CHAPTER I

INTRODUCTION

1.1 General Overview

Inflation, which today confronts the economic policy makers throughout the world in the form of a dominant economic problem, is not a new phenomenon because from the earliest days of recorded history, mankind has been puzzled and discomfited by the rising prices. Throughout the ancient period, the mediterian civilizations frequently experienced higher prices in terms of metallic currency due to the discovery of new mines and improved methods of mining gold (Vaish, 2002). But there is no universally accepted precise definition of inflation. Economists have defined it on their own words. Broadly, the definition of inflation is classified into three aspects; (a) Common view (b) Keynesian view and (c) Modern view.

Common view: In common view, inflation is a significant and continuous rise in the general price level. Some important views are discussed here. According to Ackley, inflation is simply defined as "a persistent and appreciable rise in the general level or average prices" (Ackley, 2007: 421). According to Crowther, "inflation is a state in which the value of money is falling, i.e., prices are rising" (Crowther, 1958: 107). According to Pigou, "inflation exists when money income is expanding relatively to the output of work done by the productive agents for which it is the payment" (Pigou, 1949: 34). According to Colander, "a one time rise in the price level is not inflation. Unfortunately, it's often hard to tell if a one-time rise in the price level is going to stop, so the distinction blurs in practice, but we must understand the distinction, if the price level goes up to 10% in a month, but than remains constant the economy does not have an inflation problem, inflation is an ongoing rise in the price level" (Colander, 2001:248).

Keynesian view: Keynes defined inflation as a phenomenon of full employment. Regarding the full employment, Keynes distinguished inflation into two names; semi-

inflation and real inflation. According to him, general rise in price below the full employment equilibrium is know as semi-inflation and general rise in price beyond the full employment equilibrium is known as real inflation.

Modern view: Modern economists, particularly the monetarists, analyze inflation in a comprehensive and unified manner. They explain the inflationary process by combining demand pull and cost-push inflation. According to them, money is the main determinant of inflation in an economy. An increase in money supply affects the output and employment in the short run. In the long run, it only affects the general price level. Monetarist view is mainly depended upon Friedman's view "Inflation is always and everywhere monetary phenomenon" (Friedman, 1970: 24).

Monetarists also believe that expectation plays a key role in the explanation of inflationary process. Expectation of price affects the employment of workers and supply of output. If expected price is below the actual price, economy will produce higher level of output. Thus, inflation will be smaller. Conversely, if expected price is above the actual price, supply of output declines in the economy and inflation will be higher.

Structuralist's model of inflation emphasizes supply side factors as determinants of inflation. In their model, inflation is driven by development efforts made by the government. When government increases its expenditure, people have more money. On the other hand, supply of output will not increase in desired growth rate due to the structural bottlenecks in the economy and hence forces the price level up. So, structural bottlenecks are the main causes of inflation for them.

Regarding the effect of inflation in different sectors of the economy, some members of society gain and others get hurt. In an economy, in which the prices of every thing changed proportionally, nothing would be lost or gained unless those changes affected the economy's output and the rate at which that output grew. However, in the real economy, all the prices do not change at the same rate. Consequently, inflation does provide gains to some and losses to others.

Theoretically, economic literature establishes that a moderate dose of inflation is conducive for rapid growth of economy as it leads to higher rate of profit to the producers which implies higher rate of capital formation and investment in the economy. In all the classical and neo-classical growth models, investment has been considered as a crucial factor for economic growth. However, when inflation goes beyond a certain limit, it creates problems for economic growth in the form of falling real per capita income thereby reducing the availability of funds. On the demand side, persistent and high rate of inflation leads to fall in demand which in turn reduces over all level of production in the economy. Therefore it is essential to keep inflation under control to ensure rapid economic growth.

Thus, Inflation has been a wide spread problem in developing countries. At the same time, it has been a controversial phenomenon for economists and most challenging events for policy makers because economic development with price stability has been one of the main goals of macro economic thinkers and policy makers. Therefore, measure of inflation is important for (a) making polices (b) monitoring and accounting the policies and (c) forecasting and estimating about the economic activities.

1.2 An Overview of Major Inflation in the World

In the world, major inflationary shocks occurred in three periods of 20th century. They occurred; after World War I (1920-1924); after World War II (1943 -1946); and after 1970s. After World War I, some countries observed hyperinflation. Although there is no universally accepted definition of hyperinflation, in common view, it is the inflation that is 'out of control'. It is very high inflation. Mainly, Germany (1920-23), Russia (1921-1924), Austria (1921-1922), Poland (1922-1924) and Hungary (1922-24) were suffered from hyperinflation during the stated period. In the early 1920s, prices doubled in every 49 hours. In October 1923, average price level rose at the rate of 41 percent per day. After the end of World War II, some countries again realized hyperinflation. The most serve known incident of inflation was in Hungary. Its prices doubled in every 15 hours

during 1945-1946. Another historic case of hyperinflation was of Greece during (1943-1944). At that time its price doubled in every 28 hours (NRB, 2007).

Besides the historic hyperinflation, the moderate inflation occurred in Latin American countries (1970-1980), former USSR states and Eastern European countries during the economic transition from controlled socialist economy to free market economy in the early 1990s. In case of Latin American countries; Argentina, Bolivia, Brazil, Chile, Peru, and Uruguay which together experienced an average annual inflation rate of 121 percent between 1970 and 1987. In Bolivia, prices rose by 12000 percent in 1985. Argentina, like wise, recorded an inflation of 3100 percent in 1989. Similarly other countries were also suffered from high rate of inflation. In case of former USSR states; Russia, Ukraine, Belarus, Georgia, Armenia, Azerbaijan, Estonia, Georgia, Kazakhstan, Latvia, Slovenia etc. were suffered from high rate of inflation. Out of them Belarus suffered from high inflation during 1992-1995. It saw 920 percent in 1992, 966percent in 1993, 2307 percent in 1994 (at highest) and 1287 percent in 1995. Georgia went through the worst inflation in 1995 hitting 678 percent. Similarly, Latvia recorded its high inflation of 900 percent and 527 percent during 1992 and 1993 respectively. In case of the East European countries; Romania recorded its higher inflations of 216 percent in 1992, 243 percent in 1993, 167 percent in 1994 and 153 percent in 1997. Stovakia witnessed its highest inflation of 109 percent in 1991. Similarly, Croatia also observed its higher inflation situation during 1991- 1994 hitting the highest of 1469 percent in 1993. These are some examples of major inflation in the world (NRB, 2007)

Higher level of unemployment, inequality distribution of income, food insecurity, uncertainties, misallocation of resources etc. were the main problems behind these high rates of inflation in the world.

1.3 Historical Overview of Nepalese Inflation

Historically Nepal has not suffered from a very high rate of inflation; although it reached a record level of 19% in 1991/1992. The average annual rate of inflation has remained at

8% during the period for 1977/88 to 2005/06(Appendix F). Major inflationary shocks occurred in 1985/86 and 1991/92 and it remained above the average rate in these two time periods. It was found at the minimum rate 2 percent for the period 2000/01 and below than 6% rate for the time periods 1978/89, 1984/85 and for 1999/2000 to 2004/05(Appendix D).

Although some members of society gain from inflation, other get hurt; the popular view is that the middle and specially the lower income groups lose and that the upper income groups gain, more loosely expressed "the rich get richer and the poor get poorer" (Shapiro, 2003: 478).

Nepal is one of the least developed countries in the world. Most of Nepalese people are poor. 30.8% of population is still below the poverty line (CBS, 2004). Nepalese people spend a large share of their income on basic needs. A high rate of inflation reduces the real income of people that can be spent on food and non- food commodities. Therefore, in under developing countries like Nepal, inflation raises the problem of food insecurity that will decline the social welfare of people. However, higher social welfare is the most important economic goal of any economy. Current studies have conformed that income inequality has been increased in Nepalese economy. Gini coefficient, a tool of measuring income inequality, was 0.34 in 1995/1996 and reached at 0.41 in 2003/04 (MOF, 2005). It concludes that the gap between rich and poor people has increased during the time period. Looking at the series of data of gross domestic saving as percentage of gross domestic product during the observed time period, it is not found improved. The average annual gross domestic saving is 12% of the gross domestic product in Nepal (calculation is done by researcher using statistical year books) during the period under study. Increase in general price level may be one of the causes of this situation. Similarly, high rate of inflation has affected in production, investment and other fields of economy. Thus, measure of inflation and policies of controlling inflation has been important for the smooth functioning of Nepalese economy.

1.4 Statement of the Problems

Geographically, Nepal is a small landlocked country wedged between two neighboring economic powers, People's Republic of China and Republic of India, in the lap of Himalayas. The country has area of 147,184 sq. km. with population around 25.86 million (MOF, 2006). On the east, west, and south the country is bordered with India and to the north with Tibet autonomous region of China. Naturally, Nepal is divided into three parts known as Terai region, which is plane region and economically more active region of the country; Hills covering the middle part; and the Mountain region covering northern part of the nation. This geography has naturally made Nepal more focused towards the south, that is, with India.

In Nepal, households at the bottom quintile of the income distribution spend more than 80% of their income on food. Controlling food price inflation could thus greatly reduce poverty. When food price inflation is high, the cost of food leaves few resources for expenditure like health and education. A high rate of inflation reduces real money balances and the income that can be spent on food and non-food commodities again leading to food insecurity. Nepalese money market has not been well developed. People hold money under the mattress to purchase the capital goods. But due to the high rate of inflation, it takes long period of time to be sufficient for purchasing the capital goods. The inequality gap has been increased in Nepalese economy since the past several years. Nepal has not achieved significant improve in economic development. It signifies that inflation has adversely affected on poverty reduction, distribution of income, production, saving, investment, social welfare etc. This also leads a misallocation of resources and shows stagnation of the economy. In conclusion, it disrupts economic stability. Therefore it is essential to keep inflation under control to ensure a higher social benefit as a whole. Understanding the determinants of inflation thus is important for price stability and designing policies that can improve food security, capital formation, redistribution of income, allocation of resources, employment opportunities, and so on.

1.5 Objectives of the Study

The main objectives of this study are:

a) to identify the factors influencing inflation in Nepal.
b) to determine the magnitude and direction of the impact of identified independent variables on inflation, and
c) to analyze the impact of the determining variables on Nepalese inflation.

1.6 Assumptions of the Study

Followings are the assumptions of this study;

1. Nepalese economy is assumed to be a small open economy.
2. National Urban Consumer Price Index (NUCPI) is taken as National Consumer Price Index of Nepal.
3. Percentage change in Indian Wholesale Price Index (IWPI) is taken as a proxy variable for measuring Indian inflation.
4. Real GDP is supposed to represent the real income of the country.

1.7 Limitations of the Study

Almost all of the economic analyses have certain limitations. In the same way unavailability of the data, unreliability of data and shortage of essential materials are the main limitations of this study for analyzing the determinants of inflation in Nepal. They are listed in the following section;

1. National urban consumer price index may not represent the price index of whole Nepal.
2. Wholesale price index of India is considered as the representative of the general price level of India. It is collected from "International Financial Statistics" based upon the fiscal year from January to December. In order to adjust it with the Nepalese fiscal year, the study uses average value of Wholesale Price Index of India (IWPI) between two time periods
3. Real gross domestic product has been used as a representative for production of goods and services of Nepal. It does not represent whole production of the economy.

4. Due to the lack of data, the study explains the relationship between inflation and foreign exchange reserves only for time period 1985/86 to 2005/06.
5. Growth rate of population is based on projected population by Central Bureau of Statistics (CBS).

1.8 Organization of the Study

The present study is divided into five chapters. The five chapters are: Introduction, Review of Literature, Methodology, Empirical Analysis, and Summary, Conclusion and Recommendation.

Introductory chapter explains the general definition of inflation, historical overview of world inflation, Nepalese economy and its inflationary trend, effects of inflation on different sectors of the economy, statement of the problem, assumptions, limitations and organization of the study.

In chapter two, review of literature is presented in four sections. In first, some theories of inflation are reviewed. In second, general empirical studies on inflation are reviewed. Similarly, some empirical studies on inflation in Nepal are reviewed in third section. Finally conclusion of the review is presented.

In chapter three, the research design, sources of data, data processing methods, estimation method, hypothesis, models, and some other statistical tests of significance are presented.

Chapter four contains empirical study of the dependent variable i.e. inflation on other explanatory variables. In this chapter, the effect of determining variables on Nepalese inflation is presented using simple and multiple regression models.

In chapter five, summary, conclusion and recommendation of this study is presented.

Bibliography and appendices are given at the end of the study.

CHAPTER II

REVIEW OF LITERATURE

2.1 Introduction

The purpose of literature review is to find out what research studies have been conducted in the chosen field of study and what remains to be done. It provides the foundation for developing the theoretical framework from which hypotheses can be developed and tested. Review of literature, in this chapter, is classified into three categories. They are as following.

1. The theoretical review
2. General empirical estimates
3. Empirical estimates in Nepal

2.2 The Theoretical Review

The theoretical review is the review of some theories about the inflation and its determinants. Based upon these theories, we can specify some determinants of inflation. There are Classical, Keynesian, Post Keynesian, Monetarists, and Structuralists views on inflation. These are briefly discussed one by one in this section.

Classical view

Classical economists postulated their views on inflation they relied upon the quantity theory of money and explained that the quantity of money in the hands of public determines how high and low the price level will be. According to them quantity of money determines the level of aggregate demand, which in turn determines the price level. There is a direct and proportional relationship between the general price level and the stock of money. $P \sim M$ or $P = \frac{1}{k} M$ or $M = kP$

Where, $\frac{1}{k}$ = proportional constant.

P = General Price level.

M = Stock of money.

The first significant refinement came through Irving Fisher who formulated the transaction exchange equation by introducing the transaction velocity of money (V) and total transaction (T). Fisherian transaction exchange equation is:

$$MV = PT$$

Where, M = Stock of money in circulation

V = Transaction velocity of money

P = General Price level

T = Total transaction of goods and services

In this equation, MV represents the total money expenditure and PT represents total turn over of goods and services. Fisherian transaction exchange equation was transformed into income exchange equation due to the several disadvantages present in this equation. The income version of Fisherian equation of exchange is,

$$MV = PY$$

Where, V is income velocity of money, Y is total output and thus MV represents total money expenditure. PY, on the other hand, represents monetary value of national income. Therefore, the income version of exchange equation is more reliable than transaction version because the data for Y is easily collected form the national account and it can be used in further research.

Assuming the economy at full employment, hence, physical income constant and considering velocity of money also constant, Fisherian equation of exchange explains that an increase in stock of money (M) increases the volume of money supply (MV) which implicitly increases the aggregate demand for goods and services. When the economy is assumed fully employed, it cannot expand total output of goods and services due to rise in aggregate demand. So increase in aggregate demand will be maintained by changing the price level (P) proportionally (Froyen, 2005)

Review of classical theory suggests that money supply is the key determinant of price change. Regarding the growth rate of the variables, if growth rate of money supply is higher than the growth rate of income given the constant growth rate of velocity of money, economy will suffer from the price growth.

In Nepal, the supply of money is increasing in trend. The average growth rate of narrow money supply is 15 percent and the average growth rate of broad money supply is 17 percent during the time periods form 1977/78 to 2005/06. On another hand, the average growth rate of gross domestic product is 4.5 percent for the same time periods (Appendix F). So, the average growth of money supply is higher than the average growth of gross domestic product. Thus, in view of classical theory, money supply may be found one of the determinants of inflation in Nepal.

Keynesian view

In Keynesian theory, the key concepts in analyzing output, inflation, growth and the role of policy are aggregate demand and supply. Aggregate demand shows the relationship between spending on goods and services and the level of price whereas aggregate supply is the relationship between total supply of goods and services and the level of price. The equilibrium amount of output and price are determined by the intersection between aggregate demand and supply. Thus, any change in the position of aggregate demand or supply curve affects the price level and output. In this way, Keynesian view on inflation is explained in demand pull and cost push inflation. (Shapiro, 2003)

Demand pull inflation

Demand pull inflation occurs as the aggregate demand curve shifts upward along an upward-sloping or vertical aggregate supply curve. According to Keynes, aggregate demand curve shifts upward either by the change in fiscal factors or by the chance in monetary factor. In the IS-LM frame work, the fiscal factors which shift the IS curve rightwards and in turn shift the aggregate demand curve upwards are consumption

expenditure, investment expenditure, taxes, and government expenditure. Similarly, the factor which shifts the LM curve rightwards and in turn shifts the aggregate demand curve upward is money supply. The degree of such shifts in aggregate demand which have the different level of price change depend upon either in the degree of rightward shift of IS curve or in the degree of right ward shift of LM curve (Shapiro, 2003)

Keynesian demand pull inflation suggests that not only money supply but also fiscal factors (consumption expenditure, investment expenditure, taxes, and government expenditure) may be responsible for the change in general price level in any economy. Inflation in our economy may be also influenced by these factors and thus, the theory helps to choose the fiscal variables in our investigation

Cost-push inflation

Cost-push inflation emphasizes on the supply side inflation and exerts that the general level of price rises because of the increase in the cost of production. An increase in cost of production results less supply of goods and services and shifts the supply curve leftwards. When supply curve shifts leftward with the given demand curve, it rises the price with less employment and output. Labor is an active factor of production. So price per unit labor hour, wage, is the main factor which causes the cost of production. An increase in wage rate increases the cost of production and in turn shifts the supply curve left. This will increase the general price level in the economy. Similarly, profit is another factor of supply side inflation. An increase in the profit margin by the firms will also shift the supply curve leftwards and hence price level.

This theory shows that the factors which affect the cost of production may influence price level in the economy. The significance of this theory is that the general price level may also be influenced by the cost of raw materials, prices of capital inputs, interest rate and exchange rate which affect the cost of production. Nepal is a least developed country in the world. It imports the capital goods and many essential raw materials form abroad. Thus, increase in price level on those goods and services, change in interest rate and

exchange rate may also create a situation of supply irresponsive to market demand curve, pushing the price level up.

Phillips Curve Theory

The original Phillips Curve model explains the relationship between unemployment and rate of change of money wage rates. It shows the inverse relationship between the rate of change of money wage rates and unemployment.

Subsequently, the original Phillips Curve relationship between the rate of change of money wage and unemployment was transformed into a relationship between rate of change in price (inflation) and unemployment by assuming that prices would change whenever wages rose more rapidly than labor productivity (Makinen, 1978). Thus, the new version of Phillips Curve shows the trade off between inflation and unemployment. It means unemployment and inflation can coexist in an economy and they are inversely related to each other. On the one hand Phillips Curve denies a unique definition of full employment on the other it suggests unemployment can be reduced by creating inflation. Hence, policy makers in the quest of reducing unemployment create inflation. In other words unemployment is one of the macro economic variables that can give rise to inflation.

However, the modern view suggests that Phillips Curve relation dead in the long run having no trade-off between unemployment and inflation.

The review of Phillips Curve theory suggests that any efforts to reduce the unemployment rate will raise the price level in the economy. Therefore Phillips Curve theory indirectly shows that the factors which affect the unemployment rate may also influence the price level in the economy.

Monetarists view

Monetarists believe that expansionary monetary policy can only temporarily move the unemployment rate below the natural rate. Friedman's theory of natural rate of unemployment and output is the theoretical foundation for the monetarists' belief that in the long run the influence of money supply is primarily on the price level and other nominal variables. The unemployment rate will gradually return to the natural rate, and the lasting effect of expansionary policy will be a higher inflation rate. So, there is positive association between the change in money stock and the general price level in the long run. According to Friedman "Inflation is always and everywhere a monetary phenomenon" (Friedman, 1970: 24). Thus, the key determinant of inflation in their theory is money supply.

The monetarists' explanation of inflation has a long history and is directly derived from the quantity theory of money which relates the general price level to the given stock of money. The theory states that the demand for money is highly depended on the level of income and in equilibrium situation supply of money is equal to the demand for money. Since demand for money depends upon the income elasticity of money demand and level of income, a higher growth rate of the money supply than the income growth rate makes a higher excess money supply in the economy and hence creates inflationary problem in case for closed economy (Livacic, 1986).

Monetarists believe on natural rate of unemployment. Any efforts to reduce the unemployment rate below the natural rate create inflation in the economy. According to them, unemployment rate can be reduced below the natural rate only in the short run. In the long run it will be in the natural rate. Therefore inflation takes place in cycles. When aggregate demand increases in the economy, in the short run economy supplies more output along the initial supply curve so unemployment declines and price level increases. The trade off can be explained by the Phillips curve. But in the long run workers expect the price level equal to the actual price and the unemployment rate will return to the initial natural rate. Supply curve shifts leftward and price level again increases, in this way inflation takes place in cycles.

They have also introduced the role of expectation on inflation. But their expectation was adaptive expectation. According to them if expected price is below the actual price, inflation rate will be small because it also increases the output than before. Conversely, if expected price is above the actual price, inflation rate will be high because it declines the level of output than before.

In conclusion, they suggest that unemployment rate can not be reduced below the natural rate by managing the aggregate demand. It can be reduced only by reducing the frictions in labor market (Makinen, 1978)

In Nepal, the average growth rate of money supply is higher than the average growth rate of income (which is already mentioned in classical review). Therefore, in view of monetarists, it continuously faces the excess money supply at each period. So inflation may be a continuous problem of Nepalese economy. On another hand, this theory has explained the role of expected price on inflation. Thus, growth rate of money supply and expected price may be found main determinants of inflation in Nepal.

Structuralists view

Structuralist's model of inflation emphasizes supply side factors as determinants of inflation. They emerged in the 1950s as part of the structuralist theory of inflation promoted by Prebisch. In their model, inflation is driven by development efforts made by the government. When government increases its expenditure, people have more money. On the other hand, supply of output will not increase in desired growth rate due to the structural bottlenecks in the economy and hence forces the price level up. So, in their view, structural bottlenecks are the main causes of inflation. Inadequate infrastructure of the economy, food prices, administered prices, wages, and import prices etc. are considered as sources of inflation. Structuralist's model assumes that such factors have to be accommodated by monetary policy makers because they are determined outside the

monetary sphere. Money developments (expansion) in themselves are given little importance as independent determinants of inflation by the structuralists.

Structural approach on inflation has been applied to explain inflation in Latin American, Asian and African countries and in general underdeveloped economies like Nepal. These economies face many structural issues and rigidities, in the economy, such as lack of transportation, black marketing, monsoon based agriculture production, existence of saving investment gap, lack of capital and human capital resource, a low level of economic freedom and so on. As a result economy continuously faces the rise in price (Khan and Schimmelpfennig, 2006).

This theory suggests that structural bottlenecks or such characteristics existing in the economy are mainly responsible for inflation. Therefore, inflation can not adequately be determined just by considering the variables suggested by Keynesians, Fisherians and neo Fishrians in developing countries. So, theory suggests that the structural factors should be included for estimating the inflation in developing country like Nepal.

2.3 General Empirical Estimates

Inflation is usually a common problem of any economy. Socially it is not desirable, so controlling inflation is one of the goals of monetary policy of any economy. Thus, several studies on inflation have been conducted in the world economy. In this section, the study is concentrated on some empirical studies made on inflation in the world.

Harberger(1963) has developed an econometric model to find the causes of inflation in Chile in “The Dynamics of inflation in Chile”. The main objective of the study was to identify the factors that cause the Chilean inflation and also to find out the dynamic process by which money supply affected the rate of inflation. The rate of inflation is considered as the dependent variable and percentage change in money supply at current and previous period, percentage change in the real income and past change in the rate of inflation are considered as independent variables. Herberger’s study covers the period of

1939 to 1958 and uses the ordinary least square technique to estimate the general price level. He introduces both percentage change in current money supply and percentage change in one year lagged money supply in the model. According to his study the effect of an increase in money supply upon the price level doesn't occur instantaneously. And one way of capturing the lagged effect of money supply on inflation is to introduce the lagged money supply as explanatory variables in the model.

Vogel (1974), using the Harberger's model, has tried to explain the inflation in Latin America in his study. He has extended Harberger's model to sixteen Latin American countries covering a period of 1950 -1969. In his model also, we find money supply,(current and lagged money supply), real gross national product(current and lagged) and lagged changes in the rate of inflation as independent variables and consumer price index as a dependent variable

Harberger and Vogel's study shows that the money supply (current and lagged) has greater influence on inflation rate in the economy. Similarly, lagged change in the rate of inflation is another determinant of inflation in their model.

Lovis Kuijs (2002) has attempted to analyze the relationship between monetary policy transmission mechanism and inflation in the Slovak Republic. His study used the vector auto regression model (VAR) for investigation. The estimated vector auto regression model suggests that the main direct determinants of inflation are foreign prices, the exchange rate and wage costs, with some additional impact from aggregate demand, but no direct impact of either monetary aggregate or interest rates. However there is a statistically significant indirect impact of monetary policy on prices. As discussed in his study, a higher level of broad money tends to lead to higher unit labor cost and a change in interest rate affects the exchange rate and aggregate demand and therefore higher prices.

Specially, his model has focused on the monetary policy transmission mechanism to explain inflation. His conclusion shows that monetary policy transmission mechanism

has the indirect effect on prices by affecting the direct determinants of inflation such as foreign prices, exchange rate, wage cost and interest rate.

Several previous studies on inflation have explained money supply as a main direct determinant of inflation. But this study explains an indirect impact of monetary aggregates or interest rates on inflation. Therefore, this study has to cover the indirect impact of a change in monetary aggregates on prices. Besides this, the variables which have been found the direct determinants of inflation in his study may be also included in our investigation.

Nachega (2005) has attempted to examine the fiscal dominance hypothesis in the Democratic Republic of the Congo (DRC) during 1981 – 2003 using multivariate co-integration analysis and vector error correction modeling. The fiscal dominance hypothesis implies that over all fiscal deficits in percent of real GDP affects inflation through its effect on broad money growth or Seignorage in percent of GDP. In real terms, seignorage can be expressed as the ratio of new currency printed during a period to price level during the same period. Alternatively, it can also be expressed as: Seignoraget = dMt / Pt. The hypothesis also implies that increase in real GDP growth will reduce inflation directly through a larger supply of goods, or indirectly through higher transaction money demand or both. On another hand, income velocity of money is expected to influence inflation directly because an increase in the velocity of money will reduce the demand for money and therefore inflation. Lower the demand for money means higher the flight out of money and in turn higher will be the equilibrium rate of inflation because increase in velocity of money captures the impact of the loss of confidence of national currency, resulting from the expectations of a higher inflation or currency depreciation.

The empirical results show a strong and statistically significant long term relationships between budget deficit and money growth (increase in money supply) and between money creation and inflation.

Aisen and Francisco (2006) have analyzed the causes of worldwide diversity of inflation volatility. Using the within groups (fixed effects), estimator, on a sample covering around the 100 countries for the period form 1975 to 1999, analyzed that higher degrees of political instability ideological polarization, political fragmentation and low economic freedom are associated with higher inflation volatility.

The empirical results show that executive changes and the index of the freedom are statistically significant and have the expected signs, indicating that greater political instability and lower economic freedom lead to higher inflation volatility. Concerning the economic variables, results indicate that countries with relatively large agriculture sectors, lower GDP per capita and overvalued currencies have higher inflation volatility.

Although such variables are not directly going to be tested in this study, we should not forget the impact of these variables on developing countries like Nepal. Thus, higher inflation volatility in Nepal may have been the result of these factors.

Khan and Schimmelpfennig (2006) have developed the model of inflation from a monetarist's perspective. According to them, economic agents hold money for transaction purposes, as a store of value, and for speculative purpose. On view of monetarists, they explain that inflation results if money growth exceeds real GDP growth with a constant velocity of money. The opportunity cost of holding money that is the interest rate has inverse relationship with money demand and thus inflation. Import prices could also play a role in particular if exchange rate is paged. Their data base covers the period from January 1998 to June 2005 on monthly basis by including the relative importance of monetary and supply side factors for inflation in Pakistan. The explanatory variables in the model are money supply, real GDP, velocity of money, interest rate, exchange rate, and wheat support price and the dependent variable is inflation. The authors estimate the above relation in both the short term and the long term using a Vector-Error Correction Model (VECM).

The empirical results conclude that in the long run monetary factors play a dominant role in inflation with a lag effect of 12 months. Broad money growth and private sector credit growth are the key variables that explain inflation developments in Pakistan.

Edimon Ginting (2007) has attempted to answer some important questions around the inflationary process in Nepal, particularly the transmission of inflation from India. Because the Nepali currency is pegged to the Indian rupee and there is an open border between the two countries. Thus, monetary policy can play only a limited role in the long run.

He has used two major frameworks for analyzing open economy inflation: The Purchasing Power Parity (PPP) and the Scandinavian approach. In the review of Scandinavian approach, he has found three key theoretical implications. First, any change in the trading partners' traded prices will be transmitted one is to one to domestic inflation. Second, even Nepalese currency is pegged with Indian currency, the differential in productivity growth between tradable and non tradable sectors could give rise to deviation in the domestic rate of inflation from Indian rate of inflation. Finally, given capital controls, domestic monetary policy could also contribute to the deviation of domestic inflation and inflation in India through non tradable prices. He has also measured core inflation to analyze the underling price movements. In his view, the analysis of core inflation measures will make it possible to determine: (i) whether or not and to what extent, temporary shocks to inflation in India translate to domestic inflation in Nepal; (ii) whether the temporary shocks in Nepal are important sources of deviation from inflation in India.

The estimations are based on monthly data from 1996:8 to 2006:9. To examine the long and short run relationship between inflation in Nepal and India, he has performed Augmented Dickey Fuller (ADF) test. During the sample period, the estimation equation suggests that, on average, head line inflation in Nepal is about 1 percent higher than that in India. However, when the same equation is estimated for the pair of unbiased core inflation measures, temporary shocks originating from Nepal contribute more to the

deviation of headline inflation between Nepal and India. The result shows that the core inflation in Nepal may diverge from core inflation in India in the short run, but will come back to the Indian level in the long run. When the two deviate in the short run, the speed of adjustment to the long run equilibrium is about 7 percent per month, suggesting that the pass through time period from India to Nepal is about seven to eight months.

Edimon Ginting's study is directly related to the country Nepal. His study has focused the imported inflation in Nepal from India. The study has found the head line inflation in Nepal is about 1 percent higher than that in India and also calculated the speed of adjustment of Nepalese core inflation to the Indian inflation. Thus, his study suggests that Indian prices have significant role in the price situation in Nepal.

2.4 Empirical Estimates in Nepal

Since long, Nepal has been facing a problem of inflationary pressure. Many economists and central bankers have been advocating and adopting price stability as the main objective of the monetary policy. Nepalese monetary policy has also been adopting the policy of 'stability with growth'. In order to know the power of monetary authority to control inflation in Nepal, it is essential to estimate Nepalese inflation. There are numerous studies on inflation in Nepal. Some of them are reviewed in the following section.

Pant (1978) attempts to develop a model of general price level for Nepal and shows not only the Indian prices but also domestic factors are responsible for price rises in Nepal. The study covers eleven years from 1964/1965 to 1974/1975. The explanatory variables in the model are money supply (both current as well as one year lagged), real income, expected rate of inflation, Indian wholesale price and the dependent variable is the consumer's price index.

In his result, the signs of the coefficients of independent variables are as expected. The explanatory power of independent variables is 99% and the results show that Nepalese inflation is influenced by domestic factors as well as Indian prices.

The variables which affect the inflation on those periods may also affect the inflation in current periods. Hence the variables considered by Pant will be considered in this study as well.

Khatiwada (1981), in his study, has attempted to analysis the determinants of inflation for the period 1965/66 to 1979/80. In his study, he has found both domestic as well as external factors are responsible for increasing the general level of prices in Nepal. The study combines both monetary and structural approaches of inflation to analyze the determinants of inflation in Nepal. So the explanatory variables in the model are: money supply (both narrowly and broadly defined), Indian prices (wholesale, consumer's import and export), gross domestic product (at constant price), government expenditure, foreign exchange reserves, petroleum prices and expected rate of inflation. And the dependent variable is the rate of inflation. He has attempted a stepwise simple regression technique to estimate the rate of inflation with various explanatory variables including lagged values of the variables.

The ordinary least square method of regression analysis has been applied all over the study. He has also analyzed the period separately from 1970/71 to 1979/80 by including petroleum prices to find the effect of the rise in petroleum prices on inflation in Nepal.

The empirical analysis of rate of inflation and money supply shows that current money supply (narrowly as well as broadly defined) has no impact upon the price level. However one year lagged money supply both (narrow and broad) have significant impact on Nepalese inflation. But two year lagged money supply (narrow and broad) have insignificant impact upon the price level with low explanatory power. Nepalese rate of inflation and Indian prices show a greater association between them. The coefficient of GDP has been found unexpected (i.e. opposite to the theoretical view). But statistical test

shows that it has no significant impact upon the price level. Similarly, the coefficient of government expenditure is not statistically significant.

The coefficient of current foreign exchange reserves is statistically significant but negative, showing inconsistence with theoretical hypothesis. Petroleum prices are also responsible for increasing the general price level in Nepal. But one and two year lagged foreign exchange reserve and expected rate of inflation have insignificant impact upon the domestic price level.

In conclusion, his study shows that one year lagged money supply (both narrow and broad) has significant impact upon the price level. Indian price is also responsible factor of inflation in Nepal. Similarly, the study examines the impact of increase in price of petroleum products on price level in Nepal. Price of petroleum products, supply of money, wholesale price of India are continuously increasing. Whether these factors still explain inflation in Nepal or not will be the subject matter of investigation of this study.

Pant (1988), in his book, "Sources of Inflation in Asia: Theory and Evidences" has attempted to identify (i) sources of inflation (ii) quantification of inflation created by external and domestic factors and (iii) causes of variation in inflation rates among the Asian countries. The purpose of his book is to analyze the causes of inflation under fixed exchange rate system. His log linear model is tested for selective five Asian countries (China, India, Philippines, Thailand and Nepal) for the period 1951 to 1971.

The empirical results found, for the selected countries, were satisfactory because the variables had the expected signs with considerable degree of statistical significance. According to the results, inflation was influenced by external and domestic factors. In India, domestic factors had played a key role for the sharp increases in the price level during the period under study.

In case of Nepal, thirty years period (1955-1985) was considered for the study. The empirical results show that the coefficients of all variables are not significant. The

coefficients of real income and import prices have opposite signs than expected. But another empirical result shows that the Indian wholesale price affects the Nepalese price level very significantly by a coefficient almost equal to unity. The result indicates that the wholesale price index of India and Nepalese price index change by the same amount. He has extended his study by adding the variable as the change in exchange rate of Nepalese rupee to capture the effects of exchange rate change. Then the coefficient of Indian wholesale price index was reduced to .514. This indicates that one unit change in the wholesale price of India changes the Nepalese price level by 0.514 units and this is relatively satisfactory.

His study has not included the lagged values of money supply and Indian wholesale price in the model to find the effect of lagged values of the variables on Nepalese price level. In khatiwada's study, inflation was also influenced by the lagged values of money supply. So, his study has left large space for further research on Nepalese inflation.

Bista (2001) has attempted to analyze the factors responsible for inflation in Nepal covering the time periods from FY 1974/1975 to FY 1998/1999. This study combines monetary, fiscal and structural factors to analyze the determinants of inflation in Nepal. So the explanatory variables in the model are money supply (both narrowly and broadly defined), real income, expected cost of holding money, Indian wholesale price, deficit financing, and foreign exchange reserves. And the dependent variable is inflation rate. He has applied the ordinary least square method of regression analysis for estimating the inflation in Nepal.

The empirical analysis shows that one year lagged values of money supply(both narrow and broadly defined), expected cost of holding money, the wholesale price index of India lagged by one year are found most significant factors responsible for creating inflation in Nepal. The coefficients of real income, current money supply, foreign exchange reserves, and deficit financing have no significant impact upon the general price level in Nepal.

The previous study on inflation in Nepal by Khatiwada (1965/66 – 1979/80) has found that there was immediate impact of Indian wholesale price index in Nepalese inflation. But this study shows that lagged impact of wholesale price of India has significant impact on inflation in Nepal. Thus, whether lagged or current Indian wholesale price is responsible in creating inflation in Nepal will be one of the subject matters of investigation of this study.

Pandey (2005), in his study, has attempted to analyze the causes of inflation in Nepal. The study covers the time series data of the period from FY 1972/1973 to FY 2003/2004. He has used double log linear regression model to analyze the causes of inflation. The explanatory variables in the model are average money supply (both narrow and broad money), total government expenditure, real gross domestic product, whole sale price index of India (lagged by six months) and exchange rates with India and United States of America. The dependent variable is inflation.

The empirical results show that all the variables except government expenditure have the expected sign. The coefficients of average money supply, wholesale price of India and exchange rate with Indian currency have been found to be statistically significant indicating that these are the most important determinant of inflation in Nepal.

The coefficient of government expenditure has unexpected sign and statistically insignificant similarly the coefficient of real gross domestic product, coefficient of exchange rate with US dollar and coefficient of expected inflation are also found statistically insignificant implying that they do not have the significant role in explaining the price level in Nepal. But the researcher has not ignored the possibility of indirect effects of government expenditure on price level through monetary expansion. Another estimated equation in which one year lagged money supply is introduced along with the significant variables shows that the lagged average money supply has insignificant impact upon the price level.

The empirical results confirm that Nepalese inflation is influenced by both the monetary as well as structural factors. Indian prices, money supply and exchange rate changes are the most significant determinants of inflation in Nepal. The coefficient of money supply indicated that each 10% change in money supply causes 3.7 percent change in the rate of inflation in Nepal. This result is different to the other previous results found in Khatiwada's and Nar Bahadur's analysis. In their study current money supply had no significant impact upon the general price level but this study shows that current money supply has significant impact upon the general price level. Therefore, this study provides the space for further research on this determinant of inflation.

Paudel (2005) has tried to examine the effect of budget deficits on inflation in Nepal using time series data of fiscal year 1976/1977 to 2000/2001. He has specified two models for investigation. First model was linear regression model. It was specified to understand the effect of budget deficit on inflation. Broad money supply, budget deficit, domestic credit and foreign exchange reserve were independent variables and GDP deflator was dependent variable. Second model was specified to capture the indirect effect of budget deficits on inflation. It was log linear model. Budget deficit, domestic credit and foreign exchange reserve were independent variables and broad money supply was the dependent variable in the model. GDP deflator was calculated at the base year price of 1994/95.

The estimated equations show that the coefficients of budget deficit were positive and significant at one percent level in both models. Broad money supply had negative coefficient which was unexpected (opposite to the expected sign) and it was found insignificant at one and five percent level of significant. But it was found significant at 10 percent level. The coefficient of domestic credit was positive but insignificant. The coefficient of foreign exchange reserve was found positive and significant at 1 percent level of significance. The explanatory power of independent variables was more than 98 percent. Durbin Watson statistics show that the model was free from the auto correlation problem.

His study has also found that the budget deficits do have significant direct and indirect effect on the price level in Nepal. However the previous studies have found that there is no significant role of deficit financing on Nepalese inflation. The unique feature of his study is that it has taken the GDP deflator as the dependent variable. Thus whether the deficit financing play a significant role or not in determining inflation in Nepal, is one of the subject matter that is going to be analyzed in this study.

NRB (2007) has tried to explain the factors determining inflation in Nepal. The study covers the time period from 1978 to 2006. Researchers have used the model of Khan and Schimmelpfennig for explaining inflation in Nepal. But they have slightly changed the model by including the cost push factor (i.e. money wage rate) as one of the explanatory variables and also have used the foreign factor (Indian consumer price index) in place of the exchange rate. Altogether, money supply, velocity of money, real gross domestic product, money wage rate and external factor were the independent variables and consumer price index was the dependent variable. Their study has used double natural logarithm model for investigation.

Empirical results suggest that Nepalese inflation was mainly determined by Indian inflation with narrow money only having an effect in the short run(less than one year). This result was similar to previous studies, which have concluded that Nepalese inflation is basically determined by Indian inflation and growth rate of domestic money supply.

The sample periods taken by this study are same with the periods selected by NRB for the investigation. But this study will choose some other explanatory variables which may be found significant determinants of inflation in Nepal.

2.5 Conclusion

Classical theory concludes that the supply of money is the main determinant of general price level in an economy. There is proportional relationship between money supply and the general price level. According to Keynes, change in aggregate demand or supply

plays a key role in determining the price level and employment in the economy. Therefore the factors which shift the aggregate demand curve rightwards and aggregate supply curve leftwards are the determinant of inflation in the economy. The demand side factors such as money supply, government expenditure, deficit financing, taxes, autonomous investment expenditure etc. and supply side factors such as wage rate, interest rate, import price, price of the petroleum products, exchange rate, profit margin by the firms etc. are main determinant of inflation in the economy. The Phillips curve theories establish a simple trade-off between inflation and unemployment. Its primary implication is that unemployment can only be reduced by increasing inflation. Monetarists' theories, on the other hand, stress the unique role of money as an independent and ultimate cause of inflation. Structurilists have put their view on inflation different to other theories. According to them, structural bottlenecks are the main causes of inflation in developing countries. They have given little importance on money supply as independent determinants of inflation.

The review of general empirical estimates has declared monetary as well as structural factors as the determinants of inflation in different character of the economy. The study of Harberger (1963) and Vogel (1974) revealed strong relationship between money supply and general price level as supporting the theoretical view of monetarists. In the study of Lovis(2002) and Nachega (2005), fiscal deficit, foreign prices, exchanged rate, wage costs etc. were considered as the factors influencing inflation. Asian and Francisco (2006) focused on the structural factors such as political fragmentation, low level of economic freedom, degree of political instability, overvalued currencies as the explanatory variables of inflation. Similarly, in the study of Khan and Schimmelpfening (2006) and Ginting (2007), foreign prices, money supply, exchange rate, real GDP, velocity of money, interest rate and wheat support price were included as the explanatory variables of inflation. Thus, general empirical estimates have concluded that inflation of an economy may be the result of monetary expansion or supply shocks, or other structural bottlenecks or combine effect of them.

The empirical studies on inflation in Nepal have found some contradictory results regarding the explanatory variables viz money supply and Indian prices. The study of Khatiwada (1981) and Bista (2001) showed strong association between Nepalese inflation and one year lagged narrow money supply. However, current narrow money supply had been found statistically significant variable of Nepalese inflation in the study of Pandey (2005) and NRB (2007). Similarly, some studies had found current wholesale price of India is significant but other studies had found lagged wholesale price of India is significant determinant of Nepalese inflation. Pandey (2005) found that not only money supply and Indian prices but also exchange rate is a significant variable of inflation in Nepal. In the study of Balram (2005), fiscal deficit was found the significant determinant of inflation in Nepal. Thus, empirical studies on Nepalese inflation have also explained monetary as well as structural factors for estimating the inflation in Nepal.

From the above discussion, it can be concluded that the determinants of inflation may be changed with the change in time and economic conditions. Therefore, a continuous research is essential on this topic for formulating the policies.

CHAPTER III

RESEARCH METHODOLOGY

3.1 Introduction

This chapter shows the technique used by the investigator to attain the objectives of this thesis. It consists of general design, sources of data, sample selection, data processing technique, hypotheses, models and data analysis technique.

3.2 General Design

The general design serves as a framework for the study. It is the plan to reach the objective of the study. The general design of our study is concerned with hypotheses testing studies. The study has made some hypotheses about the inflation. These hypotheses have to be tested by using the statistical tools.

3.3 Sources of Data

The necessary data for the investigation of relationship between dependent and independent variables is obtained from the secondary sources. The variables Consumer Price Index of Nepal (NCPI), Narrow Money Supply (M1), Broad Money Supply (M2), and Foreign Exchange Reserve (FER) are collected from "Quarterly Economic Bulletin" a quarterly publication of Nepal Rastra Bank. Data for the variables Nominal Gross Domestic Product (NGDP), Population (POP), Nominal Gross Agriculture Product (NGAP), GDP deflator and Agriculture deflator are taken from "Statistical Year Books" a publication of Central Bureau of Statistics. Fiscal Deficit (FD) is taken from "Economic Survey" a yearly publication of Ministry of Finance. The data for the variable Wholesale Price Index of India (IWPI) is obtained from "International Financial Statistics" a Publication of International Monetary Fund (IMF). The data of the other variables which are used in this study are obtained from simple calculation by the researcher himself. Data for the expected rate of inflation is obtained by using adaptive expectation method.

3.4 Sample Size

The empirical analysis covers twenty nine years time series data form FY 1977/78 to 2005/06 in yearly basis. The objective of selecting this time period is to find the reliability of the relationship between independent and dependent variables.

3.5 Data Processing Technique

In this study, dependent variable is inflation. It is the percentage change in general price level. So, it can be measured by four indices: the consumer price index, the whole sale price index, the GDP deflator or the personal consumption expenditure deflator. In Nepal, it is measured by consumer price index. The change in natural logarithms of variables is used as proxy for the percentage change of the variables in this study. Thus, inflation is the change in natural logarithms of consumer price at base year 1995/96.

Real gross domestic product, during the time periods, is calculated by dividing the nominal gross domestic product by GDP deflator at base year price 1995/96. GDP deflator indices at different base year prices are transformed at the single base year price 1995/96. For example; GDP deflator of fiscal year 1991/92 is 150 at the base year 1984/85 and is 80 for the same year at another base year 1995/96. If we have to transfer the GDP deflator 82.5 of fiscal year 1980/81 from base year 1984/85 to 1995/96, the formula is used as $\frac{80}{150} \times 82.5 = 44$.

Since wholesale price index of India is collected from "International Financial Statistics" and based upon the fiscal year from January to December, it needs an adjustment to our fiscal year. The adjusting is made by simply taking the average of the data of two time periods. For example, data for fiscal year 2005/06 is calculated by taking the average of data of 2005 and 2006.

3.6 Method of Estimation

The ordinary least square (OLS) method of regression is used in this study. There are two types of variables: dependent and independent variables or explained and explanatory variables. The dependent variable is assumed to be stochastic i.e. it has probability distribution. The explanatory variables, on the other hand, are assumed to have fixed values i.e. they are non stochastic in character. If we are studying the dependence of a variable on only a single explanatory variable, such a study is known as simple or two variables regression analysis. However, if we are studying the dependence of a variable on more than one explanatory variable such that general price level on money supply, government expenditure, expected rate of inflation etc. it is known as multiple regression analysis.

We use simple and multiple regression analysis in order to find the effect of various variables on inflation. Therefore, general regression models are as follows.

$Y = bo + b_1X + U$ …in case for one explanatory variable

$Y = bo + b_1X_1 + b_2X_2 + \ldots\ldots + bnXn + U$ …in case for more than one explanatory variable.

Where, Y is dependent variables, Xi for i = 0,1,2…n are independent variables, bi for i = 0,1,2…n are parameters, and U is error term.

3.7 Hypothesis

The study will test the hypothesis that the dependent variable has a significant relationship with independent variables. The general hypothesis is tested as;

$H_0 : \frac{\partial Y}{\partial X_i} = 0$. There is no significant relationship between dependent variable and independent variable.

$H_1 : \frac{\partial Y}{\partial X_i} \neq 0$. There is significant relationship between dependent and independent variable.

Where H_0 = Null hypothesis and H_1 = Alternative hypothesis

The notation ∂ implies the rate of change in respective variables.

3.8 Models

The objective of the study is to analyze the determinants of inflation in Nepal considering excess demand, cost-push, as well as structural theories. The dependent variable in the model is the rate of inflation and it is calculated simply from the change in natural logarithm of national urban consumer price index and the explanatory variables are as following;

3.8.1 Money Supply

Considering the classical and its refinement by monetarists on inflation, both types of money supply (narrow and broad money) are included as explanatory variables in the model. Keeping in view the 'money illusion' various lags in money supply will also be included as the explanatory variables and the most effective one is selected for further explaining the rate of inflation. Thus, estimating equations are;

$$dln\ (NCPIt) = bo + b_1 dln(M1t/\ M1t\text{-}1/\ M1t\text{-}2\ ) + Ut \quad \ldots\ldots\ldots\ldots\ (1)$$

$$dln\ (NCPIt) = bo + b_1 dln(M2t/\ M2t\text{-}1/\ M2t\text{-}2\ ) + Ut \quad \ldots\ldots\ldots\ldots\ (2)$$

Where, dln is the change in natural logarithm which shows the % change of the variable. NCPIt is consumer price index of Nepal. M1t, M1t-1& M1t-2 are the current, one year and two year lagged narrow money supply respectively and M2t, M2t-1& M2t-2 are the current, one year and two year lagged broad money supply respectively. bo is constant term, i.e. inflation independent with the money supply. b_1 is coefficient of respective money supply. Ut is error term. And expected pattern of signs of the parameters are $bo < 0$ or $bo > 0$ and $b_1 > 0$ for the both equations.

3.8.2 Wholesale Price Index of India (IWPI)

Nepalese foreign trade is concentrated with India. The share of trade with India to total trade is more than 60% in recent years. Most of the goods (consumer as well as capital) are imported from India. Due to this, price level in Nepal is expected to be highly

influenced by the price change in imported goods. Thus percentage change in wholesale price index of India is taken as another explanatory variable in the model. In order to examine the lagged impact of IWPI, the study introduces one year and two year lagged IWPI as for the explanatory variables and most effective one is selected for further explaining the rate of inflation. Thus, the estimating equation is;

$$dln(NCPIt) = bo + b_1 dln (IWPIt/ IWPIt-1/ IWPIt-2) + Ut \quad \ldots\ldots\ldots\ldots (3)$$

Where, IWPIt, IWPIt-1& IWPIt-2 are current, one year, and two year lagged wholesale price index of India respectively. bo is constant term, i.e. inflation independent with IWPI. b_1 is coefficient of respective IWPI. And, expected pattern of signs of parameters are $bo < 0$ or $bo > 0$ and $b_1 > 0$. Ut is error term.

Most of the previous studies have taken the wholesale price index of India as an explanatory variable to measure the inflation in Nepal. NRB (2007) has chosen the consumer price index of India as an explanatory variable to examine the effect of Indian prices to Nepalese inflation. But this study has chosen the wholesale price index of India as previous studies because wholesale price index (WPI) includes the prices level at a different stage of pricing process in comparison with consumer price index (CPI). That is, consumer price index is calculated from the retailers' price to the final consumers whereas wholesale price index is obtained from wholesalers' price to the retail levels. Hence, WPI differs from the CPI to the extent of margin level between wholesalers and retailers and other addition of costs such as transportation and local taxes. In order to reduce the effect of these factors (margin between wholesalers and retailers, transportation cost, local taxes, etc) on Nepalese inflation, wholesale price index of India is taken for comparison with Nepalese CPI.

3.8.3 Expected Rate of Inflation (P*)

Regarding the effect of expected rate of inflation on current inflation rate, it is considered as another explanatory variable in the model. Expected rate of inflation affects the holding of real money balance which in turn changes the level of price in the economy.

An increase in real money holding will reduce the inflation and conversely a decline in real money holding will increase the inflation. Therefore estimating equation is;

dln (NCPIt) = bo + b_1P*t +Ut …… (4)

Where, bo is constant, b_1 is the coefficient of expected rate of inflation and expected signs of parameters are bo< 0 or bo > 0 and b_1 > 0. Ut is error term.

Since the expected rate of inflation is not directly observable, P. Cagan and Friedman's adaptive exception model is applied in this work. Their hypothesis states that,

X*t- X*t-1 = ¥ (Xt-1 = X*t-1)

Where, ¥ is the adjustment coefficient and lies between o and 1

In our case,

$p^*_t - p^*_{t-1} = ¥ (\dot{p}_{t-1} = p^*_{t-1})$, where $\dot{p}_{t-1}$ is actual inflation rate of previous time period.

If ¥ = 1, $p^*_t = \dot{p}_{t-1}$ meaning that expectations are realized with the one year lagged price. And if ¥ = 0, $p^*_t = p^*_{t-1}$, meaning that expectations are static. It means current expectation is realized with one year lagged expectation.

3.8.4 Real Gross Domestic Product (RGDP)

Real gross domestic product is expected to reduce inflation. The supply side theory suggests that there is an inverse relationship between the real GDP growth and inflation. But one can say on the basis of the famous Philips Curve relationship that countries that on average have higher rates of economic growth or lower unemployment have higher rates of inflation. On this basis, it would be difficult to argue that there exists any systematic relationship between inflation and growth, either positive or negative. Now, real GDP growth is considered as another explanatory variable in the model and the estimating equation is

dln (NCPIt) = bo + b_1 dln(RGDPt) +Ut …… (5)

Where,. bo is constant. b_1 is the coefficient of GDP. And, expected pattern of signs of parameters are bo< 0 or bo > 0 and b_1<0 or b_1>0. Ut is error term.

3.8.5 Fiscal Deficit (FD)

Different countries' experience also suggests that the main problem of inflation is large fiscal deficits and printing of new money to finance it. The nature of fiscal deficit, in Nepal, has been also increasing in trend. The supply of output has not increased as increased in the fiscal deficit to the GDP ratio. On the other hand, fiscal deficit has the indirect effect on inflation through the increase in the money supply in the economy. Thus, percentage change in fiscal deficit has been considered as explanatory variable in the model and the estimating equation is;

$$dln (NCPIt) = b_0 + b_1 dln (DFYt) + Ut \ldots\ldots\ldots(6)$$

Where, bo is constant, b_1 is the coefficient of DFY. And, expected pattern of signs of parameters are $bo < 0$ or $bo > 0$ and $b_1 > 0$. Ut is error term.

3.8.6 Foreign Exchange Reserve (FER)

Foreign exchange reserve has been considered an important determinant of inflation in various countries. The empirical estimates in Nepal have also included it as an explanatory variable. Therefore, this study has also considered the percentage change in foreign exchange reserve as explanatory variable in the model. The estimating equation is;

$$dln(NCPIt) = bo + b_1 dln (FERt) + Ut \ldots\ldots\ldots\ldots (7)$$

Where, bo is a constant. b_1 is the coefficient of FER. And, expected pattern of signs of parameters are $bo < 0$ or $bo > 0$ and $b_1 > 0$. Ut is error term.

Due to the lack of data, the model explains the relationship between inflation and foreign exchange reserves for the time period 1985/86 to 2005/06.

3.8.7 Ratio of Money Supply to Real GDP

Ratio of money supply to real GDP shows money available to one unity of physical output. A higher ratio between them implies more money is available to one unit of real output which creates inflationary pressure in the economy. Thus percentage change in

ratio of money supply to real GDP has been considered as an explanatory variable in the model. The estimating equations are;

$$dln(NCPIt) = bo + b_1 dln\ (M1t/RGDPt) + Ut \ldots\ldots\ (8)$$

$$dln(NCPIt) = bo + b_1 dln\ (M2t/RGDPt) + Ut \ldots\ldots\ ..(9)$$

Where, bo is a constant. b_1 is the coefficient of money supply to real GDP. And, expected pattern of signs of parameters are $bo < 0$ or $bo > 0$ and $b_1 > 0$. Ut is error term.

3.8.8 Population (POP)

Size of population is another factor of demand side inflation. The general conception is that an increase in the size of population increases the demand for goods and services in the economy. Higher the demand for goods and services, higher will be the general level of price. Thus the growth rate of population is considered as another explanatory variable in the model. The estimating equation is;

$$dln(NCPIt) = bo + b_1 dln\ (POPt) + Ut \ldots\ldots\ (10)$$

Where, bo is a constant and b_1 is the coefficient of population growth. The expected patterns of signs of parameters are $bo < 0$ or $bo > 0$ and $b_1 > 0$. Ut is error term.

3.8.9 Real Gross Agriculture Product (RGAP)

An increase in agriculture product is expected to reduce inflation in any economy. It is one of the supply side factors of inflation. In order to find the impact of growth of agriculture production on Nepalese inflation, percentage change in real gross agriculture product has been considered as another explanatory variable in the model. The estimating equation is;

$$dln(NCPIt) = bo + b_1 dln\ (RGAP) + Ut \ldots\ldots\ (11)$$

Where, bo is a constant. b_1 is the coefficient of real gross agriculture product. The expected patterns of signs of parameters are $bo < 0$ or $bo > 0$ and $b_1 < 0$. Ut is error term.

3.8.10 Real per Capita Income (RPCI)

Real per capital income is real gross domestic product divided by total population. Higher per capita income is expected to increase the inflation in the economy. It is because an increase in real per capita income increases the purchasing power in the hands of the people. So, percentage change in real per capita income has been considered as another explanatory variable in the model to analyze the effect of per capita income on inflation. The estimating equation is;

$$dln(NCPIt) = bo + b_1 dln(RPCIt) + Ut \ldots\ldots\ldots (12)$$

Where, bo is a constant. b_1 is the coefficient of real gross agriculture product. The expected patterns of signs of parameters are $bo < 0$ or $bo > 0$ and $b_1 < 0$. Ut is error term.

3.9 Statistical Test of Significance of the Least Square Method

The following statistical tests are used to make the results more reliable.

3.9.1 The overall significance of the regression model (F-test)

F-test is a measure of overall significance of the estimated regression model. It will test whether the explanatory variables influence the dependent variable or not. That is, it measures the goodness of fit of the model.

If calculated F value lies below the tabulated F value at the specific level of significance with given degrees of freedom, we accept the null hypotheses. That is, dependent variable is not influenced by the change in explanatory variables. Conversely if calculated F value lies above the tabulated F value at chosen level of significance and given degrees of freedom, we reject the null hypotheses. That is, change in explanatory variables influence the dependent variable.

3.9.2 The test of significance (the t – test)

t-test is applied for judging the statistical reliability of the estimates of the regression coefficients. Broadly speaking, a test of significance is a procedure by which sample

results are used to verify the truth or falsity of a null hypothesis (Gujarati, 2004). The null and alternative hypotheses will be;

H_0: if it is accepted, parameter is not statistically significant.

H_1: if it is accepted, parameter is statistically significant.

A statistic is said to be statistically significant if the value of the test statistics lies in the critical region i.e. calculated t value lies above the tabulated t value. In this case, the null hypothesis is rejected. Similarly, a test is said to be statistically insignificant if the value of the t- statistics lies in the acceptance region i.e. calculated t value lies below the tabulated t value.

3.9.3 The coefficient of determination (R^2)

The coefficient of determination, R^2, measures the percentage of the total variation in dependent variable (in our case general price level) explained by the explanatory variables in the model. It is non negative quantity and the value of this lies between zero and one i.e. $0< R^2 < 1$. If it is 1, 100% variation in dependent variable is explained by the explanatory variables. It means it is perfectly fit. And if it is zero there is no relationship between dependent and independent variables.

3.9.4 Adjusted coefficient of multiple determination ($\bar{R}^2$)

The term adjusted means adjusted for the degree of freedom associated with the sums of squares entering into the formula of R^2. According to H.Theil "it is good practice to use $\bar{R}^2$ rather then R^2 because R^2 tends to give an overly optimistic picture of the fit of the regression, particularly when the number of explanatory variables is not very small compared with the number of observations" (Theil 1978: 135). R^2 is necessarily nonnegative but $\bar{R}^2$ may turn out to be negative. If it is negative, in an application, its value is taken as zero.

3.9.5 Durbin Watson (DW) test

Durbin Watson test is a test of auto correlation among the residuals. “The term auto correlation may be defined as the correlation between members of series of observations ordered in time (as in the time series data) or in space (as in cross section data)” (Gujariti 2004: 442). In the regression context, the classical regression model assumes that such auto correlation does not exist in the errors.

We are dealing with time series data involving classical linear regression of inflation on variables; money supply, real gross domestic product, fiscal deficit, foreign exchange rate, consumer price of India, expected inflation. Thus, the study will test the auto correlation of error terms to check the time series data whether the errors terms are correlated or not. If they are correlated the estimated statistics are not going to be efficient for the long term. And if they are not correlated the estimated statistics are going to be efficient for the long term.

3.9.6 Stationary time series test (unit root test)

If a time series is stationary, its mean, variance and auto-covariance (at various lags) remain the same no matter at what point we measure them; that is, they are time invariant. We need to check up the time series data, whether it is stationary or not, because if a time series is non stationary, we can study its behavior only for the time period under consideration. That is, the results cannot be generalized in other time periods. Therefore, the process of forecasting, such time series (non-stationary) may be of little practical value. In order to check whether the time series is stationary or not, this study uses Augmented Dickey Fuller (ADF) test. The hypotheses are;

Null hypothesis (H_0): If it is accepted, there is a unit root. The time series is non-stationary.

Alternative hypothesis (H_1): If it is accepted, the time series is stationary.

CHAPTER IV

EMPIRICAL ANALYSIS

4.1 Introduction

This chapter tries to investigate the determinants of inflation in Nepal based on the period from 1977/78 to 2005/06. The study has used ordinary least square method to investigate the relationship between independent and dependent variables in the following section.

The thirteen identified variables (NCPI, M1, M2, IWPI, RGDP, FD, FER, P*, M1/RGDP, M2/RGDP, RPCI, POP, RGAP) are initially subject to time series analysis. If a time series is stationary; its mean, variance and auto – covariance (at various lags) remain the same i.e. independent with time, no matter at what point we measure them. If time series is non-stationary; we can study its behavior only for the time period under consideration. That is, result cannot be generalized in other time periods. The forecasting made by using non stationary variables will be little practical value. In order to avoid the problem of spurious regression, non-stationary data need to be made stationary. The common method to do this is taking first difference of the series. If the series becomes stationary by its first difference, it is said to be integrated of order first symbolized as I(1) and so on. The non-stationary of series is checked through Augmented Dickey Fuller Test as explained in methodology chapter. The Table 4.1 gives the t-statistics and associated p- values of the Dickey Fuller Test of the above thirteen variables.

Interpolated Dickey-Fuller Test 1%, 5% and 10% critical value for n = 28 are -3.730, -2.992, -2.626 ; for n =27 are -3.736, -2.994, -2.628; for n=20 are -3.750, -3.000, -2.630; and for n = 19 are -3.750, -3.000, -2.630 as given in STATA 9. First difference of time series has n-1 observation with their corresponding n in log levels.

Table 4.1

Augmented Dickey Fuller tests for unit root

Variables	Log levels		Ist difference of log levels	
	t-statistics	p-value	t-statistics	p-value
NCPI (n =28)	-2.260	0.1851	-3.797	0.0029
M1 (n =28)	-0.935	0.7763	-4.585	0.0001
M2 (n =28)	-1.218	0.6659	-3.490	0.0082
IWPI (n =28)	-2.874	0.0485	-2.514	0.1122
RGDP (n =28)	-0.441	0.9030	-5.749	0.0000
FD (n =28)	-2.213	0.2015	-5.155	0.0000
FER (n =20)	-3.245	0.0175	-3.056	0.0300
P* (n =27)	----	----	-3.598	0.0058
M1/RGDP (28)	-0.758	0.8312	-5.860	0.0000
M2/RGDP (28)	-0.985	0.7588	-5.157	0.0000
RGAP (28)	-0.153	0.9438	-7.734	0.0000
POP (28)	-0.954	0.7697	-3.469	0.0088
RPCI (28)	-0.538	0.8843	-5.499	0.0000

Source: Appendix B, C and D

Table 4.1 shows that all time series data, in log levels, have presence of unit root at greater than 5% level of significance; except for FER and IWPI. Time series data for FER and IWPI reject the null hypothesis of a unit root at 5% level of significance (see column 2 and 3 of the table). On the other hand, all the variables are stationary at the 5% level of significance in their first difference of log levels; except for IWPI. The time series data for IWPI, in first difference of log levels, accepts the null hypothesis of a unit root. Thus, all the variables which are taken to be integrated of order one (i.e. in first difference of log levels), are stationary; accept IWPI. The variable dlnIWPI is stationary at 11.22% level of significance. They are integrated as following;

4.2 Inflation and Money Supply

Money supply is considered as an important determinant of inflation. The excess demand theory as discussed in theoretical review postulates that a higher growth rate of money supply than the growth rate of real output creates inflationary situation in an economy and pushes the price level up. Looking at the figures, narrow money supply has increased from Rs 2060.6 million in 1977/78 to Rs 132822.0 million in 2005/06 and broad money has increased from Rs 3772.1 million in 1977/78 to Rs 405751.0 million in 2005/06. The average annual growth rate of narrow money supply is 15 percent and the average growth of broad money supply is 17 percent during the time periods for 1977/78 to 2005/2006 (Appendix B and F).

In order to find the empirical results between inflation and money supply, the study runs the regression of inflation on percentage change in money supply. The simple regression estimation of inflation on percentage change in current narrow money supply gives the following results:

$$d\ln NCPI = 0.045 + 0.247\ d\ln M1 \quad .....(1)$$

$$t \qquad 2.071 \qquad 1.780$$

$$p \qquad 0.048 \qquad 0.087$$

$$R^2 = 0.096 \qquad F = 3.168$$

$$\bar{R}^2 = 0.074 \qquad DW = 1.351 \qquad N = 28$$

Equation (1) reveals that the coefficient of percentage change in current narrow money supply is positive but insignificant at 5% level of significance. According to the value of coefficient, 1% changes in current narrow money supply changes the price level by 0.247% in Nepal. The p value shows that it is significant at 8.7% level of significance.

Looking at the value of $\bar{R}^2$, the explanatory power of narrow money supply in the total variation of inflation is very weak. The tabulated lower limit and upper limit values of Durbin Watson statistics for 5% level of significance and N = 28 are 1.33 and 1.48 respectively. The critical value of DW statistics lies on indeterminate zone. It means statistics does not conformed about the autocorrelation between error terms.

The regression results taking percentage change in one year and two year lagged narrow money supply as explanatory variable separately show that there is no significant relationship between the Nepalese inflation and percentage change in one year and two year lagged narrow money supply. The results are given in appendix H.

Looking at the results between Nepalese inflation and percentage change in domestic narrow money supply with their lag values, it can be concluded that narrow money supply is not a significant determinant of Nepalese inflation, if we neglect the effects of other variables in the economy. There is no lagged effect of narrow money supply. This implies the economy is free from money illusion.

When we take the percentage change in broad money supply as an explanatory variable replacing the narrow money supply, the estimated regression result is:

$$
\begin{array}{lllll}
d\ln NCPI = & 0.028 & + 0.322 \quad d\ln M2 & \text{.....(2)} \\
t & 1.192 & 2.373 & \\
p & 0.244 & 0.025 & \\
R^2 = & 0.178 & F = 5.630 & \\
\bar{R}^2 = & 0.146 & DW = 1.621 & N = 28
\end{array}
$$

Equation (2) shows that the coefficient of broad money supply is positive and significant at 2.5% level of significance. According to the coefficient, 1% changes in the broad money supply causes 0.322% change in the rate of inflation in Nepal. The adjusted coefficient of determination, that is $\bar{R}^2 = 0.146$, shows that 14.6% of total variation in the rate of inflation is explained by the broad money supply. DW statistics has found above the upper limits (limits are same as for equation-1) implying no significant autocorrelation exists between the error terms. In the simple regression model F value and t value of the coefficient are significant at the same level of significance. So F is also significant at 2.5% level of significance.

To confirm the lagged effect of broad money supply, the regression model has included the percentage change in one year lagged and two year lagged broad money supply as the explanatory variable separately. The estimated regression results show that there is no

statistically significant relationship between Nepalese inflation and percentage change in lagged values of broad money supply. The results are given in appendix H

Looking at the results between inflation and broad money supply, the percentage change in current broad money supply has been found statistically significant determinant of inflation in Nepal neglecting the effect of other variables in the economy. The result has conformed that there is no money illusion in the economy i.e. the percentage change in lagged values of broad money supply has no significant influence on Nepalese inflation. The results indicate that the time deposit in the commercial banks is used to purchase consumer goods and services in Nepalese economy. Commercial banks have not invested their loan in production sector. Loans are used in non production sectors such as consumption, housing, trade etc.

4.3 Nepalese Inflation and Wholesale Price of India

Nepal is part of the South Asian Economic and South Asian Association of Regional Corporation (SAARC) whose currency is pegged to Indian currency and there is an open border between the two countries. Traditionally, India has been a major trading partner of Nepal both on export and import front. Long porous border, free movement of people and capital and the special regime of trade and payments between two countries are the major factors responsible for such relationship (Dahal, 2004: 367). Nepal exports few goods and services but imports large amount of consumer, intermediate and capital goods from India. An increase in the price of capital goods increases the cost of production and in turn in general price level. But, price change in consumer goods in foreign market directly affects the price level in domestic country. It is generally believed that the imported inflation has been one of the important factors in determining Nepalese inflation. And also it can be expected that larger the trade concentration with India, higher will be the effect of Indian prices on Nepalese inflation. The trade concentration of Nepal with India is given in appendix E.

The estimated simple regression equation of Nepalese inflation on percentage change in current wholesale price of India gives the following results:

$$d \ln NCPI = 0.041 + 0.583 \; d \ln IWPI \quad .....(3)$$

t	2.288	2.500		
p	0.031	0.019		
$R^2 =$	0.194	$F =$	6.251	
$\bar{R}^2 =$	0.163	$DW =$	1.540	$N = 28$

Equation (3) shows that the coefficient of percentage change in Indian wholesale price index is positive and it is 0.583. It means, 1% increase in Indian prices causes the Nepalese inflation by 0.583%. t and F values are significant at 1.9% level of significance. The tabulated limits for Durbin Watson statistics are similar as above. Thus, calculated DW statistics shows that there is no significant auto correlation between the error terms.

The value of $\bar{R}^2$ is 0.163 suggesting 16.3% of the total variation of inflation is explained by the wholesale price of India.

To conform the effects of the percentage change in lagged values of wholesale price of India on Nepalese inflation, the percentage change in one year and two year lagged whole sale price of India are included as the explanatory variable separately.

Taking the percentage change in one year lagged of IWPI as explanatory variable, the estimation results are found as;

$$d \ln NCPI = 0.044 + 0.562 \; d \ln IWPI_{-1} \quad .....(4)$$

t	2.399	2.388		
p	0.024	0.025		
$R^2 =$	0.186	$F =$	5.703	
$\bar{R}^2 =$	0.153	$DW =$	1.699	$N = 28$

Equation (4) shows that the coefficient of one year lagged Indian wholesale price is positive and significant at 2.5% level of significance. It also explains that a 1% change in one year lagged Indian prices causes 0.562% change in the Nepalese inflation. The value of R^2 and $\bar{R}^2$ is slightly smaller than in equation (3). There is no significant difference

between the result of equation (3) and (4). Both have more or less equal effect on Nepalese inflation. DW statistics lies above the upper limits. Thus, error terms are free from auto correlation.

The estimated simple regression equation of Nepalese inflation on percentage change in two year lagged wholesale price of India shows that there is no significant relationship between them. The estimated results are given in appendix H.

The empirical analysis of Nepalese rate of inflation and percentage change in Indian wholesale price shows a greater association between the variables. Current as well as one year lagged Indian wholesale price have been found significant variables for increasing inflationary pressure in Nepal. The data shows that the average annual growth rate of Indian wholesale price is 7.05% (see appendix F) during the period under study. The shortage of food supply, increasing oil price in international market, population growth, increasing international market prices etc. have all pushed Indian prices up and this situation is immediately followed by Nepal by importing inflation in terms of higher import prices. It is because Nepalese trade is highly concentration with India, there is pegged exchange rate and open boarder system in trade between two countries. On the other hand, Nepal imports a large amount of consumer as well as capital goods form India.

Thus, from the results it can be concluded that Indian inflation immediately affects the price level in Nepal and its effect remains for one year. It is because of import of three types of goods (consumer, intermediate and capital goods) from India.

4.4 Inflation and Real Gross domestic product

There is no unique relationship between inflation and real GDP growth rate. The supply side theory explains that increase in physical output will reduce the price level in the economy. But Phillips Curve theory states that there is inverse relationship between the inflation and unemployment. Indirectly, it shows the positive relationship between

inflation and output growth. The annual growth rate of real GDP (at constant price 1995/96) has remained low and unstable over time. It was found negative for periods 1979/80, 1982/83 and for 2001/02. The average annual growth rate of real GDP is 4.5% during the time period. The necessary data are given in appendix B and E. Monetary and fiscal policies have been used for the exploitation of available potential resources. But, despite the largest attempt of various plans agriculture, industrial and services sectors are not improving their productivity due to the various factors such as political instability, lack of capital and technology, lack of skilled man power, conflicts etc. Thus, projected gross domestic product has not been achieved and it is always lower than the projected.

The estimated simple regression model of Nepalese inflation on real GDP growth shows that there is no significant relationship between them. The results are given in appendix H.

The reason behind this result is that real gross domestic product has not been increasing significantly during a long period of time. The growth rates of agriculture and industrial sectors are not satisfactory as warranted by increasing population. The average annual growth rate of real gross domestic product is only 4.5% during the period under study. On the other hand, the population growth rate of Nepal is 2.25% (Population census 2001). This is sufficient to explain that per capita income of people has not increased that significantly. Thus, increase in real output is found incapable to stabilize the price level in Nepal. The positive association between the variables depicts Phillips Curve relation as in the theoretical review. It means 1% increase in real GDP is achieved by accruing 0.040% inflation. This also explains that there is high level of unemployment in Nepalese economy. But the result is not statistically significant.

4.5 Inflation and Fiscal deficits

The excess of government expenditures over government revenue in any one fiscal year is known as fiscal deficit. In general, fiscal deficit has been considered as an important and useful weapon in the underdeveloped economies like Nepal in order to create more

employment opportunities and mobilize physical as well as human resources through higher level of government spending. However, larger deficits do not always produce desired effect in underdeveloped countries because they usually face structural bottlenecks and rigidities. Generally, it is assumed that financing of deficit through the banking system from printing of new money and creating interest-bearing debt is always associated with the general price level. This argument is based on the assumption of inelastic supply function. When deficit financing in the economy is resorted, aggregate supply of money increases and then raises the purchasing power in the hands of the people. Inelastic supply function signifies that output will not increase as demand increases in the economy. Economy faces the excess demand that increases the general price level up. Therefore, underdeveloped countries are continuously facing the problem of inflation and fiscal deficit. Looking at the time series data of fiscal deficit between 1977/78 and 2005/06, it was Rs 1092.9 million in fiscal year 1977/78, about 2/3 of the total revenue. After ten years, it has reached at Rs 6754.7 million. Similarly, it has reached at Rs 30941.5 in fiscal year 2005/06 (Appendix A).

The estimated simple regression model of Nepalese inflation on Fiscal deficit growth shows that the relationship between the two cannot be statistically confirmed during the period under study. The estimated results are given in appendix I.

The fiscal deficit not having significant effect on inflation is not usual. However, it is possible if the amount of deficit is not that big in comparison to its economy. Hence probably the fiscal deficit that has been created by Nepalese government is not big enough in creating inflation, in Nepal. The other reason behind not having significant relationship in between inflation and fiscal deficit may be due to the definition of inflation in this study. In this study the growth of national urban consumer price index is defined as inflation. Obviously it represents only the price movements in urban Nepal. Probably budget deficit do not have significant effect on urban consumer price index in Nepal.

4.6 Inflation and Foreign Exchange Reserve

It is believed that an increase in international reserves accelerates the rate of inflation. An increase in the foreign exchange reserves increases the base money (high power money) and given the constant money multiplier results higher money supply and then inflation. In Nepal, foreign exchange reserve has been continuously increasing. Looking at the time series data, it was Rs 3463.3 million in 1985/86, it increased to Rs 44438.2 million in 1995/96. Similarly it reached to Rs 165126.7 in 2005/2006. The average growth rate of foreign exchange reserve is 19% during the period from 1985/86 to 2005/06 (Appendix B). To find out the impact of percentage change in foreign exchange reserve on Nepalese inflation, the percentage change in total foreign exchange reserve is treated as the explanatory variable in the model.

The estimated simple regression model of Nepalese inflation on foreign exchange growth gives the following results;

$$
\begin{array}{rllll}
d\ln NCPI = & 0.056 & +0.115\ d\ln FER & \text{.....(5)} & \\
t & 4.249 & 2.108 & & \\
p & 0.000 & 0.049 & & \\
R^2 = & 0.198 & F = & 4.444 & \\
\bar{R}^2 = & 0.153 & DW = & 1.913 & N = 20
\end{array}
$$

The coefficient of percentage change in foreign exchange reserve is positive and it is 0.115. It explains that 1% increase in the foreign exchange reserve increases inflation by 0.115%. The t and F values are significant at 4.9% level of significance. Regarding the value of $\bar{R}^2$, foreign exchange reserve explains only 15.3% of total variation of Nepalese inflation. The tabulated lower limit and upper limit values of Durbin Watson statistics for 5% level of significance and N = 20 are 1.20 and 1.41 respectively. Thus, DW statistics shows that the error terms are free form autocorrelation problem.

The results conclude that the growth of total foreign exchange reserve is significant determinant of Nepalese inflation. It is because foreign exchange reserve is the dominant part of high powered money and an increase in foreign exchange reserve increases in

money supply. It indicates that the central bank will have long time controlling money supply to control inflation in Nepal.

4.7 Actual Inflation and Expected rate of inflation

Expected rate of inflation affects the holding of real money balance which in turn changes the price level in the economy. If expected rate of inflation is high people would like to hold less money that is higher will be the actual rate of inflation in the economy. Conversely, if the expected rate of inflation is low, people would like to hold more money and fewer goods, i.e. smaller the actual rate of inflation.

The estimated simple regression model of Nepalese inflation on expected rate of inflation gives the following results;

$$d\ln NCPI = 0..056 + 0.333\ d\ln P^* \quad .....(6)$$

$$t \quad 3.391 \quad 1.825$$

$$p \quad 0.002 \quad 0.080$$

$$R^2 = 0.118 \quad F = 3.331$$

$$\bar{R}^2 = 0.082 \quad DW = 1.919 \quad N = 27$$

Equation (6) shows that the coefficient of expected rate of inflation is positive. The coefficient explains that a 1% increase in expected rate of inflation causes the actual inflation by .333%. t and F value are significant at 8% level of significance. The tabulated lower limit and upper limit values of Durbin Watson statistics for 5% level of significance and N = 27 are 1.32 and 1.47 respectively. Thus, DW statistics shows that there is no significant auto correlation between the error terms. $\bar{R}^2$ is very small suggesting that the explanatory power of expected rate of inflation on the total variation of inflation is very weak, that is, the expected inflation explains only 8.2% of total variation of inflation.

The expected rate of inflation that might increase the price level is not found significant at 5% level of significance. The reason behind this may be that most of the Nepalese people spend their income in basic goods and services. Thus, despite the expectation of

increasing prices, almost all the people cannot increase aggregate demand because of the lack of extra purchasing power. Conversely, at the expectation of falling price, people can not hold more money because their income does not allow that. And another reason may be that Nepalese economy is still not that monetized.

4.8 Inflation and money supply to real GDP ratio.

The ratio between money supply and real GDP shows money available to per unit of real output. Generally, it is assumed that higher money available relative to physical output creates inflationary pressure in any economy. In Nepal, ratio of money supply to real GDP has been continuously increasing during the period under study (see appendix C).

The estimated simple regression equation of Nepalese inflation on percentage change in the ratio of narrow money supply to real GDP shows that there is no significant relationship between them. The effect of explanatory variable is insignificant in 10% level of significance. The results are given in appendix I.

Taking the percentage change in ratio of broad money supply to real GDP as explanatory variable in the model replacing the variable narrow money supply to real GDP, the estimated equation has the following results;

$$d\ln NCPI = \underset{t}{0.056}\ \underset{p}{+0.214}\ d\ln\frac{M2}{RGDP} \quad .....(7)$$

$$\begin{array}{llll} & 3.445 & 1.796 & \\ & 0.002 & 0.084 & \\ R^2 = & 0.110 & F = & 3.227 \\ \bar{R}^2 = & 0.076 & DW = & 1.417 \qquad N = 28 \end{array}$$

Equation (7) shows that the coefficient of ratio of broad money supply to real GDP is positive. According to coefficient, 1% increase in expected rate of inflation causes the actual inflation by .214%. t and F value are significant at 8.4% level of significance. The tabulated lower limit and upper limit values of Durbin Watson statistics for 5% level of significance and N = 28 are 1.33 and 1.48 respectively. DW statistics lies between the limits. That is, auto correlation can not be conformed. $\bar{R}^2$ is very small suggesting that

the explanatory power of expected rate of inflation on the total variation of inflation is very weak, that is, the expected inflation explains only 7.6% of total variation of inflation.

From the results, inflation and money supply to real GDP ratio, it can be concluded that the change in ratio of broad money supply to real GDP has greater impact on Nepalese inflation than the effect of change in ratio of narrow money supply to real GDP. It is because commercial banks seem to have invested their loan in non production sectors i.e. time deposits of commercial banks are mostly used to purchase consumer goods and services.

4.9 Inflation and Population Growth

The size of population is an important determinant of aggregate demand. There is positive association between population growth and demand for goods and services. The general conception shows that an increase in population growth increases the demand for goods and services and thus in general price level. Population growth rate of Nepal is high. The average annual growth rate of population is 2.22% during the period under study (Appendix F).

The estimated simple regression equation of Nepalese inflation on percentage change in population shows that there is no significant relationship between them. The results are given in appendix I.

The reason behind the insignificant result between inflation and population growth may be that the purchasing power in the hands of people has not increased significantly as an increase in the population growth because of less employment opportunities in the economy. Thus growth of population is found insignificant determinant of Nepalese inflation.

4.10 Inflation and Real Gross Agriculture Product

Nepal is an agricultural country. About eighty percent of the people are dependent on agriculture for their income and employment. Agriculture sector contributes 36% of the gross domestic product (Economic Survey, 2006/07). Real gross agriculture product is expected to reduce inflation. The supply side theory suggests that there is an inverse relationship between the real gross agriculture product growth and inflation. Thus it is considered as an explanatory variable of Nepalese inflation.

The estimated simple regression equation of inflation on percentage change in real gross agriculture production shows that there is no significant relationship between them. The estimated results are given in appendix I.

The study has attributed some reasons behind the insignificant relationship between inflation and growth of agriculture production. The growth rate of agriculture itself is not significant i.e. there is no significant change in the growth of agriculture production. The average annual growth rate of agriculture production is 2.64% during the period under study (Appendix F). On the other hand average growth rate of population is 2.22%. The most important reason is that productivity of agriculture has not improved significantly. Thus, it is found insignificant determinant of Nepalese inflation.

4.11 Inflation and Real per Capita Income

Real per capita income is measured by the ratio between real gross domestic product and number of population in this study. The general conception between per capita income and inflation is that higher per capita income increases the purchasing power in the hands of the people and thus an increase in the demand for goods and services in the economy. It means higher per capita income generates inflationary pressure in the economy. Thus, percentage change in real per capita income is considered as explanatory variable in the estimating regression equation.

The estimated simple regression equation of inflation on percentage change in real per capita income shows that there is no significant relationship between inflation and growth of real per capita income at 10% level of significance. The results are given in appendix I.

The reason behind the insignificant relationship between them is that the increase in income is skewedly distributed in the economy. That is to say an increase in income does not increase the purchasing power of the general people in the country. An increase in Gini Coefficient from 0.34 to 0.41 is a clear indication of this reasoning. Another reason is that the increase in real per capita income itself is not that significant. So, it is found insignificant determinant of Nepalese inflation. .

The objective of this study is to find appropriate determinants of Nepalese inflation as far as possible. From the above results, it can be concluded that current broad money supply, wholesale price of India and foreign exchange reserve are significant determinants of Nepalese inflation. Besides these variables, other variables are insignificant with low explanatory power on Nepalese inflation. However, expected inflation and percentage change in ratio between broad money supply and real GDP are significant at 8% and 8.4 level of significance respectively.

In order to know the combine effect of variables on Nepalese inflation, it is appropriate to exclude the variables which are insignificant at 10% level of significance and have very low explanatory power. In this view, money supply, wholesale price of India, expected inflation and ratio of broad money supply to real GDP are treated as explanatory variables in the multiple regression model. The variable foreign exchange reserve is not treated as explanatory variables in the multiple regression equation. It is because foreign exchange reserve is one of the components of base money, hence its effect will be to change money supply. In other words money supply represents the effect of foreign exchange reserve on inflation. The data of foreign exchange reserve is available only from 1985/86 to 2005/2006 and it is highly correlated with money supply (Appendix G).

First, the study chooses the variables money supply and wholesale price of India as explanatory variables of multiple regression equation. It is because they are more significant than the other variables in simple regression models. In order to know the combine effect of money supply and Indian wholesale price on Nepalese inflation, the study sets the following multiple regression models:

$$dln(NCPIt) = b_0 + b_1 dln(M1t) + b_2\, dln(IWPIt) + Ut \text{……..(A)}$$

$$dln(NCPIt) = b_0 + b_1 dln(M1t) + b_2\, dln(IWPIt\text{-}1) + Ut \text{ ……. (B)}$$

$$dln(NCPIt) = b_0 + b_1 dln(M2t) + b_2\, dln(IWPIt) + Ut \text{ …….(C)}$$

$$dln(NCPIt) = b_0 + b_1 dln(M2t) + b_2\, dln(IWPIt\text{-}1) + Ut \text{ ……..(D)}$$

Where, dln is first difference of natural logarithm. And, expected pattern of signs of parameters are bo< 0 or bo > 0, $b_1 > 0$ and $b_2 > 0$. Ut is error term.

The estimated regression model of Nepalese inflation on narrow money supply and current wholesale price of India gives the following results;

$d\ln NCPI =$	0.007	$+0.235$	$d\ln M1$	$+0.568$	$d\ln IWPI$	.....(8)
t	0.277	1.864		2.546		
p	0.784	0.074		0.017		
$R^2 =$	0.292		$F =$	5.160	$DW =$	1.556
$\bar{R^2} =$	0.236		p	0.013	$N = 28$	

The coefficients of percentage change in narrow money supply and current wholesale price of India are positive. The coefficient of the percentage change in narrow money supply shows that 1% change in narrow money causes the Nepalese inflation by 0.235%. It is statistically significant at 7.4% level of significance. The coefficient of percentage change in current wholesale price of India shows that 1% increase in wholesale price of India causes the Nepalese inflation by 0.568%. It is found significant at 1.7% level of significance. The tabulated lower limit and upper limit values of Durbin Watson statistics for 5% level of significance with two explanatory variables and N = 28 are 1.26 and 1.56 respectively. Since calculated DW statistics is similar to the upper limit that there is no clear cut view about auto correlation between error terms. F value is found statistically significant at 1.3% level of significance. The value of $\bar{R^2}$ is low suggesting 23.6% of total variation on inflation is explained by the explanatory variables.

The result of equation (8) shows that statistics are slightly improved in the joint effect of current narrow money supply and current wholesale price of India on inflation. There is no significant improvement than their individual effect on inflation. Thus, results confirm as the same in their individual effect.

The estimated multiple regression equation of Nepalese inflation on narrow money supply and one year lagged wholesale price of India gives the following results;

$$d\ln NCPI = \underset{t}{\underset{p}{0.005}} + \underset{2.194}{\underset{0.038}{0.272}}\, d\ln M1 + \underset{2.462}{\underset{0.021}{0.540}}\, d\ln IWPI - 1 \quad \text{.....(9)}$$

$R^2 = 0.322$ $\quad F = 5.693$ $\quad DW = 1.765$

$\bar{R}^2 = 0.265$ $\quad p = 0.009$ $\quad N = 27$

The equation (9) shows that the coefficients of narrow money supply and one year lagged wholesale price of India are positive. According to the coefficient, a 1% change in the narrow money supply and one year lagged Indian wholesale price index causes the Nepalese inflation by 0.272% and 0.54% respectively. The corresponding t values of the coefficients show that narrow money supply is significant at 3.8% and one year lagged wholesale price is significant at 2.1%. F value is also significant at 0.9% level of significance. Regarding the value of $\bar{R}^2$, 26.5 % of the total variation of inflation is explained by the independent variables. The tabulated lower limit and upper limit values of Durbin Watson statistics for 5% level of significance with two explanatory variables and N = 27 are 1.24 and 1.5 respectively. Thus, calculated DW statistics shows that there is no significant autocorrelation between the error terms. All the statistics are improved as compared to the statistics of equation (8). Thus, model (B) is better fit than the model (A)

From the results of equation (9), it can be concluded that the combine effect of current narrow money supply and one year lagged wholesale price of India is statistically significant and has higher power of explaining the variation of Nepalese inflation. Current narrow money supply which was not found statistically significant in previous

models has been found significant with one year lagged wholesale price of India. This implies that Nepalese people change their desire for holding money according to the price changed in India in the last year. The results confirm that Nepalese people would purchase more goods and services if they got the price rise in India in the last year. The results also confirmed that an increase in Indian price will have also a delayed effect in Nepalese inflation. It looks like it takes nearly one year to transfer Indian inflation to Nepal. It looks reasonable too. An increase in wholesale price in India will be transferred to Nepalese wholesalers only then it will be transferred to the consumers. Hence it takes some time to have an effect of an increase in wholesale price in India on Nepalese consumer price index.

The estimation of multiple regression of Nepalese inflation on broad money supply and current wholesale price of India gives the following results;

$d\ln NCPI =$	0.001	$+0.272$	$d\ln M2$	$+0.503$	$d\ln IWPI$	.....(10)
t	0.040	2.130		2.262		
p	0.969	0.043		0.033		
$R^2 =$	0.318		$F =$	5.820	$DW =$	1.780
$\bar{R}^2 =$	0.263		p	0.008	$N = 28$	

The coefficients of broad money supply and current wholesale price of India are positive and statistically significant at 4.3% and 3.3% level of significance respectively. According to the coefficients, 1% change in broad money supply and current wholesale price of India causes the Nepalese inflation by 0.272% and a 0.503% respectively. F value is significant at 0.8% level of significance showing strong fit of the model. But the value of $\bar{R}^2$ implies that the variables have explained only 26.3% of total variation of Nepalese inflation. The tabulated limits of Durbin Watson statistics are same as equation (8). Thus, DW statistics shows no significant autocorrelation between the errors terms. Hence the estimated equation is reasonably efficient.

Current broad money supply was found significant at 2.5% level of significance in the simple regression model. But it is found significant with the Indian wholesale price at 4.3% level of significance. This implies that investment demand increases in the

Nepalese economy with the rise in price of Indian products because of higher expected profit by entrepreneurs. But this does not mean a high increase in investment demand.

The estimated of multiple regression equation of Nepalese inflation on percentage change in broad money supply and percentage change in one year lagged wholesale price of India gives the following results;

$d\ln NCPI =$	0.006	$+0.273$	$d\ln M2$	$+0..455$	$d\ln IWPI-1$	.....(11)
t	0.232	2.128		2.015		
p	0.818	0.044		0.055		
$R^2 =$	0.315		$F =$	5.518	$DW =$	1.947
$\bar{R}^2 =$	0.258		p	0.011	$N = 27$	

The coefficients of broad money supply and one year lagged wholesale price of India are positive and statistically significant at 4.4% and 5.5% level of significance. According to the coefficients, 1% change in broad money supply causes the Nepalese inflation by 0.273% and 1% change in one year lagged wholesale price of India causes the Nepalese inflation by 0.455%. F value is significant at 1.1% level of significance showing lower fit than the previous model. The value of $\bar{R}^2$ implies that the variables have explained only 25.8% of total variation of Nepalese inflation. Based upon the same limits as equation (9), DW statistics shows no significant autocorrelation between the errors terms.

Comparing to the results of equation (10), it can be concluded that the effect of one year lagged Indian wholesale price on investment demand is higher than its current effects. It conforms that Nepalese investors change their investment behavior looking at the price changed in India in the last year. One year lagged wholesale price of India is found significant only at 5.5 % level of significance with broad money supply. This implies that investors demand increases with increased in Indian price in the last year.

The estimated results from equation (8) to (11) conformed that the combine effect of narrow money supply and one year lagged wholesale price of India has higher explanatory power of explaining Nepalese inflation. From the results; current narrow money supply and current wholesale price of India explains 23.6%, current narrow

money supply and one year lagged wholesale price of India explains 26.5%, current broad money supply and current wholesale price India explains 26.3% and current broad money supply and one year lagged wholesale price of India explains 25.8% of total variation of Nepalese inflation. Therefore equation (9) is chosen for further investigation.

The results of estimated multiple regression equation of Nepalese inflation on percentage change in current narrow money supply, percentage change in one year lagged wholesale price of India, expected inflation and percentage change in ratio of M2 to real GDP show less explanatory power of the independent variables than in equation (10). According to $\bar{R}^2$, current narrow money supply, one year lagged wholesale price of India and expected inflation explain 24.3% of total variation of inflation. Similarly current narrow money supply, one year lagged wholesale price of India and broad money supply to real GDP ratio explain 23.9% of total variation of inflation. The t values of the coefficients of narrow money supply, expected inflation, and broad money supply to real GDP are found insignificant at 5% level of significant. The results are given in appendix J. Thus, empirical study concludes that broad money supply, wholesale price of India (current and one year lagged), foreign exchange reserve, narrow money supply with one year lagged wholesale price of India are main determinants of Nepalese inflation. The combine effect of narrow money supply with one year lagged wholesale price of India has higher power of explaining total variation of Nepalese inflation. According to the value of $\bar{R}^2$, they explain 26.5% of total variation of Nepalese inflation. The results also conform that 1% increase in narrow money supply causes the Nepalese inflation by 0.272% and 1% increase in one year lagged wholesale price of India causes the Nepalese inflation by 0.54%. Besides these two, current wholesale price of India, current broad money supply, foreign exchange reserve, expected inflation, broad money supply to real GDP have also some impact on Nepalese inflation.

CHAPTER V

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

Inflation, a persistence and appreciable rise in price, has been a wide spread problem in developing countries. It has been a controversial phenomenon for economist and most challenging events for policy makers. The economic development with price stability has been one of the main goals of macro economic thinkers and policy makers. Nepal has experienced accelerating rate of inflation since the past several years. In Nepal, the average annual rate of inflation has remained at 8% during the period for 1977/78 to 2005/06.

Most of Nepalese people are poor. They spend a large share of their income on basic needs. A high rate of inflation reduces the real income of people that can be spent on food and non food commodities. Thus, on one hand it raises the problem of food insecurity for the people and on the other hand it leaves less resource for investment. Nepalese money market has not been well developed. People of country side hold money under the mattress to purchase the capital goods. But due to the high rate of inflation, it takes long period of time to be sufficient for purchasing the capital goods. The inequality gap has been increased in Nepalese economy since the past several years. Nepal has not achieved significant improvement in economic development. However it has a number of economic challenges in present; low economic growth, low per capita income, unequal income distribution, low level of saving, underdeveloped physical infrastructures, high cost economy leading higher cost of production and so on. Understanding the determinants of inflation thus is important for price stability and designing policies that can improve food security, capital formation, redistribution of income, allocation of resources, employment opportunities, and so on.

Therefore, finding the factors determining inflation and analyzing the effect of these variables on Nepalese inflation is main objective of this study. An econometric model of general price level incorporating money supply, import prices, foreign exchange reserve,

real gross domestic product, expected inflation, fiscal deficit, money supply to real GDP ratio, population growth, per capita income and real gross agriculture product was developed for this purpose. The models were estimated using CPI as the measure of general price level and broad implications of the results for finding the determinants of inflation were discussed for the sample period from 1977/78 to 2005/2006.

The estimated simple regression equation of inflation on the other independent variables show that the current broad money supply, current wholesale price of India, one year lagged wholesale price of India, and foreign exchange reserves are found significant determinant of Nepalese inflation at 5% level of significance. The other variables such as current narrow money supply, two year lagged wholesale price of India, expected inflation, broad money supply to real GDP ratio are significant at only 10% level of significance. But they have low explanatory power of explaining the total variation of Nepalese inflation.

The remaining explanatory variables such as one year and two year lagged money supply (both narrow and broad), real GDP, fiscal deficit, narrow money supply to the real GDP ratio, population growth, per capita income and real gross agriculture product are found insignificant variables at 10% level of significant having negative sign of adjusted coefficient of determination ($\bar{R}^2$); except for the variable, two year lagged broad money supply. The value of $\bar{R}^2$ for two year broad money supply is 0.047.

The estimated multiple regression equations of Nepalese inflation on money supply and wholesale price of India show that the combine effect of current narrow money supply and one year lagged wholesale price of India has the higher power of explaining the total variation of Nepalese inflation. Regarding the value of $\bar{R}^2$, they explained 26.5% of the total variation of inflation. f value is significant at 0.9% level of significance showing good fit of the model. The coefficients of narrow money supply and one year lagged wholesale price of India are significant at 3.8% and 2.1% level of significance respectively.

5.2 Conclusions

The empirical results suggest that inflation in Nepal is mainly determined by Indian prices. Current and one year lagged wholesale price of India have been found significant determinant of Nepalese inflation. It shows that a change in wholesale price of India affects immediately the general price level in Nepal and its effect remains for the next one year. The study attributed this result to the geographical and trade situation of Nepal having open boarder system, pegged exchange rate system and highly trade concentration between two countries.

Current domestic broad money supply has been found another significant determinant of Nepalese inflation. The study attributed this result to the decision of Nepalese investors on investment demand. From the results, it is concluded that there is lack of investment demand in Nepalese economy. Commercial banks have invested their loans in non production sectors. The result also concludes that investment demand in Nepalese economy is influenced by the price change in India but it is quite low.

Current domestic narrow money supply with the one year lagged wholesale price of India, has been found another one of the significant determinants of inflation in Nepal. The result concludes that Nepalese people change their decision on holding money looking at the price change in India in the last year. Foreign exchange reserve is also found one of the significant determinants of Nepalese inflation. But there are no other reasons than it is the dominant part of base money. An increase in base money increases money supply with the given money multiplier.

The other variables which were on investigation in this study such as real gross domestic product, fiscal deficit, expected rate of inflation, money supply to real GDP ratio, population growth, per capita income and real gross agriculture product are not found significant determinants of Nepalese inflation. The study attributed some reasons of being these variables insignificant in Nepalese inflation. Real gross domestic product has not been increasing significantly during a long period of time. The growth rates of agriculture and industrial sectors are not satisfactory as warranted by increasing population. High but

more or less constant population growth rate is the reason of being variable population growth insignificant in Nepalese inflation. Similarly, despite the expectation of increasing prices, almost all the people cannot increase aggregate demand due to the lack of extra purchasing power. Nepalese economy is still not that monetized. The fiscal deficit that has been created by Nepalese government is not big enough in creating inflation, in Nepal. The other reason behind not having significant relationship in between inflation and fiscal deficit may be due to the definition of inflation in this study. In this study the growth of national urban consumer price index is defined as inflation.

The above results are similar with many other studies which suggest that inflation in India is an important contributor for inflation in Nepal. The magnitude of the coefficients of wholesale price of India (current and one year lagged) is found more or less equal to the other previous studies i.e. in around 0.50 to 0.60. But the magnitude of the coefficient of narrow money supply with one year lagged whole sale price of India is different than other previous studies. In this study it is found 0.27. Another interesting result of this study is that consumption and investment decision of Nepalese people is also influenced by the price changed in India in last one year.

5.3 Recommendations

The study concludes that the root cause of inflation in Nepal is Indian inflation with domestic narrow money supply growth. Also regarding the insignificant variables, the study makes following recommendations for controlling the rising inflationary trend in Nepal.

1. The study has found that Indian inflation is one of the main contributors of Nepalese inflation. Open-boarder system, pegged exchange rate system and high trade concentration between the countries are main responsible factors of transmission of inflation from India to Nepal. Therefore, monetary authority should rethink about the exchange rate policy and refine monetary formulation on this regard. As Nepal is a member of World Trade Organization, Nepalese

government should formulate some actions to curtail the imports. Trade diversification policy should be developed effectively. All the illegal activities on exports and imports should be minimized and government should also promote the imports substitute industries.

2. Since money supply is another main important determinant for rising inflation in Nepal, monetary authority should keep proper balance between money supply and demand for money. Monetary authority can effectively regulate money supply only in the efficient money market. Thus, it should promote the financial market so that it can regulate the money supply as per to the requirement of the economy. Similarly, monetary authority should encourage commercial banks for investing their loans on production sector. Government and monetary authority should formulate policies of attracting investment demand in the economy.

3. Fiscal deficit, gross domestic product, population growth, per capita income, and agriculture production are found insignificant variables of Nepalese inflation. So, growth rate of GDP should be made significant by promoting the agriculture and industrial sectors. Government should invest on social and economic overhead capital which is essential for economic growth as well as for trade diversification within improvement in balance of payment. The growth rate of population should be checked significantly.

4. The empirical study has explained only a few percent of total variation of inflation in Nepal. Thus, we can not reach at the concrete solution for combating the higher rate of inflation. Other alternatives, which were beyond the scope of this study, are political stability, structural bottlenecks, high economic freedom. Change in these variables can play vital role for curtailing the inflation in developing countries like Nepal.

5. Finally, this study has not used sophisticated statistical tools and methodology to find the effect of determining variables on Nepalese inflation. Thus, this study

suggests that other researches are essential on Nepalese inflation from which it can be explained more.

APPENDIX A

NOMINAL AND REAL GDP GDP DEFLATOR AGRICULTURE DEFLATOR NOMINAL GROSS AGRICULTURE PRODUCT REAL AGRICULTURE PRODUCT GOVERNMENT EXPENDITURE REVENUE AND FISCAL DEFICIT

Year	NGDP	GDPdef	RGDP	NGAP	Adef	RGAP	GE	GR	FD
1978	19732	19.37	101870.0	11616	20.17	57594	2674.9	1582	1092.9
1979	26128	25.02	104415.2	13365	22.55	59262	3020.5	1811.90	1208.6
1980	23351	22.89	102007.0	13520	23.93	56504	3470.7	1800.00	1670.7
1981	27307	24.75	110353.0	15510	24.84	62429	4092.3	2419.20	1673.1
1982	30988	27.06	114507.0	17715	27.14	65282	5361.3	2879.50	2481.8
1983	33821	30.40	111258.7	19082	29.61	64442	6979.2	2841.60	4137.6
1984	39290	32.25	121821.6	22570	31.90	70745	7437.3	3409.30	4028.0
1985	46587	35.96	129555.1	22761	33.09	68775	8394.8	3916.60	4478.2
1986	55734	41.24	135139.3	27136	36.21	74937	9797.1	4644.50	5152.6
1987	63865	45.51	140346.9	30623	41.07	74562	11513.2	5975.10	5538.1
1988	76906	45.69	168319.6	36755	46.30	79391	14105.1	7350.40	6754.7
1989	89270	50.88	175450.5	42572	50.51	84279	18004.9	7776.80	10228.1
1990	103416	56.35	183529.4	50470	56.66	89082	19669.3	9287.50	10381.8
1991	120370	61.54	195601.3	55368	60.78	91094	23549.8	10729.90	12819.9
1992	149487	73.22	204172.8	65156	72.33	90079	26418.2	13512.70	12905.5
1993	171474	81.19	211210.6	70090	78.93	88797	30897.7	15148.40	15749.3
1994	199272	86.84	229471.2	80589	85.72	94018	33597.4	19580.80	14016.6
1995	219175	92.68	236489.8	85569	91.68	93339	39060.0	24575.20	14484.8
1996	248913	100.00	248913.0	96896	100.00	96896	46542.4	27893.10	18649.3
1997	280513	107.23	261602.0	108785	107.57	101127	50723.7	30373.50	20350.2
1998	300845	111.49	269835.2	112495	110.30	101986	56118.3	32937.90	23180.4
1999	342036	121.50	281507.9	132373	126.21	104883	59579.0	37251.00	22328.0
2000	379488	127.06	298663.4	145131	131.92	110013	66272.5	42893.80	23378.7
2001	411217	130.40	315354.0	151059	130.18	116039	79835.1	48893.60	30941.5
2002	422807	134.85	313545.5	160144	135.00	118624	80072.2	50445.50	29626.7
2003	456201	140.96	323629.8	171104	140.72	121590	84006.1	56229.80	27776.3
2004	495336	147.73	335299.6	183358	145.19	126291	89442.6	62331.00	27111.6
2005	543936	154.96	351020.9	196403	144.37	136042	102560.4	70122.70	32437.7
2006	596593	165.43	360629.6	207872	151.14	137537	110889.2	72282.10	38607.1

Source: www.cbs.gov.np, Economic survey and Statistical Year Books

Where, NGDP = Nominal Gross Domestic Product, RGDP = Real Gross Domestic Product, NGAP = Nominal gross agriculture product, Adef = agriculture deflator, and RGAP = Real gross agriculture product. GE = Government Expenditure, GR = Government Revenue, FD = Fiscal Deficit,

Note: Fiscal year 1978 represents the fiscal year 1977/78 and similarly to other years.

APPENDIX B

CONSUMER PRICE INDEX OF NEPAL MONEY SUPPLY REAL GDP FISCAL DEFICIT FOREIGN EXCHANGE RESERRVE AND WHOLE PRICE INDEX OF INDIA IN LEVELS

Year	NCPI	M1	M2	IWPI	RGDP	FD	FER
1978	17.6	2060.6	3772.1	22.9	101870.0	1092.9	
1979	18.2	2504.9	4511.4	24.2	104415.2	1208.60	
1980	19.9	2830.4	5285.3	28.1	102007.0	1590.70	
1981	22.6	3207.8	6307.7	32.5	110353.0	1673.10	
1982	25.0	3611.5	7458.0	34.8	114507.0	2481.80	
1983	28.5	4348.9	9222.4	36.6	111258.7	4137.60	
1984	30.3	4931.5	10455.2	39.3	121821.6	4028.00	
1985	31.5	5480.0	12296.6	41.5	129555.1	4478.20	
1986	36.5	7029.3	15159.0	43.6	135139.3	5152.60	3463.3
1987	41.4	8120.2	17498.2	46.4	140346.9	5538.10	4176.2
1988	45.9	9596.6	21422.6	50.0	168319.6	6754.70	7064.8
1989	49.7	11775.4	26605.1	53.9	175450.5	10228.10	8310.8
1990	54.5	14223.0	31552.4	58.1	183529.4	10381.80	11589.8
1991	59.8	16283.6	37712.5	64.7	195601.3	12819.90	18656.6
1992	72.4	19457.7	45670.5	72.9	204172.8	12905.50	24251.4
1993	78.8	23833.0	58322.5	79.9	211210.6	15749.30	33510.4
1994	85.9	28510.4	69777.1	87.1	229471.2	14016.60	42015.7
1995	92.5	32985.4	80984.7	95.8	236489.8	14484.80	43084.9
1996	100.0	36498.0	92652.2	102.3*	248913.0	18649.30	44438.2
1997	108.1	38460.3	103720.6	106.9	261602.0	20350.20	48541.4
1998	117.1	45163.8	126462.6	112.4	269835.2	23180.40	65157.7
1999	130.4	51062.4	152800.2	117.6	281507.9	22328.00	76650.8
2000	134.9	60979.8	186120.8	123.5	298663.4	23378.70	93858.1
2001	138.1	70576.9	214454.2	130.5	315354.0	30941.50	105172.5
2002	142.1	77155.9	223988.3	135.2	313545.5	29626.70	105901.2
2003	148.9	83754.1	245911.2	140.6	323629.8	27776.30	108229.4
2004	154.8	93969.6	277310.1	149.1	335299.6	27111.60	130205.1
2005	161.8	100205.7	300440.0	157.5	351020.9	32437.70	129896.4
2006	174.7	132822.0	405751.0	164.9	360629.6	38607.10	165033.7

Source: Quarterly Economic Bulletins of NRB, Appendix-A, Economic Survey, and International Financial Statistics

Where, NCPI = Consumer Price Index of Nepal, M1= Narrow Money Supply, M2 = Broad Money supply, ICPI = Consumer Price Index of India, RGDP = Real Gross Domestic Product, FD = Fiscal Deficit, FER = Foreign Exchange Reserve

Note: Fiscal year 1978 represents the fiscal year 1977/78 and similarly to other years.
* It is calculated by the average of IWPI of year 1995 and 1996 for adjusting the Indian fiscal year into Nepalese fiscal year. Series of WPI of India is measured at the base year 1995.

APPENDIX C

POPULATION REAL PERCAPITA INCOME RATIO OF MONEY SUPPLY TO REAL GDP AND REAL GROSS AGRICULTURE PRODUCT

Year	POP	RPCI	M1/RGDP	M2/RGDP	RGAP
1978	13885722	732.49	0.02026	0.03709	57590
1979	14254861	733.17	0.02397	0.04317	59268
1980	14633813	696.81	0.02776	0.05183	56498
1981	15022839	735.91	0.02902	0.05706	62440
1982	15338153	745.51	0.03158	0.06522	65273
1983	15660086	710.43	0.03909	0.08290	64444
1984	15988776	760.79	0.04054	0.08595	70752
1985	16324365	792.73	0.04235	0.09502	68785
1986	16666997	811.64	0.05196	0.11206	74941
1987	17016821	824.85	0.05785	0.12466	74563
1988	17373987	968.60	0.05703	0.12730	79384
1989	17738650	988.71	0.06714	0.15170	84284
1990	18110967	1014.23	0.07743	0.17177	89075
1991	18491097	1058.47	0.08320	0.19268	91096
1992	18937160	1078.39	0.09528	0.22364	90082
1993	19393984	1088.87	0.11286	0.27618	88800
1994	19861827	1155.87	0.12419	0.30394	94014
1995	20340957	1162.36	0.13951	0.34252	93334
1996	20831644	1194.88	0.14663	0.37223	96896
1997	21331362	1226.70	0.14698	0.39638	101129
1998	21843068	1235.25	0.16739	0.46870	101990
1999	22367048	1258.60	0.18139	0.54279	104883
2000	22903598	1303.61	0.20424	0.62336	110014
2001	23151423	1362.12	0.22380	0.68005	116039
2002	23701451	1323.36	0.24599	0.71412	118625
2003	24249996	1334.21	0.25886	0.76005	121592
2004	24797059	1352.44	0.28020	0.82689	126288
2005	25342638	1384.73	0.28555	0.85613	136041
2006	25886736	1393.37	0.36824	1.12491	137536

Source; Statistical Year Books, Appendix A and Appendix B,

Where, POP = Total population, RPCI = Real per capita income, M1/RGDP = Narrow money supply to real GDP ratio, M2/RGDP = Broad money supply to real GDP ratio and RGAP = Real gross agriculture product.

Note: Fiscal year 1978 represents the fiscal year 1977/78 and similarly to other years.

APPENDIX D

GROWTH RATES OF THE VARIABLES

Year	dln CPI	dln M1	dln M2	dln IWPI)	dln RGDP	dln FD	dln FER	P*	dlnM1/ RGDP	dlnM2/ RGDP	dln RPCI	dln POP	dln RGAP
1978													
1979	0.03	0.20	0.18	0.06	0.02	0.1			0.17	0.15	0.00	0.03	0.03
1980	0.09	0.12	0.16	0.15	-0.02	0.27		0.03	0.15	0.18	-0.05	0.03	-0.05
1981	0.13	0.13	0.18	0.15	0.08	0.05		0.09	0.04	0.10	0.05	0.03	0.10
1982	0.10	0.12	0.17	0.07	0.04	0.39		0.13	0.08	0.13	0.01	0.02	0.04
1983	0.13	0.19	0.21	0.05	-0.03	0.51		0.10	0.21	0.24	-0.05	0.02	-0.01
1984	0.06	0.13	0.13	0.07	0.09	-0.03		0.13	0.04	0.04	0.07	0.02	0.09
1985	0.04	0.11	0.16	0.06	0.06	0.11		0.06	0.04	0.10	0.04	0.02	-0.03
1986	0.15	0.25	0.21	0.05	0.04	0.14		0.04	0.20	0.16	0.02	0.02	0.09
1987	0.13	0.14	0.14	0.06	0.04	0.07	0.19	0.15	0.11	0.11	0.02	0.02	-0.01
1988	0.10	0.17	0.20	0.08	0.18	0.20	0.53	0.13	-0.01	0.02	0.16	0.02	0.06
1989	0.08	0.20	0.22	0.07	0.04	0.41	0.16	0.10	0.16	0.18	0.02	0.02	0.06
1990	0.09	0.19	0.17	0.08	0.05	0.01	0.33	0.08	0.14	0.12	0.03	0.02	0.06
1991	0.09	0.14	0.18	0.11	0.06	0.21	0.48	0.09	0.07	0.11	0.04	0.02	0.02
1992	0.19	0.18	0.19	0.12	0.04	0.01	0.26	0.09	0.14	0.15	0.02	0.02	-0.01
1993	0.08	0.20	0.24	0.09	0.03	0.20	0.32	0.19	0.17	0.21	0.01	0.02	-0.01
1994	0.09	0.18	0.18	0.09	0.08	-0.12	0.23	0.08	0.10	0.10	0.06	0.02	0.06
1995	0.07	0.15	0.15	0.09	0.03	0.03	0.03	0.09	0.12	0.12	0.01	0.02	-0.01
1996	0.08	0.10	0.13	0.07	0.05	0.25	0.03	0.07	0.05	0.08	0.03	0.02	0.04
1997	0.08	0.05	0.11	0.04	0.05	0.09	0.09	0.08	0.00	0.06	0.03	0.02	0.04
1998	0.08	0.16	0.20	0.05	0.03	0.13	0.29	0.08	0.13	0.17	0.01	0.02	0.01
1999	0.11	0.12	0.19	0.05	0.04	-0.04	0.16	0.08	0.08	0.15	0.02	0.02	0.03
2000	0.03	0.18	0.20	0.05	0.06	0.05	0.20	0.11	0.12	0.14	0.04	0.02	0.05
2001	0.02	0.15	0.14	0.05	0.05	0.28	0.11	0.03	0.09	0.09	0.03	0.01	0.05
2002	0.03	0.09	0.04	0.04	-0.01	-0.04	0.01	0.02	0.09	0.05	-0.03	0.02	0.02
2003	0.05	0.08	0.09	0.04	0.03	-0.06	0.02	0.03	0.05	0.06	0.01	0.02	0.02
2004	0.04	0.12	0.12	0.06	0.04	-0.02	0.18	0.05	0.08	0.08	0.01	0.02	0.04
2005	0.04	0.06	0.08	0.05	0.03	0.18	0.00	0.04	0.02	0.03	0.02	0.02	0.07
2006	0.08	0.28	0.30	0.05	0.03	0.17	0.24	0.04	0.25	0.27	0.01	0.02	0.01

Source: all calculations, accept P*, are the first differences of natural logarithm of data series from Appendix B and C. P* = one year lagged of dln NCPI,

Note: Fiscal year 1978 represents the fiscal year 1977/78 and similarly to other years. And there are five digits after the decimal.

APPENDIX E

TRADE CONCENTRATION OF NEPAL WITH INDIA

Fiscal Year	Trade concentration with India
1978	57.8%
1979	53.4%
1980	49.8%
1981	52.5%
1982	51.0%
1983	44.9%
1984	51.3%
1985	52.4%
1986	42.0%
1987	40.0%
1988	34.3%
1989	25.8%
1990	22.5%
1991	29.0%
1992	27.8%
1993	25.1%
1994	27.4%
1995	28.0%
1996	29.8%
1997	25.9%
1998	31.0%
1999	36.2%
2000	38.5%
2001	47.1%
2002	54.8%
2003	55.9%
2004	57.6%
2005	61.3%
2006	63.6%

Source: Inflation in Nepal, 2007

Note: Fiscal year 1978 represents the fiscal year 1977/78 and similarly to other years.

APPENDIX F

DESCRIPTIVE STATISTICS

	N	Minimum	Maximum	Mean	Std. Deviation
dlnNCPI	28	.02344	.19120	.0819700	.03955405
dlnM1	28	.05237	.28178	.1487861	.05281645
dlnM2	28	.04350	.30049	.1670754	.05187116
dlnIWPI	28	.03577	.14970	.0705850	.02985484
dlnRGDP	28	-.02878	.18175	.0451489	.03786661
dlnFD	28	-.11655	.51113	.1273068	.15374285
dlnFER	20	-.00237	.52572	.1931960	.14894455
dlnP*	27	.02344	.19120	.0821648	.04029384
dlnM1/RGDP	28	-.01428	.25432	.1035739	.06494315
dlnM2/RGDP	28	.02092	.27303	.1218643	.06134508
dlnRPCI	28	-.05086	.16065	.0229650	.03845351
dlnRGAP	28	-.11335	.17814	.0264808	.05875890
dlnPOP	28	.01076	.02624	.0222461	.00289332

APPENDIX G

CORRELATION MATRIX IN FIRST DIFFERENCE

	dln NCPI	dln M1	dln M2	dln IWPI	dln RGDP	dln FD	dln FER	dln EP	dlnM2/ RGDP	dlnM1/ RGDP	dln RPCI	dln RGAP	dln POP
dln NCPI	1	.330	.422*	.440*	.038	.141	.445*	.343	.332	.245	.026	.186	.168
Sig.		.087	.025	.019	.846	.473	.049	.080	.084	.209	.894	.344	.392
dln M1	.330	1	.85**	.037	-.01	.197	.532*	.219	.72**	.81**	.008	-.141	-.101
Sig.	.087		.000	.853	.961	.316	.016	.273	.000	.000	.967	.473	.609
dln M2	.422*	.85**	1	.171	.086	.346	.62**	.385*	.79**	.64**	.090	-.115	.005
Sig	.025	.000		.385	.663	.072	.003	.047	.000	.000	.650	.560	.981
dln IWPI	.440*	.037	.171	1	.086	.060	.492*	.211	.093	-.019	.058	.220	.325
Sig	.019	.853	.385		.663	.760	.028	.291	.639	.924	.770	.261	.091
dln RGDP	.038	-.010	.086	.086	1	-.22	.60**	.320	-.54**	-.59**	.99**	.50**	-.180
Sig	.846	.961	.663	.663		.261	.005	.104	.003	.001	.000	.006	.359
dln FD	.141	.197	.346	.060	-.22	1	.172	.170	.431*	.291	-.196	-.122	-.329
Sig	.473	.316	.072	.760	.261		.469	.398	.022	.133	.317	.537	.087
dln FER	.445*	.532*	.62**	.492*	.60**	.172	1	.536*	.251	.126	.59**	.297	-.075
Sig	.049	.016	.003	.028	.005	.469		.015	.286	.597	.006	.204	.752
dln EP	.343	.219	.385*	.211	.320	.170	.536*	1	.135	-.005	.299	.082	.092
Sig	.080	.273	.047	.291	.104	.398	.015		.501	.981	.129	.683	.647
dlnM2/ RGDP	.332	.71**	.79**	.093	-.54**	.431*	.251	.135	1	.90**	-.54**	-.40*	.113
Sig	.084	.000	.000	.639	.003	.022	.286	.501		.000	.003	.034	.566
dlnM1/ RGDP	.245	.81**	.64**	-.019	-.59**	.291	.126	-.005	.90**	1	-.57**	-.40*	.021
Sig	.209	.000	.000	.924	.001	.133	.597	.981	.000		.001	.033	.915
dln RPCI	.026	.008	.090	.058	.99**	-.196	.60**	.299	-.54**	-.574**	1	.49**	-.249
Sig	.894	.967	.650	.770	.000	.317	.006	.129	.003	.001		.008	.201
dln RGAP	.186	-.141	-.115	.220	.50**	-.122	.297	.082	-.40*	-.40*	.49**	1	-.023
Sig	.344	.473	.560	.261	.006	.537	.204	.683	.034	.033	.008		.908
dln POP	.168	-.101	.005	.325	-.18	-.329	-.075	.092	.113	.021	-.25	-.02	1
Sig	.392	.609	.981	.091	.359	.087	.752	.647	.566	.915	.201	.908	

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
Sig. = Significance

APPENDIX H

RESULTS OF SIMPLE REGRESSION EQUATIONS

Dependent variable; Inflation
Independent variable; Percentage change in one year lagged narrow money supply.

$d\ln NCPI =$	0.069	$+0.102$	$d\ln M1-1$	
t	2.757	0.616		
p	0.011	0.544		
$R^2 =$	0.015	$F =$	0.379	
$\bar{R}^2 =$	-0.24	$DW =$	1.405	$N = 27$

Dependent variable; Inflation
Independent variable; Percentage change in two year lagged narrow money supply

$d\ln NCPI =$	0.068	$+0.107$	$d\ln M1-2$	
t	2.457	0.594		
p	0.022	0.558		
$R^2 =$	0.015	$F =$	0.353	
$\bar{R}^2 =$	-0.027	$DW =$	1.337	$N = 26$

Dependent variable; Inflation
Independent variable; Percentage change in one year lagged broad money supply.

$d\ln NCPI =$	0.044	$+0.248$	$d\ln M2-1$	
t	1.580	1.509		
p	0.127	0.144		
$R^2 =$	0.084	$F =$	2.278	
$\bar{R}^2 =$	0.047	$DW =$	1.493	$N = 27$

Dependent variable; Inflation
Independent variable; Percentage change in two year lagged broad money supply.

$d\ln NCPI =$	0.079	$+0.028$	$d\ln M2-2$	
t	2.468	0.150		
p	0.021	0.882		
$R^2 =$	0.001	$F =$	0.023	
$\bar{R}^2 =$	-0.041	$DW =$	1.274	$N = 26$

Dependent variable; Inflation
Independent variable; Percentage change in two year lagged wholesale price of India

$d\ln NCPI =$	0.049	$+0.484$	$d\ln IWPI-2$	
t	2.507	1.946		
p	0.019	0.063		
$R^2 =$	0.136	$F =$	3.788	
$\bar{R}^2 =$	0.100	$DW =$	1.499	$N = 26$

Dependent variable; Inflation
Independent variable; Percentage change in real gross domestic product.

$d\ln NCPI =$	0.080	$+0.040$	$d\ln RGDP$	
t	6.695	0.196		
p	.000	0.846		
$R^2 =$	0.001	$F =$	0.38	
$\bar{R}^2 =$	-0.037	$DW =$	1.303	$N = 28$

Source: Appendix D, calculations are based on SPSS 3.0

APPENDIX I

RESULTS OF SIMPLE REGRESSION EQUATIONS

Dependent variable; Inflation Independent variable; Percentage change in fiscal deficit $d\ln NCPI = 0.077 + 0.036\ d\ln FD$ t 7.841 0.728 p 0.000 0.473 $R^2 =$ 0.020 $F =$ 0.530 $\bar{R}^2 =$ -0.018 $DW =$ 1.405 $N = 28$	Dependent variable; Inflation Independent variable; Percentage change in ratio of M1 to RGDP $d\ln NCPI = 0.067 + 0.149\ d\ln \frac{M1}{RGDP}$ t 4.723 1.288 p 0.000 0.209 $R^2 =$ 0.060 $F =$ 1.659 $\bar{R}^2 =$ 0.024 $DW =$ 1.254 $N = 28$
Dependent variable; Inflation Independent variable; Percentage change in population (PG) $d\ln NCPI = 0.031 \quad 2.299\ d\ln PG$ t .520 0.87. p 0.607 0.392 $R^2 =$ 0.028 $F =$ 0.757 $\bar{R}^2 =$ -0.009 $DW =$ 1.293 $N = 28$	Dependent variable; Inflation Independent variable; Percentage change in Real per capita income (RPCI). $d\ln NCPI = 0.081 + 0.027\ d\ln RPCI$ t 9.127 0.0.135 p 0.000 0.894 $R^2 =$ 0.001 $F =$ 0.018 $\bar{R}^2 =$ -0.038 $DW =$ 1.294 $N = 28$
Dependent variable; Inflation Independent variable; Percentage change in real gross agriculture product (RGAP) $d\ln NCPI = 0.079 \quad 0.125\ d\ln RGAP$ t 9.551 0.964 p 0.000 0.344 $R^2 =$ 0.035 $F =$ 0.930 $\bar{R}^2 =$ -0.003 $DW =$ 1.259 $N = 28$	

Source: Source: Appendix D, calculations are based on SPSS 3.0

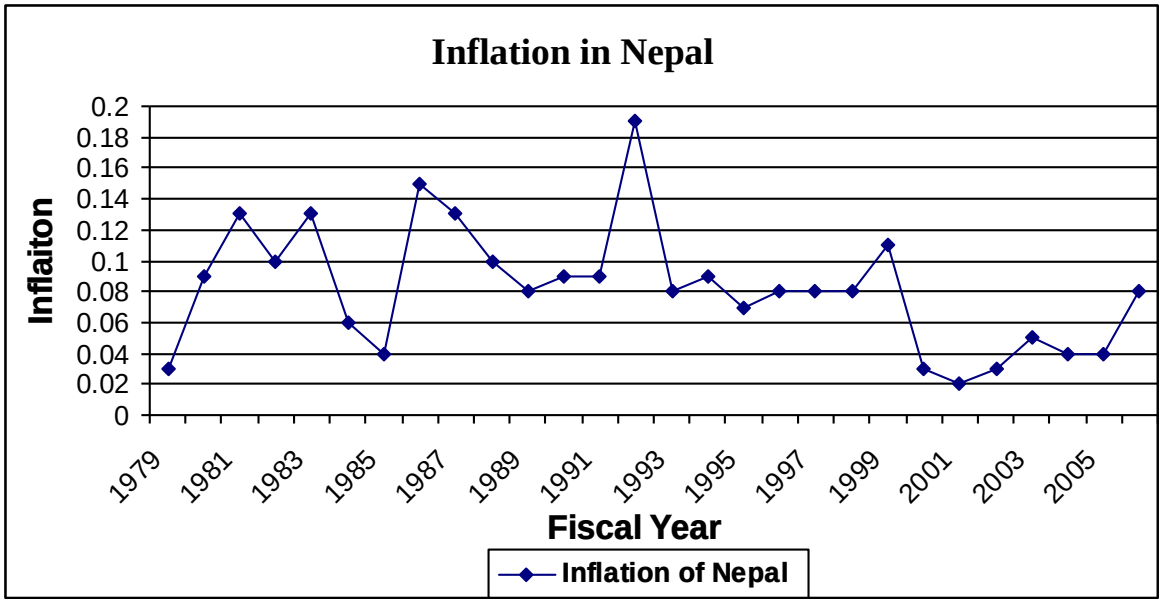
APPENDIX J

RESULTS OF MULTIPLE REGRESSION EQUATIONS

dependent variable dlnNCPI		**1**	**2**
Independent variables			
dlnM1	Coefficient t-Statistics p-value	0.257 1.989 0.059	0.217 1.195 0.244
dlnIWPI-1	Coefficient t-Statistics p-value	0.481 1.939 0.065	0.527 2.340 0.028
dlnP*	Coefficient t-Statistics p-value	0.100 0.530 0.601	
dlnM2/RGDP	Coefficient t-Statistics p-value		0.067 0.430 0.671
	Constant t-Statistics p-value	0.003 0.131 0.897	
R-squared Adjusted R-square DW-Statistics F -Statistics p-value for F N=27		0.330 0.243 1.908 3.775 0.024	0.327 0.239 1.792 3.728 0.026

Source: Appendix D. Calculations are based on SPSS 3.0

APPENDIX K



Source: Appendix - D

BIOLIOGRAPHY

Ackley, Gardner (2007). *Macroeconomic Theory*. First Indian Reprint. Surjeet Publications (Reprint), 7-k Kolhapur Road, Kamla Nagar, New Delhi.

Aisen, A. and Veiga, Francisco (2006). "Political Instability and Inflation Volatility," IMF *Working Paper*, No.06/212.

Ball, R.J. and Doyle Peter (1969). *Inflation*. Penguim Education, A Division of Penguin Books Limited, England.

Bista Nar Bahadur (2001). "*The Dynamics of Inflation in Nepal: A Quantitative analysis, 1975-1999," Dissertation* submitted to Tribhuvan University as a partial fulfillment of the requirements for the Degree of M.A. in Economics.

Colander, David C. (2001). *Macroeconomics*. Fourth Edition. Irwin/McGraw-Hill Publication, New York.

Crowther, Geoffrey (1948). *An Outline of Money*. Revised Edition, 1948, MacMillan Company, London.

Dahal, Madan Kumar (2004). *Nepalese economy*. Central Department of Economics, Tribhuvan University, Kritipur, Nepal.

Diouf, Mame Autou (2007). "Modeling Inflation for Mali," *IMF Working Paper*, No.07/295.

MOF (2005). *Economic Survey 2004/05*, Government of Nepal, Ministry of finance, Kathmandu

MOF (2006). *Economic Survey 2005/06*, Government of Nepal, Ministry of finance, Kathmandu

Friedman, M. (1970). "The Counter-Revolution in Monetary Theory," Institute of Economic Affairs, *Occasional Paper*, No.33, London.

Froyen, R.T. (2005). *Macroeconomics Theories and Policies*. Seventh Edition, Pearson Education Pvt. Ltd (Indian Branch), New Delhi, India.

Ginting, Edimon (2007). "Is Inflation in India an Attractor of Inflation in Nepal?" *IMF Working Paper*, No.07/269.

Granger, C.W.J. (1986). "Developments in the Study of Co-Integrated Economic Variables," *Oxford Bulletin of Economics and Statistics*, vol. 48.

Gujarati, D.N (2004). *Basic Econometrics*. Fourth Edition. Tata McGraw - Hill publishing company limited, New Delhi.

Harberger, A.C. (1963). "*The Dynamics of Inflation in Chile*", Measurement in Economics, C. Christ (ed.), Standford University.

Khan, Mohsin S. and Schimmelpfennig Axel (2006). "Inflation in Pakistan: Money or Wheat?" *IMF Working Paper*, No. 06/60.

Khatiwada, Y. R. (1981). "*An Econometric Analysis of The Determinants of Inflation in Nepal*," Dissertation submitted to Tribhuvan University as a partial fulfillment of the requirements for the Degree of M.A. in Economics, Kritipur.

Kuijs, Lovis (2002). "Monetary Policy Transmission Mechanisms and Inflation in Slovac Rupublic", *IMF Working Paper*, No.02/80.

Levacic, R. and Rebmann, Alexander (1982). *Macroeconomics: An Introduction to Keynesian – Neo classical Controversies*. Second Edition, Macmillan Publishers Ltd, London.

CBS (2004). *Nepal Living Standard Survey (2003/04)*, Nepal Government, Central Bureau of Statistics, Kathmandu.

Makinen, Gail E. (1978). *Money, The Price Level and Interest Rates: An Introduction to Monetary Theory*. Prentice Hall of India Pvt. Ltd., New Delhi.

McCulloch, J. Huston (1982). *Money and Inflation: A Monetarist Approach*. Second Edition, Academic Press, Inc., New York.

Nachega, Jean-Claude (2005). "Fiscal Dominance and Inflation in the Democratic Republic of the Congo," *IMF Working Paper*, No.05/221.

Nepal Rastra Bank (2006). "*Inflation Analysis and Price Division*," Vol.1, No.2, Research Department, Nepal Rastra Bank, Kathmandu, Nepal.

Nepal Rastra Bank (2007). "*Inflation Analysis and Price Division*", Vol. 1, No.5, Research Department, Nepal Rastra Bank, Kathmandu, Nepal.

Nepal Rastra Bank (2007). *Inflation in Nepal*. Research Department, Nepal Rastra Bank, Kathmandu, Nepal.

Pandey, Ravindra Prasad (2005). "Inflation," *50 years of Nepal Rastra Bank*, Nepal Rastra Bank, Kathmandu, Nepal.

Pant, H.M. (1978). "*An Econometric Analysis of the General Level of Prices in Nepal*," Dissertation submitted to Tribhuvan University as a partial fulfillment of the requirements for the Degree of M.A. in Economics.

Pant, Raghav Dev (1988). *Sources of Inflation in Asia: Theory and Evidences*. Nirala Publications, New Delhi.

Paudel, Balram (2005). "Government Budget Deficits and Inflationary Pressure in Nepal," *The Economic Journal of Nepal*, Vol.28, No.1.

Paul A. Samuelson and William D. Nordhaus (1989). *Macroeconomics*. Thirteenth Edition. McGraw – Hill, Inc., United States of America.

Pigou, A.C. (1949). *The Veil of Money*. MacMillan Publication, London.

Shapiro, Edward (2004). *Macroeconomic Analysis*. Fifth Edition. Galgotia Publications Pvt. Ltd., New Delhi.

Theil, Henri (1978). *Introduction to Econometrics*. Prentice Hall, Englewood Cliffs, N.J.

Vaish, M.C. (2002). *Macroeconomic Theory*. Twelvelth Edition. Vikas Publishing House Pvt. Ltd. Janpura, New Delhi.

Vogel, Robert C. (1974). "The Dynamics of Inflation in Latin America: 1950 – 1969," *The American Economic Review*, Vol.64, No 1.

Annual Reports Provided by:

Economic Survey, Various Issues, Government of Nepal, Ministry of Finance, Kathmandu.

Quarterly Economic Bulletin, (2007). Nepal Rastra Bank, Research Department, Kathmandu.

Statistical Year Book, Various Issues, Government of Nepal, Central Bureau of Statistics, Kathmandu.

International Financial Statistics, Various Issues, International Monetary fund, USA.