granger Cause D(LNRGDP)		4.35100	0.0208
D(LNGE) does not Granger Cause D(LNCPI)	39	0.26208	0.7710
D(LNCPI) does not Granger Cause D(LNGE)		1.71867	0.1945
D(LNER) does not Granger Cause D(LNCPI)	39	0.18747	0.8299
D(LNCPI) does not Granger Cause D(LNER)		1.76994	0.1857
D(LNICPI) does not Granger Cause D(LNCPI)	39	5.97714	0.0060
D(LNCPI) does not Granger Cause D(LNICPI)		0.25493	0.7764
D(LNM) does not Granger Cause D(LNCPI)	39	1.27879	0.2914
D(LNCPI) does not Granger Cause D(LNM)		1.15920	0.3258

Table 4.2.4 Granger Causality Test

Source: Calculation using Eivews10 based on Appendix IX

For the identification of the direction of causal association among the variables, and to find out directional causality between the two variables, the study has used the pair-wise Granger (1969) causality test. Table 4.2.4 shows the unidirectional causal

relation between the inflation and broad money supply in Nepal. The one way causation was established from inflation to broad money supply at 5 percent level of significance at two lags. Similarly, there is seen that the unidirectional causal relation between the inflation and real gross domestic product. The one way causation was established from inflation to real gross domestic product at 5 percent level of significance at two lags. Like that, there is also unidirectional causal relation between the inflation in Nepal and Indian Inflation. The one way causation was established from Indian inflation to Nepali inflation at 5 percent level of significance at two lags. But there no causality exists between inflation and other variables such as total imports, exchange rate, and government expenditure. Finally, it can be concluded that there is the unidirectional causality runs from LNCPI to LNM_2, LNCPI to LNRGDP and LNICPI to LNNCPI and no feedback relation in the short run.

4.2.5 Residual Diagnostic

Under this study, the following residual diagnostics are presented based on equation 2.1.

a) Heteroscedasticity Test

Breusch-Pagan-Godfrey test is used to test the heteroscedasticity of the equation 2.1 by setting the following null hypothesis. The Breusch-Pagan-Godfrey test regressed the square residuals on the original regressors.

Null hypothesis: Residuals are not heteroscedasticity.

F-statistic	1.018791	Prob. F(6,34)	0.4298
Obs*R-squared	6.247954	Prob. Chi-Square(6)	0.3960
Scaled explained SS	4.280951	Prob. Chi-Square(6)	0.6387

Table 4.2.5aHeteroskedasticity Test: Breusch-Pagan-Godfrey

Source: Authors Calculation using Eviews-10 based on Appendix VIII

In the table 4.2.5 the probability value of F-statistic, Observed R-squared and Scaled explained SS is more than 5 percent. It means that the null hypothesis is not rejected. Thus, it can be concluded that the difference form equation is free from heteroscedasticity.

b) **Serial CorrelationTest**

Breusch-Godfrey Serial Correlation LM test has been applied to test serial correlation by using the following null hypothesis.

Null hypothesis: There is no serial correlation

F-statistic	1.293974	Prob. F(2,32)	0.2881
Obs*R-squared	3.067713	Prob. Chi-Square(2)	0.2157

Table 4.2.5bBreusch-Godfrey Serial Correlation LM Test

Source: Calculation using Eviews10 based on Appendix VIII

In the table 4.2.5 the p-value of both F-statistic and Observed R-squared with degree of freedom two is higher than 5 percent. It means that the null hypothesis is rejected. Then, it can be concluded that there is no serial correlation in the difference form equation.

c) **Normality Test**

The Jarque-Bera test is applied to test the Normality of the residuals by setting following null hypothesis.

Null hypothesis: Residuals are normally distributed
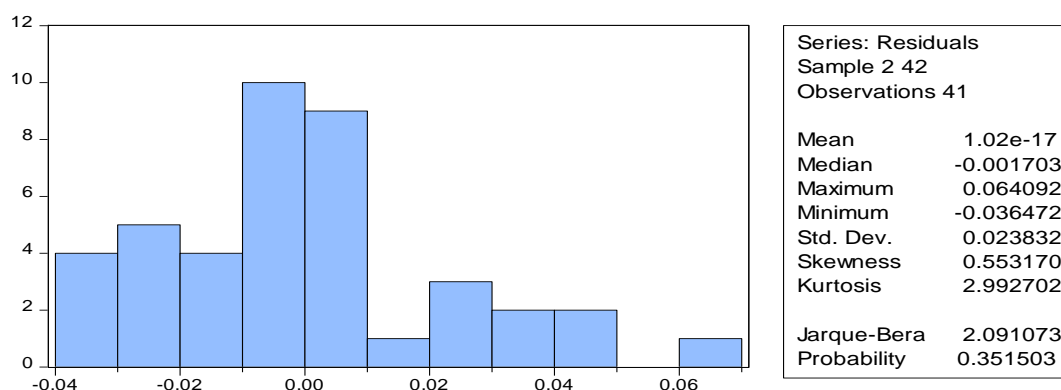
Figure 4.2.5 Normality of the residuals

Source: Authors Calculation using Eviews-10 based on Appendix VIII

The figure 4.2.4 shows that the residuals are normally distributed with JB value 2.09 and P-value 0.35. Here, P-value is more than 5 percent level of significance. It reveals that the null hypothesis is not rejected. It means that the residuals are normally distributed.

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CHAPTER- V

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of the Findings

The main objective of this study was to explore the major factor determinants of inflation in Nepal from 1975 to 2016 and also to examine the trend, pattern, and structure of inflation during the study period. It was necessary to draw the lessons for the future and further suggest policy recommendations. Based on this study, findings indicate that the average inflation rate during the study period was 8.5 percent with a high level of inflation of 21.1 percent in 1992 and a minimum inflation of 2.4 percent in 2001. Likewise, the average inflation rate of FBG and NFSG was observed 9.1 percent and 8.3 percent respectively with high inflation of both groups of 24.5 percent and 14.8 percent in 1992 and minimum rate of inflation of both groups was -2.3 percent and 2.1 percent during 20s.

The Study analyzed the inflation pattern, trend, and structure in Nepal at first. For this, the study analyzed trend, pattern and structure of overall CPI, CPI in KTM valley, Hill region and Terai region during the study period. And it also analyzed the trend, pattern and structure of inflation of food and beverages and non-food and service groups. It was found that the inflation in Nepal was highly fluctuating and volatile during the study period 1975 to 2016. It was also found that the inflation of food and beverage groups and non-food and services groups were highly fluctuating and volatile like overall inflation of the nation. The food and beverages group was found more responsible for raising the inflation in Nepal. According to the regions wise inflation pattern and trend, it was observed that the inflation in KTM valley was higher than other two regions Hills and Terai. It can be said that the geographical structure, size of population and their living standard are the major cause to rise in inflation rate of KTM valley. The average inflation rate in KTM valley was found 8.9 percent while Hills and Terai was 8.5 and 8.4 percent respectively during the study period.

The regression coefficient showed that there was a negative relationship between real gross domestic product and price level in Nepal. It is due to the low productivity of the nation and higher dependency on foreign aid and trade. Likewise, other variables taken in the study namely government expenditure, ex-change rate, total imports, broad money supply and Indian Inflation have positive relationship with inflation in Nepal. So, the increase in these variables leads to increase in price level in Nepal. However, broad money supply, government expenditure and total imports have low impact on inflation in Nepal. But, the impact of Indian inflation on NCPI was found that high in both short run and long run. It is due to the open border and the trade dependence. It is also found that the impact of exchange rate on inflation in Nepal is significant.

5.2 Conclusion

Price stability has been an important aspect of overall economic stability of Nepal. Price stability plays a key role to achieve the target of overall economic growth including that of poverty reduction and income inequality. Thus, it is necessary to control the inflation at desired level. For this, there is need of identifying the major factors causing of inflation in Nepal. Hence, this study has attempted to find some major factor determinants of inflation in Nepal. The empirical findings of this study obtained for the regression equation in log linear level form and first difference form shows that inflation in Nepal is highly influenced by the Indian inflation. The result shows that the one percent change in Indian inflation brings the 0.58 percent change in inflation of Nepal. It is due to the higher dependency on Indian trade and market with open border. After Acceptance of liberalization and privatization policy and implementation in 1990s, the Nepalese product and market could not compete with foreign products. Due to this inflation in Nepal has been increased after liberalized the economy. Likewise, increasing the foreign currency US dollar is also leading to increase the inflation in Nepal. The result shows that the one percent increase in ex-change rate leads to increase 0.14 percent in inflation in Nepal. The negative relationship between real gross domestic product and inflation in Nepal shows that if increase in real GDP of Nepal can decrease in inflation. So, the effectiveness of RGDP could be important variable to change the level of prices. However, the money supply in the short run does not seem to affect the inflation rate as indicated by the insignificant regression coefficient.

Finally, it is concluded that the inflation in Nepal is highly an imported phenomena supported by domestic factors. The present pattern of inflation is the result of the interaction of both monetary and structural factors which are the internal factors and external factors. Both factors are causing for growing inflation in Nepal in the present.

5.3 Recommendations

Generally, there are three measures are sued to control the inflation in an economy which are monetary, fiscal and direct controls. The policy appropriate to control the inflation can be selected according to the economic characteristics and nature of inflationary situation of the country.

The following recommendations are made through this thesis.

1. Inflation in Nepal is highly imported phenomena supported by domestic factors. So it is necessary to develop the plan and policies to make the self reliance economy in Nepal. It can be down size the import rate of Nepal with increase in productivity of Nepal which helps to reduce the inflation rate in Nepal.

2. Inflation in Nepal is not the purely monetary phenomena. So it is impossible to control the inflation in Nepal by taking single monetary measures. So, it is necessary to used all three measures of inflation in Nepal.

3. Supply side deficiency is also an important factor of price hiking. So the supply side must also be strengthened to contain inflation within the target.

4. Rising inflation in Nepal has been mainly driven by food price inflation. So it should be solve the issue of price increasing in food products by providing subsidies and following the policy of protectionism in food products.

5. Imports are also the one of the causes of rising inflation in Nepal. So, it should be reduce the size of imports by making the policy to increase domestic productions.

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APPENDIX- I

Overall CPI, CPI of Kathmandu Valley, Hilly and Terai Region

Years	NCPI	CPI-K	CPI-H	CPI-T
1975	4.20	3.7	4.2	4.6
1976	4.10	3.9	4.4	4.4
1977	4.30	3.9	4.5	4.5
1978	4.70	4.3	5	5.1
1979	4.90	4.4	5.2	5.2
1980	5.4	5	5.7	5.7
1981	6.1	5.7	6.4	6.4
1982	6.7	6.3	7.1	7.1
1983	7.7	7.1	8.1	8.2
1984	8.2	7.5	8.6	8.7
1985	8.5	7.7	9.4	8.9
1986	9.8	9.1	10.5	10.4
1887	11.2	10.3	12	11.6
1888	12.4	11.3	13.4	13.1
1889	13.4	12.2	14.8	14.1
1990	14.7	14.2	14.8	15.2
1991	16.1	15.6	16.3	16.7
1992	19.5	18.8	19.5	20.3
1993	21.2	21.1	20.9	22
1994	23.1	23.8	22.2	23.1
1995	24.9	25.7	24	24.8
1996	26.9	27.2	26.3	27.2
1997	29.1	29.3	28.5	29.4
1998	31.5	31.5	30.8	32.1
1999	35.1	34	34.4	36.3
2000	36.3	35.3	35.6	37.4

2001	37.2	36.4	37.5	37.9
2002	38.3	37.1	38.4	39.2
2003	40.1	38.6	39.9	41.4
2004	41.7	40.8	41.1	42.7
2005	43.6	42.9	42.9	44.5
2006	47.1	45.7	46.6	48.4
2007	49.8	48.6	49.3	51.1
2008	53.2	52	52.4	54.3
2009	59.9	59.3	58.9	60.9
2010	65.6	64.7	64.9	66.7
2011	71.9	72.6	71.8	71.5
2012	77.8	77.9	78.8	77.3
2013	85.5	85.5	86.2	85.1
2014	93.3	93.2	93.2	93.4
2015	100	100	100	100
2016	109.9	111.6	110.4	108.6

Source: NRB, Quarterly Economic Bulletin, Vol. 51, Mid July 2017, No. 4

APPENDIX-II

Index for Food and Beverages Group and Non-food and Services Group

Years	Food and Beverages	Non-Food and Services
1975	3.5	4.7
1976	3.4	5.0
1977	3.4	5.4
1978	3.9	5.6
1979	4.0	6.1
1980	4.4	6.5
1981	5.0	7.4
1982	5.5	8.1
1983	6.4	8.9
1984	6.8	9.7

1985	6.9	10.6
1986	8.1	11.8
1887	9.4	12.9
1888	10.5	14.1
1889	11.1	15.9
1990	12.3	17.2
1991	13.6	18.8
1992	16.9	21.5
1993	18.0	24.4
1994	19.6	26.7
1995	21.0	28.8
1996	22.9	30.7
1997	24.8	33.1
1998	26.7	36.1
1999	31.0	38.2
2000	31.2	40.9
2001	30.5	44.2
2002	31.6	45.2
2003	33.0	47.4
2004	34.1	49.7
2005	35.4	52.2
2006	38.2	56.4
2007	40.9	59.2
2008	44.7	61.6
2009	52.4	67.2
2010	60.4	70.4
2011	69.3	74.3
2012	74.6	80.9
2013	81.7	89.1
2014	91.2	95.1
2015	100.0	100.0

| | 2016 | 110.9 | 109.2 |

APPENDIX – III

Percentage Change of Overall NCPI, FBG and NFSG

Years	Overall	Food and Beverages	Non-Food and Services
1975	16.7	15.7	19.0
1976	-0.7	-4.1	7.3
1977	2.7	-0.3	7.1
1978	11.2	15.6	3.8
1979	3.4	1.5	8.1
1980	9.8	11.1	7.6
1981	13.4	13.4	13.4
1982	10.4	11.0	9.4
1983	14.2	16.0	10.6
1984	6.2	5.5	8.4
1985	4.1	1.0	9.9
1986	15.8	18.6	10.8
1887	13.3	15.1	9.5
1888	10.8	12.1	9.0
1889	8.3	5.9	12.8
1990	9.7	11.0	8.1
1991	9.8	10.0	9.3
1992	21.1	24.5	14.8
1993	8.9	6.3	13.5
1994	8.9	9.1	9.0
1995	7.7	7.3	7.9
1996	8.1	8.9	6.7
1997	8.1	8.2	8.0
1998	8.3	7.8	9.0

1999	11.4	16.2	5.8
2000	3.4	0.5	7.1
2001	2.4	-2.3	8.1
2002	2.9	3.6	2.1
2003	4.7	4.5	5.0
2004	4.0	3.3	4.7
2005	4.5	4.0	5.1
2006	8.0	7.8	8.1
2007	5.9	7.0	4.9
2008	6.7	9.3	4.1
2009	12.6	17.1	8.9
2010	9.6	15.5	5.0
2011	9.6	14.7	5.4
2012	8.3	7.7	9.0
2013	9.9	9.6	10.0
2014	9.1	11.6	6.8
2015	7.2	9.6	5.2
2016	9.9	10.9	9.2

Source: NRB, Quarterly Economic Bulletin, Vol. 51, Mid July 2017, No. 4

APPENDIX – IV

Percentage Change of Overall CPI of KTM Valley, Hill and Terai Region

Years	KTM Valley	Hills	Terai
1975	15.6	13.5	17.9
1976	5.4	4.8	-4.3
1977	0	2.3	2.3
1978	10.3	11.1	13.3
1979	2.3	4	2
1980	13.6	9.6	9.6
1981	14	12.3	12.3

1982	10.5	10.9	10.9
1983	12.7	14.1	15.5
1984	5.6	6.2	6.1
1985	2.7	9.3	2.3
1986	18.2	11.7	16.9
1887	13.2	14.3	11.5
1888	9.7	11.7	12.9
1889	8	10.4	7.6
1990	16.4	0	7.8
1991	9.9	10.1	9.9
1992	20.5	19.6	21.6
1993	12.2	7.2	8.4
1994	12.8	6.2	5
1995	8	8.1	7.4
1996	5.8	9.6	9.7
1997	7.7	8.4	8.1
1998	7.5	8.1	9.2
1999	7.9	11.7	13.1
2000	3.8	3.5	3
2001	3.1	5.3	1.3
2002	1.9	2.4	3.4
2003	4	3.9	5.6
2004	5.7	3	3.1
2005	5.1	4.4	4.2
2006	6.5	8.6	8.8
2007	6.3	5.8	5.6
2008	7	6.3	6.3
2009	14	12.4	12.2
2010	9.1	10.2	9.5
2011	12.2	10.6	7.2
2012	7.3	9.7	8.1
2013	9.8	9.4	10.1

2014	9	8.1	9.8
2015	7.3	7.3	7.1
2016	11.6	10.4	8.6

Source: Author's Calculation using Excel

APPENDIX-V

Nominal Value of Variables (Rs. In Millions)

Years	NCPI	ICPI	Real GDP	Imports	ER	GE	M2
1975	4.20	5.62	398752.85	1814.60	10.5	2072	2064.4
1976	4.10	5.21	412582.71	1981.70	12.13	2531.8	2524
1977	4.30	5.62	416750.94	2008.00	12.45	3231.1	3223
1978	4.70	5.75	429785.70	2469.60	12.27	3780.3	3772.1
1979	4.90	6.09	438941.36	2884.70	11.9	4519.8	4511.4
1980	5.4	6.84	432339.65	3480.1	11.9	3470.7	5285.3
1981	6.1	7.72	475708.54	4428.2	11.9	4092.3	6307.7
1982	6.7	8.33	496694.26	4930.3	12.9	5361.3	7458
1983	7.7	9.28	498718.14	6314	13.7	6979.2	9222.4
1984	8.2	10.09	542593	6514.3	15.4	7437.3	10455.2
1985	8.5	10.63	571794.72	7742.1	17.83	8394.8	12296.6
1986	9.8	11.58	597901.44	9341.2	19.85	9797.1	15159
1887	11.2	12.59	608064.28	10905.2	21.59	11513.2	17498.2
1888	12.4	13.74	654864.89	13869.6	22.11	14105	21422.6
1889	13.4	14.22	683205.46	16263.7	25.53	18005	26605.1
1990	14.7	15.5	714827.28	18324.9	28.54	19669.3	31552.4
1991	16.1	17.6	760384.12	23226.5	31.85	23549.8	37712.5
1992	19.5	19.7	791621.35	31940	42.5	26418.2	45670.5
1993	21.2	20.99	822073.05	39205.6	45.49	30897.7	58322.5
1994	23.1	23.09	889641.2	51570.8	49.01	33597.4	69777.1
1995	24.9	25.46	920497.94	63679.5	49.7	39060	80984.7
1996	26.9	27.76	969630.56	74454.5	54.96	46542.4	92652.2
1997	29.1	29.72	1020642.5	93553.4	56.75	50723.8	103720.6
1998	31.5	33.65	1050670.63	89002	61.66	56118.3	126462.6

1999	35.1	35.27	1097779.76	87525.3	67.63	59579	152800.2
2000	36.3	36.7	1164914.59	108505.9	68.74	66272.5	186120.8
2001	37.2	38.05	1260480.82	115687.2	73.48	79835.1	214454.2
2002	38.3	39.68	1231959.29	107388.9	76.53	80072.2	223988.3
2003	40.1	41.23	1280561.46	124352.1	77.49	84006.1	245911.2
2004	41.7	42.72	1340525.05	136277.1	73.49	89442.6	277310.1
2005	43.6	44.55	1387163.31	149473.6	71.76	102560.5	300440
2006	47.1	47.33	1433835.1	173780.3	72.03	110889.2	347421.8
2007	49.8	50.3	1482752.74	194694.6	70.2	133604.6	395518.2
2008	53.2	54.5	1573268.7	221937.8	64.72	161349.9	495377.1
2009	59.9	60.46	1644587.07	284469.6	76.58	219661.9	630521.2
2010	65.6	67.7	1723797.03	374335.2	74.24	259689.1	719599.1
2011	71.9	73.73	1782782.2	396175.5	72.07	295363.5	921320.1
2012	77.8	80.57	1868021.2	461667.7	80.72	339167.5	1130302
2013	85.5	89.37	1945149.13	556740.2	87.66	358638	1315376
2014	93.3	95.33	2061643.12	714365.9	97.95	435052.3	1565967
2015	100	100	2130149.57	774684.2	99.19	531340	1877802
2016	109.9	105.2	2138944.79	773599.1	106.05	701171.7	2244579

Source:

1. NRB, Quarterly Economic Bulletin, Vol. 51, Mid July 2017, No. 4

2. Economic Survey, MoF, FY 2016/17

3. Central Bureau of Statistics, Official Records

4. World Bank

APPENDIX-VI

Calculation of Real Gross Domestic Product with Base Year 2014 (Rs. In Millions)

Years	RGDP	RGDP With Base year 2014
1975	1,43,080	3,98,752.85

1976	1,48,042	4,12,582.71
1977	1,49,538	4,16,750.94
1978	1,54,215	4,29,785.70
1979	1,57,500	4,38,941.36
1980	1,55,131	4,32,339.65
1981	1,70,693	4,75,708.54
1982	1,78,223	4,96,694.26
1983	1,78,949	4,98,718.14
1984	1,94,692	5,42,593.00
1985	2,05,170	5,71,794.72
1986	2,14,538	5,97,901.44
1887	2,18,184	6,08,064.28
1888	2,34,977	6,54,864.89
1889	2,45,146	6,83,205.46
1990	2,56,509	7,14,872.28
1991	2,72,839	7,60,384.12
1992	2,84,048	7,91,621.35
1993	2,94,974	8,22,073.05
1994	3,19,219	8,89,641.20
1995	3,30,291	9,20,497.94
1996	3,47,921	9,69,630.56
1997	3,66,225	10,20,642.50
1998	3,76,999	10,50,670.63
1999	3,93,903	10,97,779.76
2000	4,17,992	11,64,914.59
2001	4,41,518	12,30,480.82
2002	4,42,049	12,31,959.29
2003	4,59,488	12,80,561.46
2004	4,81,004	13,40,525.05
2005	4,97,739	13,87,163.31
2006	5,14,486	14,33,835.10
2007	5,32,038	14,82,752.74

2008	5,64,517	15,73,268.70
2009	5,90,107	16,44,587.07
2010	6,18,529	17,23,797.03
2011	6,39,694	17,82,782.20
2012	6,70,279	18,68,021.20
2013	6,97,954	19,45,149.13
2014	7,39,754	20,61,643.12
2015	7,64,336	21,30,149.57
2016	7,67,492	21,38,944.79

Source: Author's Calculation using Excel

APPENDIX-VII

Log Transformed Value of Variables

Years	LNCPI	LNICPI	LNRGDP	LNM	LNER	LNGE	LNM2
1975	1.44	1.73	12.9	7.5	2.35	7.64	7.63
1976	1.41	1.65	12.93	7.59	2.5	7.84	7.83
1977	1.46	1.73	12.94	7.6	2.52	8.08	8.08
1978	1.55	1.75	12.97	7.81	2.51	8.24	8.24
1979	1.59	1.81	12.99	7.97	2.48	8.42	8.41
1980	1.69	1.92	12.98	8.15	2.48	8.15	8.57
1981	1.81	2.04	13.07	8.4	2.48	8.32	8.75
1982	1.9	2.12	13.12	8.5	2.56	8.59	8.92
1983	2.04	2.23	13.12	8.75	2.62	8.85	9.13
1984	2.1	2.31	13.2	8.78	2.73	8.91	9.25
1985	2.14	2.36	13.26	8.95	2.88	9.04	9.42
1986	2.28	2.45	13.3	9.14	2.99	9.19	9.63
1887	2.42	2.53	13.32	9.3	3.07	9.35	9.77
1888	2.52	2.62	13.39	9.54	3.1	9.55	9.97
1889	2.6	2.65	13.43	9.7	3.24	9.8	10.19
1990	2.69	2.74	13.48	9.82	3.35	9.89	10.36
1991	2.78	2.87	13.54	10.05	3.46	10.07	10.54

1992	2.97	2.98	13.58	10.37	3.75	10.18	10.73
1993	3.05	3.04	13.62	10.58	3.82	10.34	10.97
1994	3.14	3.14	13.7	10.85	3.89	10.42	11.15
1995	3.21	3.24	13.73	11.06	3.91	10.57	11.3
1996	3.29	3.32	13.78	11.22	4.01	10.75	11.44
1997	3.37	3.39	13.84	11.45	4.04	10.83	11.55
1998	3.45	3.52	13.86	11.4	4.12	10.94	11.75
1999	3.56	3.56	13.91	11.38	4.21	11	11.94
2000	3.59	3.6	13.97	11.59	4.23	11.1	12.13
2001	3.62	3.64	14.05	11.66	4.3	11.29	12.28
2002	3.65	3.68	14.02	11.58	4.34	11.29	12.32
2003	3.69	3.72	14.06	11.73	4.35	11.34	12.41
2004	3.73	3.75	14.11	11.82	4.3	11.4	12.53
2005	3.78	3.8	14.14	11.91	4.27	11.54	12.61
2006	3.85	3.86	14.18	12.07	4.28	11.62	12.76
2007	3.91	3.92	14.21	12.18	4.25	11.8	12.89
2008	3.97	4	14.27	12.31	4.17	11.99	13.11
2009	4.09	4.1	14.31	12.56	4.34	12.3	13.35
2010	4.18	4.22	14.36	12.83	4.31	12.47	13.49
2011	4.28	4.3	14.39	12.89	4.28	12.6	13.73
2012	4.35	4.39	14.44	13.04	4.39	12.73	13.94
2013	4.45	4.49	14.48	13.23	4.47	12.79	14.09
2014	4.54	4.56	14.54	13.48	4.58	12.98	14.26
2015	4.61	4.61	14.57	13.56	4.6	13.18	14.45
2016	4.7	4.66	14.58	13.56	4.66	13.46	14.62

Source: Author's Calculation using Excel

APPENDIX - VIII

Short run specification

pendent Variable: D(LNCPI)

Method: Least Squares

Date: 03/04/18   Time: 12:10

Sample (adjusted): 2 42

Included observations: 41 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.012589	0.017516	0.718715	0.4772
D(LNM2)	0.071200	0.104361	0.682246	0.4997
D(LNER)	0.141611	0.059864	2.365550	0.0238
D(LNICPI)	0.587595	0.117292	5.009692	0.0000
D(LNRGDP)	-0.304379	0.182050	-1.671958	0.1037
D(LNM)	0.103618	0.050469	2.053084	0.0478
D(LNGE)	0.013885	0.048182	0.288174	0.7750

R-squared	0.613567	Mean dependent var	0.079512
Adjusted R-squared	0.545373	S.D. dependent var	0.038337
S.E. of regression	0.025849	Akaike info criterion	-4.318808
Sum squared resid	0.022718	Schwarz criterion	-4.026247
Log likelihood	95.53556	Hannan-Quinn criter.	-4.212273
F-statistic	8.997367	Durbin-Watson stat	2.336868
Prob(F-statistic)	0.000007		

APPENDIX IX

Pairwise Granger Causality Tests

Date: 03/04/18 Time: 19:13

Sample: 1 42

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
D(LNM2) does not Granger Cause D(LNCPI)	39	1.52487	0.2322
D(LNCPI) does not Granger Cause D(LNM2)		4.84946	0.0140

Pairwise Granger Causality Tests

Date: 03/04/18 Time: 19:15

Sample: 1 42

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
D(LNRGDP) does not Granger Cause D(LNCPI)	39	1.98965	0.1523
D(LNCPI) does not Granger Cause D(LNRGDP)		4.35100	0.0208

Pairwise Granger Causality Tests

Date: 03/04/18   Time: 19:17

Sample: 1 42

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
D(LNGE) does not Granger Cause D(LNCPI)	39	0.26208	0.7710
D(LNCPI) does not Granger Cause D(LNGE)		1.71867	0.1945

Pairwise Granger Causality Tests

Date: 03/04/18   Time: 19:19

Sample: 1 42

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
D(LNER) does not Granger Cause D(LNCPI)	39	0.18747	0.8299
D(LNCPI) does not Granger Cause D(LNER)		1.76994	0.1857

Pairwise Granger Causality Tests

Date: 03/04/18   Time: 19:20

Sample: 1 42

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
D(LNICPI) does not Granger Cause D(LNCPI)	39	5.97714	0.0060
D(LNCPI) does not Granger Cause D(LNICPI)		0.25493	0.7764

Pairwise Granger Causality Tests

Date: 03/04/18   Time: 19:21

Sample: 1 42

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
D(LNM) does not Granger Cause D(LNCPI)	39	1.27879	0.2914
D(LNCPI) does not Granger Cause D(LNM)		1.15920	0.3258