CHAPTER-I
INTRODUCTION

1.1 Background of the Study

Budget formulation work is considered as main and important activities in modern government. The entire operation activities of the country are conducted from public budget. The budget is a key tool for government planning and programs. The successful implementation of planning and programs of the government helps to develop social and economic condition in Nepal. Government or public expenditure is the amount spent by the government authorities at any level i.e. central government, province government or local government to fulfil the demand of the people within a given time period. It consists of spending on real goods and services purchased from outside suppliers; spending on administration, defence, health, education, infrastructure development; spending on transfer payments to the pensioners, the unemployed, disabled and old aged allowance. Public expenditure to carry out essential functions of administrating justice and providing national defence and to supply certain additional goods and services that is advantageous to a great society but that would not be supplied by private enterprises because doing so would not be profitable (Goode, 1984).

Government expenditure is one of the important determinants of economic growth. However the growth of economy depends on the size, spending capacity, and effective use of capital expenditure in the development process. Due to political instability, internal inability and weak governance situation capital expenditure is unable to influence on economic growth and development in Nepal (Sharma, 2012).

Public expenditure is an important instrument for government to control the economy. It plays an important role in the functioning of an economy whether developed or underdeveloped. Public expenditure was born out of revenue allocation which refers to the redistribution of fiscal capacity between the various levels of government or disposition of responsibilities between tiers of the government (Okoro, 2013).

Public expenditure is the main instrument used by governments especially in developing countries to promote economic growth which is an essential ingredient for sustainable development. Economic growth brings about a better standard of living of the people through provision of better infrastructure, health, housing, education services and improvement in agricultural productivity and food security (Loto, 2011).

Government expenditure is one of the major components of fiscal policy. It is also known as the fiscal policy of the government. Generally, it can be divided into development or capital expenditure and regular or recurrent expenditure. Capital expenditure is the amount spent in the acquisition of fixed or productive assets as well as expenditure incurred in the upgrade or improvement of existing fixed assets such as lands, building, roads, machines and equipments, etc., including intangible assets. Capital expenditure is usefully seen as expenditure creating future benefits, as there could be some lags between when it is incurred and when it takes effect on the economy. Recurrent expenditure on the other hand refers to expenditure on purchase of goods and services, wages and salaries, operations as well as current grants and subsidies (usually classified as transfer payments). Recurrent expenditure, excluding transfer payments, is also referred to as government final consumption (Aigheyisi, 2013).

The relationship between government expenditure and economic growth is especially important for developing countries. Most of the countries have experienced increasing levels of public expenditure over time. The relationship between government expenditure and economic growth has continued to generate series of debate among scholars. Government expenditure in core functions contributes positively to economic growth (Gwartney, Holcombe & Lawson, 1998).

Before FY 2004/05, the budget of Nepal was divided into two parts i.e. regular expenditure and development expenditure. After that, the budget has been divided into three parts i.e. recurrent expenditure, capital expenditure and financial management. From this, we can find out the allocated amounts of capital expenditure is spending on investing capital expenditure in total budget. Increase in capital expenditure, the development activities of the country also increased by building additional capital in the country and capital expenditure decreases and recurrent

expenditure increases, only administrative expenses are increased and capital formation activities are decreased.

1.2 Statement of the Problem

The main medium of sustainable economic and social development of the nation is the public expenditure. Planning and effective public spending can only provide targeted fruits. The public expenditure can be divided into two parts i.e. capital expenditure and recurrent expenditure. The overall economic growth and development of the country depends upon the capital or development expenditure of the government in that country. From this, the amount of expenditure mentioned in the budget is invested in capital construction, and how much money can be found in the function of such capital. Increasing in capital expenditure helps to increase in the capital formation and only increase in recurrent expenditure during the period the capital expenditure is reduced. In this regard, the fourteenth three-year plan for the nation has been ready for implementation by preparing the goal of raising the country to the level of middle income country by 2030, due to the importance of the nation's economic and social development. The capital expenditure could not be reached, according to the government's target and recurrent expenditure is increasing every year, so development programs seem to be affecting directly. On the other hand, the allocated capital expenditure of the Government of Nepal has not been spending efficiently. Different unpublished data showed that one third of the total allocated capital expenditure has not been spending at the end of every fiscal year. Thus, the study tries to answers the following research questions:

i. What is the nature and trend of the capital expenditure and economic growth in Nepal?
ii. Is there any short run and long run relationship between capital expenditure and economic growth in Nepal?
iii. Is there any causal relationship between the capital expenditure and growth in Nepal?

1.3 Objective of the Study

The general objective of the study is to analyze the relationship between the capital expenditure and economic growth in Nepal. However, the specific objectives of the study are set as follows:

i. to examine the nature and trend of capital expenditure and economic growth in Nepal.
ii. to analyze short run and long run relationship between capital expenditure and economic growth in Nepal.
iii. to examine the causal relationship between capital expenditure and economic growth in Nepal.

1.4 Hypothesis of the Study

The Null hypothesis is tested against the alternative hypothesis in this research work as stated below:

Null Hypothesis (H_0): There is no significant relationship between capital expenditure and economic growth.

Alternative Hypothesis (H_1): There is significant relationship between capital expenditure and economic growth.

1.5 Significance of the Study

The economic growth is the most important macro economic indicator of overall economy of the country. Capital expenditure has a great influence on the fiscal activities of an economy and it plays the vital role to increase the output and productivity of the country that ultimately enhances economic growth. Capital expenditure is a backbone of the economic growth of all over the countries. But the research basically focuses on the Nepalese economy. There are various research works have been done on the topic of the capital expenditure and its trend in Nepal together with the GDP growth of the economy. But, the few studies have been conducted in the relationship between the GDP growth and the capital expenditure. This study has attempted to fulfil the research gap and to suggest some policy

recommendations for the government and other stakeholders to increase its efficiency and capacity to properly mobilize and utilize its allocated and estimated capital expenditure to overall change in social and economic aspects of the nation. Therefore this study expects to make additional contribution in the field of the public expenditure.

1.6 Limitations of the Study

The study is not free from constraints it conducted with number of limitations. The study is mainly concern with government capital expenditure. Government capital expenditure in Nepal can be found only in the secondary data sets and I should rely on the secondary data set. This is the first limitation of the study. All objectives of this research are concern with the various secondary data sets which are published by various government agencies. Another limitation of this study is that the study covers only the data from 1975-2016 of Nepal, which may not provide the conclusion for all.

1.7 Organization of the Study

The study is divided into five chapters. The first chapter is introduction it consists of background of the study, statement of problem, objectives of the study, hypothesis of the study, significance of the study, limitations of the study and organization of the study. Second chapter is related with the review of the literature which includes theoretical concepts, international context and Nepalese context. Third chapter deals with the research methodology which comprise research framework, research design, incorporating various econometrics models and tests. Fourth chapter is data presentation and analysis, where the descriptive and inferential statistics to analyze the data have been discussed. At last the Fifth chapter deals with the summary conclusion and recommendation of the study.

CHAPTER-II
REVIEW OF LITERATURE

There are many studies on the topic of the relationship between capital expenditure and economic growth in Nepal. This section discusses the various theoretical concept, international and Nepalese context of literature review written in the past regarding the relationship between capital expenditure and economic growth.

2.1 Theoretical Concept

There are so many theories are developed in the field of public expenditure. In a classical economic theory, the government expenditure is not a major force. The classical economic theory is based on the concept of a laissez -faire economic market. It is also known as the free market economy. Classical economists believed that consumer expenditure and business investment expenditure represents the more important parts of a nation and economic growth. Too much government expenditure takes a valuable economic resources needed by individuals and businesses. According to classical economists, government expenditure and involvement in economic activities can reduce economic growth of a nation by increasing the role of public sector and decreasing the role of private sector.

Keynesian economics relies on government expenditure to jumpstart a nation and economic growth during economic downturns. Keynesians economists believe the nation and economy is made up of consumer expenditure, business investment expenditure and government expenditure. However, Keynesian theory dictates that government expenditure can improve the economic growth in the absence of consumer expenditure or business investment expenditure.

2.1.1. Classical View on Public Expenditure

The classical economists believe that the government intervention brings more harm than good to an economy and that the private sector should carry out most of the activities with the publication of Adam Smith's Wealth of Nations in 1776. In his great publication he advocated much on the laissez-faire economy where the profit motive was to be the main cause of economic developments. The classical economists

were opposed to the role of government expenditure in an economy. The classical economists; Smith (1776) and Ricardo (1821) viewed that countries with higher government expenditure would experience lower economic growth. In a classical economic theory, the government expenditure is not a major force. It is also known as the free market economy requires little to no government intervention. According to the classical dichotomy, an increase in the total amount of money leads to a proportionate increase in all money prices, with no change in the allocation of resources or the level of real GDP, which is known as money neutrality. Classical economists believed in the magical powers of the invisible hand or free markets in the economy. The classical economists advocated the policy of laissez-faire in economic affairs and wanted that the state activities should be confined to the bare minimum, because interference with the free economy by the government would hinder economic progress.

2.1.2. Keynesian View on Public Expenditure

Keynes (1936) developed his idea about the public expenditure on his great publication entitled General Theory of Employment, Interest and Money in 1936, and criticized the classical view on public expenditure or laissez faire or free market economy to put too much emphasis on the long run. Keynes supported higher government expenditure in order to promote economic growth. According to the Keynesians, pubic spending boosts economic activities as well as act as a tool to stabilize the short run fluctuations in aggregate expenditure.

Keynesian macroeconomic theory has generally assumed that increased government expenditure tends to leads high aggregate demand and it turn rapid economic growth. In Keynesian macroeconomics, many kinds of public expenditures, can contribute positively to economic growth through multiplier effects on aggregate demand. Keynesian approach pointed out that public expenditure is an exogenous factor and a policy instrument for mounting national income. Therefore, it posits that the causal relationship between public expenditure and national income runs from expenditure to income (Srinivasan, 2013).

The Keynesian theory asserts that government expenditure especially deficit financing could provide short-term stimulus to help that a recession or depression. The

Keynesians however advised that policy makers should be prepared to reduce government expenditure once the economy recovers to forestall inflation (Mitchell, 2005).

Keynes (1936) categorized public expenditure as an exogenous variable that can generate economic growth instead of an endogenous phenomenon. Hereby, Keynes believed the role of the government to be crucial as it can avoid depression by increasing aggregate demand and thus, switching on the economy again by the multiplier effect. It is a tool that bring stability in the short run but this need to be done cautiously as too much of public expenditure lead to inflationary situations while too little of it leads to unemployment.

2.1.3. Wagner's Law of Increasing Public Expenditure

The law cited that the advent of modern industrial society will result in increasing political pressure for social progress and increased allowance for social consideration by industry. The law suggests that the share of public sector in the economy will rise as economic growth proceeds, owning to the intensification of existing activities and extension of new activities. Wagner designed three focal bases for the increased in state expenditure. Firstly, during industrialization process, public sector activity will replace private sector activity. State functions like administrative and protective functions will increase. Secondly, governments needed to provide cultural and welfare services like education, public health, old age pension or retirement insurance, food subsidy, natural disaster aid, environmental protection programs and other welfare functions. Thirdly, increased industrialization will bring out technological change and large firms that tend to monopolize. Governments will have to offset these effects by providing social and merit goods through budgetary means. The Wagner's law state that in the future the public expenditure grows at a slow rate than national income. In the past, it has increased in faster rate than national income. Wagner believed that there were inherent tendencies for the activities of different layers of a government (such as central, state and local governments) to increase both intensively and extensively. There is a functional relationship between the growth of an economy and government activities with the result that the governmental sector grows faster than the economy (Adesoye, Maku, & Atanda, 2010).

It is important to appreciate the views of Wagner considering that before his revolutionary proposition the general belief is that as an economy grows richer, government programs and by implication government expenditure has the tendency to grow lesser. This study observes that despite the revolutionary opinion of Wagner on contemporary economic thought, the traditional view is still been held by some conservative economists who doubts the actual applicability of Wagner's law of expanding state activity (Henrekson, 1993).

2.1.4. The Endogenous Growth Theory

The Endogenous growth Model is long-run economic growth at a rate determined by forces that are internal to the economic system, particularly those forces governing the opportunities and incentives to create technological knowledge. In the long run the rate of economic growth, as measured by the growth rate of output per person, depends on the growth rate of total factor productivity, which is determined in turn by the rate of technological progress (King & Rebelo 1990).

In the endogenous growth model, public policies can affect both human capital formation and technological progress and therefore public policies can also influence economic growth. Endogenous growth models predict that distortionary taxation and productive expenditures do not affect the long-run growth rate. In testing whether the historical evidence supports the neoclassical or the endogenous growth model, several major difficulties arise. One is that there may be only limited data on government expenditure and revenues, particularly at the required level of disaggregation and the definition of expenditure as productive or unproductive, or non-distortionary (Bleaney, Gemmell, & Kneller, 2000).

2.1.5. Peacock and Wiseman Hypothesis of Public Expenditure

Peacock and Wiseman (1961) focused on the pattern of public expenditure and stated that public expenditure does not follow a smooth trend but the increase in public expenditure takes place in steps. The hypothesis put forward is that public expenditure grows due to growth in revenue. They gave three separate concepts to justify the hypothesis. The approach of the hypothesis is made up of three different ideas like displacement, inspection and concentration effect. Most of the increase in tax and spending has taken place during the period of social disturbance, what we call effect.

When social disturbance gets finished new level of tax tolerance makes society to accept higher level of public expenditure so that revenue gets stabilized at a new level. After this another effect occurs which we call as displacement effect. This is the phenomenon of expansion of government into new areas of economic activities. The third effect is called concentration effect which refers to the expansion of central government activity higher than state and local level.

Peacock and Wiseman (1961) elicited salient shaft of light about the nature of increase in public expenditure based on their study of public expenditure in England. They suggested that the growth in public expenditure does not occur in the same way that Wagner theorized. Peacock and Wiseman choose the political propositions instead of the organic state where it is deemed that government like to spend money, people do not like increasing taxation and the population voting for ever-increasing social services. There may be divergence of ideas about desirable public spending and limits of taxation but these can be narrowed by large-scale disturbances, such as major wars. In the words of Peacock and Wiseman, these disturbances will cause displacement effect, shifting public revenue and public expenditure to new levels. Government will fall short of revenue and there will be an upward revision of taxation. Initially, citizens will engender displeasure but later on, will accept the verdict in times of crisis. There will be a new level of tax tolerance. Individuals will now accept new taxation levels, previously thought to be intolerable. Furthermore, the public expect the state to heal up the economy and adjust to the new social ideas, or otherwise, there will be the inspection effect.

2.1.6. Musgrave and Rostow Theory of Public Expenditure

The Economist, Musgrave, and the economic historian, Rostow, have separately developed and suggested that the growth of public expenditure might be related to the pattern of economic growth and development in societies. They put forward a development model under the causes for growth in public expenditure and also argued that public expenditure is a prerequisite of economic growth. Economic growth takes place, the balance of public investment shift towards human capital development through increased spending on education, health and welfare services (Taiwo & Taiwo, 2011).

2.1.7. Colin Clark's Critical-Limit Hypothesis

Clark (1945) forwarded his view through Public Finance and changes in the value of Money about the growth of public-expenditure. This hypothesis concerned with the tolerance level of taxation. The hypothesis was based on the analysis of the empirical data of several western countries for the inter-war period results when the government sector taxes as well as institutional factor like the tolerance level of taxation and other receipts exceeds 25 per cent of aggregate economic activities, inflation necessarily arises, even when the budget is balance.

2.1.8. Ernest Engel's Theory of Public Expenditure

Engel's theory states that, the percentage of income allocated for food purchases decreases as income rises. As a household's income increases, the percentage of income spent on food decreases while the proportion spent on other goods (such as luxury goods) increases. Engel's law of public expenditure refers to income or total expenditure and budget shares for food (food share for short) for different households in a given population at a given period and not to changing (different) income of a given household. Food share is sometimes defined as consumption expenditures in current prices on food items divided by income but also by consumption expenditure on food divided by total expenditure' which is defined as expenditures on a well-specified large class of consumption goods and services (Chakrabarty & Hildenbrand, 2011).

2.1.9. Pure Theory of Public Expenditure

Samuelson (1954) formalized the concept of public goods (which he called collective consumption goods) i.e. goods that are non-rival and non-excludable. He highlighted the market failure of free-riding when he wrote, it is in the selfish interest of each person to give false signals, to pretend to have less interest in a given collective consumption activity than he really has. His paper showed that no decentralized pricing system can serve to determine optimally these levels of collective consumption.

Excludability is the ability of producers to detect and prevent uncompensating consumption of their products. Rivalry is the inability of multiple consumers to consume the same good. A public good is defined as a non-rival non-excludable good,

such as national defence. Because public goods are not excludable, they get under-produced. The pricing system cannot force consumers to reveal their demand for purely non-excludable goods, and so cannot force producers to meet that demand.

2.2 International Context

Cheng and Lai (1997) excited on government expenditure and economic growth in South Korea. The study examined the causality between government expenditure and economic growth along with money supply in a tri-variates framework by applying a VAR technique to South Korea data for the period 1954-94. The Phillips-Perron (PP) unit roots test and Johansen's test of co-integration are performed. The diagnostic tests for adequacy of the model also performed and passed. This study finds that there is a bi-directional causality between government expenditures and economic growth in South Korea. It is also found that money supply affects economic growth as well. The results are consistent with some of the past studies that detect a feedback between GDP and expenditure. The results of the study provided evidence to support the well documented proposition in the literature that the government has played an important role in economic development of South Korea. The findings of the research also support both the conventional Keynesian framework that causality runs from government expenditure to national income and the Wagnerian theory that national income causes government expenditure.

Bose, Haque and Osborn (2003) studied on public expenditure and economic growth: a disaggregated analysis for developing countries. The objective of the study was to evaluate the growth effects of government expenditures at its aggregate and disaggregate levels for 30 developing countries for a panel of third developing countries over the decades of the 1970s and 1980s, with a particular focus on sectoral expenditure. The methodology of the study improves on previous research on this topic by explicitly recognizing the role of the government budget constraint and the possible biases arising from omitted variables. Our primary results are twofold. Firstly, the share of government capital expenditure in GDP is positively and significantly correlated with economic growth, but current expenditure is insignificant. Secondly, at the sectoral level, government investment and total expenditures in education are the only outlays that are significantly associated with growth once the budget constraint and omitted variables are taken into consideration.

Dandan (2011) examined government expenditure and economic growth in Jordan. The objectives of the study were to analyze the composition of public expenditures in Jordan and to analyze the impact of public expenditures in GDP growth Jordan. The study used time series data on the Jordan for the period 1990-2006 used the different regression models. The study found that the government expenditure at the aggregate level has positive impact on the growth of GDP which is compatible with the Keynesian's theory; it was also found that the interest payment is proven to have no influence on GDP growth.

Modebe, Okafor , Onwumere and Ibe (2012) tried to examine the impact of recurrent and capital expenditure on Nigeria's economic growth from 1987 t0 2010. The adopted three variables multiple regression model while recurrent expenditure and capital expenditure were used as independent variable and gross domestic product growth rate as dependent variable. The finding emanating from the study reveals that while recurrent government expenditure had positive and non-significant impact on economic growth, capital expenditure had negative and non-significant impact on economic growth thus re-echoing the need for increase and encouragement of private sector investment while have proven over the years as a more efficient utilization of resources compared to public sector.

Aigheyisi (2013) studied the relative impact of federal capital expenditure and recurrent expenditure on Nigeria's economy. The study used the time series data from 1980 to 2011. The empirical analysis begins with an investigation of the effect of total government expenditure on gross domestic product (GDP) using multiple linear regression analysis. The co-integration, error correction and unit root test were used in the study. The results of the study were total government expenditure had significant positive effect on Nigeria's economy and Nigeria's federal government's recurrent expenditure exceeded her capital expenditure in the period covered by the study. The estimated short-rum (Error Correction) Model reveals that contemporaneously. The impacts of recurrent and capital expenditure on Nigeria's GDP were statistically insignificant.

Bojanic (2013) worked study on the composition of government expenditure and economic and Bolivia. The study analyzed the relationship between economic growth and productivity to budget share rations of government expenditures in Bolivia. The

study used time series data since 1940. The results indicated that defence expenditures, decentralized expenditures (local or regional), and expenditures in Santa Cruz Department represent the best ways for government to boost the country's growth. Expenditures on additional areas, such as education, and in other promising departments, such as Beni and Oruro, have the potential for generating significant growth and should be considered areas for possible government intervention. The findings also indicated the need to improve the productivity of all types of government expenditures, as it is this productivity that ultimately determines the direction in which different types of government expenditures affect economic growth.

Gangal and Gupta (2013) tried to examine the relationship between public expenditure and economic growth in India. The study analyzed the impact of public expenditure on economic growth of India from 1998 to 2012. The study included annual time series data of total public expenditure (TPE) and Gross Domestic Product (GDP) per capita as indicator of Economic Growth. In the study 'ADF Unit Root Test', 'Cointegration Test' and 'Granger Causality test' techniques have used. The study fined that there is linear stationarity in both the variables TPE and GDP that indicates the long run equilibrium and there is a positive impact of total public expenditure on economic growth. All tests of the study showed positive relationship between public expenditure and economic growth in India. IRF results found that an increase in public expenditure encourage economic growth and vice versa. Therefore, the government should increase their public expenditure to encourage economic growth.

Kapunda and Topera (2013) excited public expenditure composition and how it influenced economic growth in Tanzania. The study employed Ordinary Least Square method and using time series data from 1965 to 2010. The specific objectives of the study were to examine the impact of capital expenditure and recurrent expenditure, to analyse the impact of sectoral expenditure and control variables on economic growth and to make recommendations based on the findings. The study showed that factors which contributed positively and significantly to economic growth capital expenditure and terms of trade. In the study capital expenditure and the control variable: terms of trade were found to be positively influencing economic growth and the coefficients

were at 5 percent level of significance. Expenditure on agriculture, infrastructure, health, general public service, and defence has also a positive impact on growth, but the coefficients are insignificant at 5 per cent level. So is the case of the control variables: real exchange rate, real foreign interest rate, and the dummy variable. Total government expenditure, recurrent expenditure, expenditure on education, and population growth negatively influence growth but at an insignificant level.

Okoro (2013) studied on government expenditure and economic growth in Nigeria from 1980 to 2011. The study was based on secondary data. The aimed of the study was to establishing the dynamics properties of relationship between government spending and economic growth. The study investigated the impact of government spending on Nigerian economic growth. In the study, Real Gross Domestic Product (RGDP) was adopted as the dependent variable while government capital expenditure (GCEXP) and government recurrent expenditure (GREXP) represents the independent variables. Granger Causality test, Johansen Co-integration Test and Error Correction Mechanism models were used in the study. The result showed that there exists a long-run equilibrium relationship between government spending and economic growth in Nigeria. The policy implication is that that both the short-run and long-run expenditure has significant effect on economic growth of Nigeria. None of the variables was stationary at zero level. The three variables became stationary at first difference by ADF and PP application. There exists a long-run equilibrium relationship between government spending and economic growth in Nigeria; The VECM model negates the OLS model which indicates a change from the short run dynamics to their long run dispositions. The co-integration test employed revealed that there is a long run relationship between the Real Gross Domestic Product (RGDP) and the explanatory variables; GCEXP and GREXP. The study recommend that Government increase both capital expenditure (investment in roads, power supply, transport, and communication) and recurrent expenditure mostly on issues that should attract economic growth.

Sghari and Hammami (2013) analyzed the causality between the real per capita health care expenditure (HCE) and real per capita GDP in 30 developed countries; Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico,

Netherlands, New Zealand, Norway, Poland, Portugal, Republic of China, Slovak Republic, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States. The study was based on secondary data from 1975 to 2011. The aim of the study was to find out if the long-run relationship between the increase in health care expenditure and economic growth is stable, and probe into their short-run causal relationship and its influence. The findings of the study indicated that bidirectional Granger causality is predominant.

Srinivasan (2013) tried to determine the causal nexus between public expenditure and economic growth in India. Co-integration approach and error correction model were used in the study. The purpose of the study was to investigate the causal nexus between public expenditure and economic growth in India. The study was carried out the time series data over the period from 1973 to 2012. The co-integration test result confirms the existence of long-run equilibrium relationship between public expenditure and economic growth India. The empirical results based on the error-correction model estimate indicates one way causality runs from economic growth to public expenditure in the short-run and long-run, supporting the Wagner's law of public expenditure. The research suggested that the public expenditure is growing rapidly than the income of the economy and hence validates Wagner's law in the case of India.

Chipaumire, Ngirande, Method and Ruswa (2014) studied the impact of government spending on economic growth: case South Africa. The study investigated the validity of the Keynesian macroeconomic framework and the Classical perspective of a long run relationship and causality between government expenditure and economic growth in South Africa. In the study quarterly time series data from 1990-2010 are used. The unit root, co-integration and Granger causality test technique were used in the study in order to examine the causality relationship between government expenditure, money supply, investment and economic growth in South Africa. ADF (Augmented-Dickey Fuller) and the Philips Perron tests techniques were engaged to test for stationarity. The results of the study showed that, a negative causal relationship between government spending and economic growth is evidenced. In the study, it has evidenced that an increase in government spending in South Africa by 1 percent leads to the reduction in economic growth by 6.5 percent.

Darma (2014) empirically studied time series data from 1980 to 2010 on federal capital expenditure and economic growth in Nigeria. The objective of the study was to examine the impact of federal capital expenditure on economic growth in Nigeria. This paper was able to do empirical study on the impact of federal capital expenditure on economic growth from 1980 to 2010. In the research, secondary time series data were used and the researcher adopted Ordinary Least Squares (OLS) with a multiple equation, E view 7.0 was used in the model estimation and stationary test was conducted on the data used and all the variables were stationary at various differences. The result suggests that there is a positive impact of federal capital expenditure and economic growth in Nigeria, implying the dominance of public sector as the major economic growth deliver for national economy. The paper investigated some of the problems of federal capital expenditure in Nigeria, the most challenging factors identified being the low proportionality of capital expenditure relative to recurrent expenditure, poor planning of federal capital expenditure due to the absence of proper planning and adoption of a programme based budgeting strategy, late disbursement of federal capital funds and mismanagement of funds by government officers, these have hinder and prevent the federal capital expenditure from meeting its goals and objectives to their fullest.

Lahirushan and Gunasekara (2015) examined the impact of government expenditure on economic growth: a case study of Asian countries. The main propose of the study was to identify the impact of government expenditure on economic growth in Asian countries. The main objective of the study was to analyze whether government expenditure causes economic growth in Asian countries vice versa and then scrutinizing long-run equilibrium relationship exists between government expenditure and economic growth. The study completely based on secondary from 1970 to 2013. The methodology of the study has being quantitative that includes econometrical techniques of cointegration, panel fixed effects model and granger causality in the context of panel data of Asian countries; Singapore, Malaysia, Thailand, South Korea, Japan, China, Sri Lanka, India and Bhutan. The total 44 observations were conducted in each country, totalling to 396 observations in the study period. The study was used the random effects panel OLS model. At first, the study was fined that a momentous positive impact of government expenditure on Gross Domestic Production in Asian region. Secondly, government expenditure and economic growth indicate a long-run

relationship in Asian countries. The main finding of the study was there was a unidirectional causality from economic growth to government expenditure and government expenditure to economic growth in Asian countries. It can be concluded that role of government would play a vital role in economic growth of Asian Countries.

Mat, Mansur and Mahmud (2015) analyzed the effects of human capital investment on education, health and migration to economic development in Sabah. Extended augmented Solow growth model theory is utilized in this research. The study used time series data from 1980 to 2010. Ordinary Least Square (OLS), crosstab analysis, unit root test, cointegration, Durbin Watson test were employed in the study. Regression showed higher gross domestic product (GDP) per capita influenced by better literacy rate, longevity of life expectancy at birth and required number of immigrants with a sustainable gross domestic savings and improvement in unemployment rate. The study concluded that the human capital investment has a positive relationship with the economic development in Sabah.

Suanin (2015) tried to explore the impact of government expenditure and economic growth in Thailand. The study empirically examined the effects of different types of government expenditure in economic growth in Thailand. In the study different econometric techniques were used to estimate the short-run and long-run effects of these expenditures on growth and employed quarterly time series data over the period 1993-2014. The finding of the study indicated that while budgetary expenditure has the potential to promote economic growth in long-run, extra-budgetary expenditure as well as quasi-fiscal spending can also stimulate short-run economic growth.

Chandio, Jiang, Rehman and Jingdong (2016) conducted the study on the government expenditure on agriculture sector and economic growth in Pakistan. The time series data was used from 1983 to 2011. The study applied ADF unit root test, Johansen Co-integration test and Ordinary Least Square (OLS) technique as analytical tools to analysis the data. The results of Johansen Cointegration test showed that there exists a long-run relationship among government expenditure on agriculture, agricultural output and economic growth in Pakistan. The empirical results of regression analysis revealed that agricultural output, government expenditure have significant influence on economic growth of Pakistan. The study recommended that government of

Pakistan should increase its expenditure in the development of agriculture sector since it would enhance agricultural productivity and economic growth.

Mladenovic, Cvetanovic and Mladenovic (2016) investigated the influence of regular and development on economic growth in the EU28 during the period of 2002-2012. The main purposed of this study was to determine 'whether the share of research and development expenditure in one country has an impact on economic growth'. For the study purpose, they constructed a multiple regression model, which showed ceteris paribus, an increase in regular and development expenditure as a percentage of GDP by 1% would cause an increase of real GDP growth rate by 2.2%. This model taken into consideration actual financial crises and emphasises the negative influence of fertility rate in the EU28 on economic growth. In the study, the dependent variable was the real growth rate of gross domestic product. Data on this value have been taken from the official statistics of the European Union, i.e., Eurostat.

2.3 Nepalese Context

Basyal (1994) carried out a research about the growth of development expenditure of Nepal in different plan periods and its source of financing. Researcher has understood the dominance of foreign capital in Nepal's plan financing. During the fifth (1976-1980), sixth (1981-1985) and seventh (1986-1990) plan periods foreign loan and grants financed the total development expenditure of extent of 47.3 percent, 48.1 percent and 59.5 percent respectively. This has clarified an upward trend in the reliance of foreign resources and consequently the downward share of revenue surplus in meeting the development expenditure.

Sharma (2012) studied on the government expenditure and economic growth in Nepal. The objective of the study is to analyze the government expenditure and economic growth in Nepal. The research used the previous literature bilateral correlation and regression analysis the relationship between government expenditure and economic growth. The study is based on the Keynesian and endogenous growth models. It has to use the simple OLS technique and checked autocorrelation to find the relationship between public expenditure and economic growth. The major findings of the research are share of development expenditure over total expenditure is increasing over time and there very low correlation between the government expenditure and economic growth in Nepal.

Sapkota (2013) conducted study in Capital spending and economic growth in Nepal. The study used annual time series data of capital expenditure on the basis of percent of budget allocation and percent of GDP. The study presented declining capital expenditure budget allocation in recent years, the actual capital expenditure itself is consistently lower than the budgeted amount. The struggle and consistent inability to spend on time the allocated capital budget has put issues surrounding the quality of spending on the backburner. The study finds it is not only having an impact on productivity, but is also suppressing economic growth and jobs creation below the potential. Scaling up both quantum and quality of capital spending is vital to creating the foundations for the lacklustre growth to take off on sustainable path.

Bhusal (2014) has conducted the study in the relationship between the government spending and economic growth in Nepal. The objectives of the study are to test the Wagnerian hypothesis in Nepalese economy, to check the causality between the economic growth and government spending and to check the long run relationship between them. The research used the data set for the period of fiscal year 1975-2012. It has used ADF test to check the unit root of variable. Johansen co-integration test and error correction model (ECM) are used to check the long-run and short-run relationship between the variables respectively and Ganger Causality test is used to check the direction of causality among the variables. The finding of the research are Wagnerian hypothesis do not exists in Nepalese economy, there exists both short-run and long-run relationship between government spending and economic growth in Nepal and Granger causality test shows that Government Spending Granger Causes economic growth but economic growth does not Granger causes government spending.

Adhikari (2017) analysed on the capital expenditure in Nepal with the objectives to examine the trend and pattern of capital expenditure in Nepal and to explore the causes of low capital expenditure in Nepal by using the data set for the period of the from1991/92 to 2013/14. The study conducted in descriptive research design. The conclusions of the study are there is series of unusual trend in public expenditure. Both recurrent and capital expenditure are increasing but growth rate of recurrent expenditure is much higher than capital expenditure, government expenses much more resources on unproductive and recurrent type of expenditure which hassle to vitalize the economy. Due to which the nation is facing the problems of unemployment, poverty, low economic growth.

2.4 Research Gap

The international review of the existing empirical literature on relationship between public capital expenditure and economic growth by Cheng and Lai (1997), Bose, Haque and Osborn (2003), Dandan (2011), by Modebe, Okafor , Onwumere and Ibe (2012), Aigheyisi (2013), Bojanic (2013), Gangal and Gupta (2013), Kapunda and Topera (2013), Okoro (2013), Sghari and Hammami (2013), Srinivasan (2013), Chipaumire, Ngirande, Method and Ruswa (2014), Darma (2014), Lahirushan and Gunasekara (2015), Mat, Mansur and Mahmud (2015), Suanin (2015), Chandio, Jiang, Rehman and Jingdong (2016), and Mladenovic, Cvetanovic and Mladenovic (2016) shows the share of government capital expenditure in GDP is positively and significantly correlated with economic growth, but recurrent expenditure is insignificant.

In Nepalese context Basyal (1994) carried out a research about the growth of development expenditure of Nepal in different period and its financing and showed during the fifth, sixth and seventh plan periods foreign loan and grants financed the total development expenditure of extent of 47.3, 48.1 and 59.5 percent respectively. Sharma (2012) do also proved positive relation between government expenditure and economic growth. Likewise Bhusal (2014) finds Wagnerian hypothesis do not exists in Nepalese economy, there exists both short-run and long-run relationship between government spending and economic growth in Nepal and Granger causality test shows that Government Spending Granger Causes economic growth but economic growth does not Granger causes government spending. And Sapkota (2013) and Adhikari (2017) only analyse on capital expenditure in Nepal. Since study is not done more on this topic ,there exists dillema of whether capital expenditure has impact on growth. So, this research tries to explore the short run and long run relationship between capital expenditure and economic growth in Nepal, taking GDP as dependent variable and capital expenditure as independent variable by applying econometric techniques on the annual time series dataset covering the time period from 1975 to 2016.

CHAPTER-III

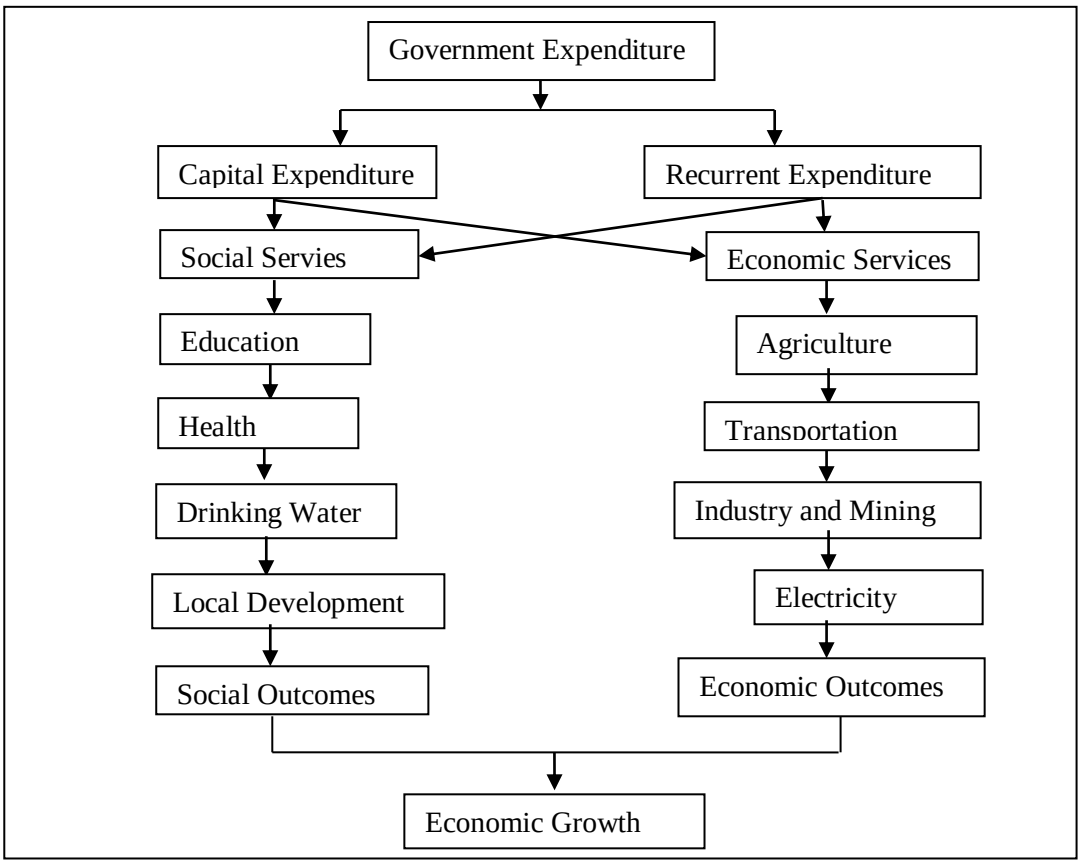
RESEARCH METHODOLOGY

This chapter contains the extensive discussion on the methodology used in this study. Research framework, research design, sources of data, explanation of variables, tools of data analysis and model specifications are the major headings in this chapter.

3.1 Research Framework

Government spending as a fiscal instrument serves useful roles in the process of controlling inflation, unemployment, depression, balance of payment equilibrium and foreign exchange rate stability. In the period of depression and unemployment, government spending causes aggregate demand to rise and production and supply of goods and services follow the same direction. As a result, the increases in the supply of goods and services couple with a rise in the aggregate demand exalt a downward pressure on unemployment and depression (Taiwo & Taiwo, 2011).

Figure 3.1: Framework for Government Capital Expenditure and Economic Growth



Source: Keynesian Macro Economic Theory

3.2 Research Design

The main objective of the study is to find the relationship between government capital expenditure and economic growth in Nepal. In order to achieve the given objective different techniques are adopted. The methods adopted include quantitative and qualitative techniques. Under qualitative techniques we have observed the nature and trend of variables through graphical and tabular presentation. For quantitative analysis we have done descriptive analysis, unit root testing of variable, Johansen cointegration test and Vector Error Correction Model etc.

3.3 Sources of Data

In the entire study, to fulfil the objective of the research, data and information are gathered from secondary sources. Data published by Nepal Rastra Bank, Central Bureau of Statistics and Ministry of Finance is taken under consideration in the study ranging the period of 1975 to 2016. The necessity to take these data is nature of study i.e. econometric time series method is adopted to study the prescribed relationship. So to fulfil the objectives time series data of GDP, government capital expenditure, gross fixed capital formation, gross national saving, government revenue and terms of trade (TOT) are taken. GDP is taken from Nepal Rastra Bank, government capital expenditure, gross fixed capital formation, gross national saving, and government revenue are taken from various economic survey published. And the data of terms of trade is calculated own self from the data of exports and imports published by Ministry of Finance.

3.4 Explanation of Variables

In this study, for both quantitative and qualitative purpose various variables have been used that are explained as

Government Capital Expenditure (GCE): Capital expenditure is an amount spent by the government of the nation to acquire or improve a long term assets such as equipments, buildings, infrastructures etc. It is taken from various economic surveys published by Ministry of Finance (MoF).

Gross Domestic Product (GDP): GDP is the final monetary value of the goods and services produced within the geographic boundaries of a country during a specified

period of time, normally a year. It is taken out from the current macroeconomic indicator produced by Nepal Rastra Bank.

Terms of Trade (TOT): TOT is the ratio of an index of a country's exports prices to an index of its imports prices. It can be interpreted as the amount of import goods an economy can purchase per unit of export goods. It is calculated by the following formula:

$$TOT = \frac{Index\ of\ Export\ Prices\ (P_{x)}}{Index\ of\ Import\ Prices\ (P_{m)}} X\ 100$$

P_x and $P_m$can be calculated from the following formula:

$$P_x = \frac{Current\ Year\ Export}{Base\ Year\ Export}$$

$$P_m = \frac{Current\ Year\ Import}{Base\ Year\ Import}$$

Ratio of Capital Expenditure to GDP (CE_GDP): Capital expenditure to GDP ratio is the ratio of the capital expenditure to the GDP. It is calculated by the following formula

$$\text{CE\_GDP} = \frac{\text{Capital Expenditure}}{\text{GDP}}$$

Ratio of Capital Expenditure to Government Revenue (CE_GR): Capital expenditure to government revenue ratio is the ratio of capital expenditure to the government revenue. It is calculated by the following formula

$$\text{CE\_GR} = \frac{\text{Capital Expenditure}}{\text{Government Revenue}}$$

Gross Fixed Capital Formation (GFCF): GFCF refers to the net increase in physical assets (investment minus disposals) within the measurement period. It does not account for the consumption (depreciation) of fixed capital and also does not include land purchases. It includes land improvements; plant, machinery, equipment purchase; and the construction of roads, railways and commercial and industrial buildings. It is a component of expenditure approach to calculating GDP. It is taken from various economic surveys published by Ministry of Finance (MoF).

Gross National Saving (GNS): GNS is derived by deducting final consumption expenditure from gross national disposable income, and consists of personal saving,

plus business saving, plus government saving, but excluding foreign saving. It is taken from various economic surveys published by Ministry of Finance (MoF).

3.5 Tools of Data Analysis

To study the relationship between Government Capital Expenditure and economic growth in Nepal, only secondary time series data set has been used, which are published by Ministry of Finance, Government of Nepal, Central Bank of Nepal i.e. Nepal Rastra Bank. This study relies on the time series data collected from 1975 to 2016. Before starting time series analysis it is necessary to check whether the data is stationary or not. The data that are not stationary it cannot be used for further analysis and the result thus came can be spurious. Among the various test of unit root Augmented Dickey-Fuller (ADF) test is used in our study.

After checking the stationarity of each variables then it is necessary to find the cointegration of variables. To test cointegration, Engle-Granger cointegration, Johansen cointegration, methods of cointegration are used. Since we have considered more than one independent variable and all the variable thus considered are on first differences so Johansen method of Cointegration and Vector Error Correction Model (VECM) is used for further analysis. VECM is adopted due to presence of cointegration among the variables. VECM will evaluate the statistical significance of the variables considered as well as short run causality among the variables. To compute the long run causality Granger Causality is used. In order do diagnostic test of variable test like LM serial correlation, Heteroskedasticity, CUSUM and CUSUMSQ test were used.

3.5.1 Unit Root Test

Any sequence that contains one or more characteristic roots that are equal to one is called a unit root process. A unit root test tests whether a time series variable is non-stationary. A time series is said to be stationary if its mean and variance are constant over time and the value of the covariance between the two-time periods depends only on the distance or gap or lag between the two-time periods and not the actual time at which the covariance is computed. If the time series data is not stationary there is the

problem of spurious regression. In order to avoid spurious results in dealing with time series, it is necessary to test formally for the presence of a unit root for each variable.

3.5.1.1. Augmented Dickey Fuller (ADF) Test

There are various methods of testing the unit root in the time series data. This paper uses ADF test for the purpose. The ADF is better approach to check whether the time series data sets are stationary or not because of its robustness and the capacity to remove auto correlation from the model.

In case of ADF Test, there may create a problem of autocorrelation. To tackle autocorrelation problem, Dickey Fuller have developed a test called Augmented Dickey Fuller Test.

We have three Dickey Fuller Models:

$$\Delta Y_t = \alpha + \gamma Y_{y-1} + a_i + e_t \dots\dots\dots\dots\dots\dots\dots\dots (1)$$

$$\Delta Y_t = \alpha + \beta_t + \gamma Y_{y-1} + a_i + e_t \dots\dots\dots\dots\dots\dots (2)$$

$$\Delta Y_t = \gamma Y_{y-1} + a_i + e_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3)$$

First model equation (1) has intercept only, second model equation (2) have both trend and intercept and third model equation (3) has no trend and no intercept.

These entire three models come to same decision all the time whether our variable y has unit root or not. To check, we set the following hypothesis:

Null Hypothesis (H_0): Variable y is not stationary or got unit root.

Alternative Hypothesis (H_1): Variable Y is stationary or doesn't have unit root.

To make the variable stationary, we should go for first differencing.

The following equations (4) and (5) the series of interest is Z_t. The symbol Δ indicates the first difference of the series Z_t, t in equation (2) is a time trend, and j is the number of lagged variables that are used to ensure the error term e is white noise. The optimal number of lags can be determined by various ways, for the purpose of this paper it is found by using the Akaike Information Criterion (AIC) for the significance of the estimated coefficients of these lagged variables.

$$\Delta Z_t = \alpha_1 + \pi_1 Z_{t-1} + \sum_{i=1}^{j} c_{1i}\ \Delta Z_{t-i} + e_{1t} \dots\dots\dots\dots\dots\dots\dots\dots\dots (4)$$

$$\Delta Z_t = \alpha_2 + \pi_2 Z_{t-1} + \beta t + \sum_{i=1}^{j} c_{2i}\ \Delta Z_{t-i} + e_{2t} \dots\dots\dots\dots\dots\dots\dots (5)$$

Where, j is the number of lags. The ADF techniques tests the null hypothesis $\pi_i = 0$, against the alternative hypothesis $\pi_i < 0$. Rejection of the null hypothesis is an indication that the series Z_t is stationary. In equation (1) the alternative hypothesis indicates the series is a mean-stationary and in equation (2) it indicates the series is a trend stationary.

3.5.2. Cointegration Test

Cointegration is an econometric concept which mimics the existence of a long-run equilibrium among economic time series. If two or more series are themselves nonstationary, but a linear combination of them is stationary, then they are said to be cointegrated (Wei, 2006).

Once variable have been classified as integrated of order I(0), I(1), I(2) etc. is possible to set up models that lead to stationary relations among the variables, and where standard inference is possible. The necessary criterion for stationarity among non-stationary variables is called cointegration. Testing for cointegration is necessary step to check our modelling empirically meaningful relationships. If variables have different trends processes, they cannot stay in fixed long-run relation to each other, implying that you cannot model the long-run, and there is usually no valid base for inference based on standard distributions. If you do no not find cointegration it is necessary to continue to work with variables in differences instead (Bo Sjo, 2008).

3.5.2.1 The Johansen Test of Cointegration

The superior test for cointegration is Johansen's test. This is a test which has all desirable statistical properties. The weakness of the test is that it relies on asymptotic properties, and is therefore sensitive to specification errors in limited samples. In the end some judgement in combination with economic and statistical model building is unavoidable.

The empirical VAR is formulated with lags and dummy variables so that the residuals become a white noise process. The demand for a well-specified model is higher than

for an ARIMA model. Here we do test for all components in the residual process. The reason behind that, the critical values are determined conditionally on a normal distribution of the residual process. Typically, we assume that the system is integrated of order one. If there are signs of I(2) variables, we will transform them to I(1) before setting up the VAR. By using the difference operator $\Delta = 1 - L$, or $L = 1 - \Delta$, the VAR in levels can be transformed to a vector error correction model (VECM),

$$\Delta X_t = \beta_i \Delta X_{t-1} + \cdots + \beta_{k-1} \Delta X_{t-k-1} + IIX_{t-1} + \mu_0 + \varphi D_t + \varepsilon_t \ldots \ldots (6)$$

Where, the β_i: s and Π are matrixes of variables. The lag length in the VAR is k lags on each variable. After transforming the model, using $L = 1 - \Delta$, we 'lose' on lag at the end, leading to $k - 1$ lags in the VECM. In a more compact for the VECM becomes;

$$\Delta X_t = \sum_{i=1}^{k-1} \beta\, i \Delta X_{t-i} + \cdots + \prod X_{t-1} + \mu_0 + \varphi D_t + \varepsilon_t \ldots \ldots \quad \ldots \ldots \ldots (7)$$

The number of cointegrating vectors is identical to the number of stationary relationships in the Π-matrix. If there is no cointegration, all rows in Π must be filled with zeros. If there are stationary combinations, or stationary variables, in Π then some parameters in the matrix will be non-zero. There is a simple mathematical technique for answering the problem raised here. The rank of Π matrix determines the number independent rows in Π, and therefore also the number of cointegrating vectors. The rank of Π is given by the number of significant Eigen values found in $\widehat{\Pi}$. Each significant Eigen value represents a stationary relation. Under the null hypothesis of $\{x\}t \sim I(d)$, with $d > 1$, the test statistic for determining the significance of the Eigen values is non-standard, and must be simulated.

Originally, Johansen derived two tests, i.e. Maximum Eigen Value Test and Trace Test.

3.5.3 Maximum Eigen Value Test

The Maximum Eigen Value Test examines whether the largest eigenvalue is zero relative to the alternative that the next largest eigenvalue is zero. The first test examines if the rank of the matrix Π is zero. The null hypothesis is that rank (Π) = 0 being alternative hypothesis is that rank (Π) = 1. For further tests, the null hypothesis

is that rank (Π) = 1, 2... Being alternative hypothesis is that rank (Π) = 2, 3, If the rank of the matrix is zero then the largest eigenvalue is zero which states that there is no cointegration and tests are done. If the largest eigenvalue C is nonzero, the rank of the matrix is at least one and there might be more cointegrating vectors and so on. The test of the maximum eigenvalue is a likelihood ratio test. The Maximum Eigen Value Test is constructed as

$$\lambda_{\max\left[\mu_1(r-1)/\mu_{1(r)}\right]} = -T\log(1-\lambda_r) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (8)$$

For r = 0, 1, 2.., p − 2, p − 1. The null is that there exist r cointegrating vectors against the alternative of r + 1 vector.

3.5.4 Trace Test

The Trace Test is a test whether the rank of the matrix Π is r_0. The null hypothesis is that rank (Π) = r_0. The alternative hypothesis is that r_0< Π ≤ n, where n shows the maximum number of cointegrating vectors that is possible. The trace test is constructed as

$$\lambda_{\text{trace}\left[\mu_1(r)/\mu_0\right]} = -T\sum_{i=r+1}^{p}\log(1-\lambda_r) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (9)$$

Where the null hypothesis is λi = 0, so only the first r eigen values are non-zero. It has been found that the trace test is the better test, since it appears to be more robust to skewness and excess kurtosis. Therefore, make your decision on the basis of the trace test. Furthermore, the trace test can be adjusted for degrees of freedom, which can be of importance in small samples. Reimers (1992) suggests replacing T in the trace statistics by T − nk.

3.5.5 Vector Error Correction Model (VECM)

VECM offers a possibility to apply Vector Autoregressive Model (VAR) to integrated multivariate time series. There are some problems in applying a VAR to integrated time series, the most important of which is the so called spurious regression (t-statistics are highly significant and R^2 is high although there is no relation between the variables).

The process of estimating the VECM consists roughly of the three following steps, the confusing one of which is for me the first one:

i. Specification and estimation of a VAR model for the integrated multivariate time series,
ii. Calculate likelihood ratio tests to determine the number of cointegration relations,
iii. After determining the number of cointegrations, estimate the VECM.

In the first step one estimates a VAR model with appropriate number of lags (using the usual goodness of fit criteria) and then checks if the residuals correspond to the model assumptions, namely the absence of serial correlation and heteroscedasticity and that the residuals are normally distributed.

3.5.6. Recursive Residuals, CUSUM Test and CUSUMSQ Test

Recursive residuals can be used both to test for non-linearity and to test for structural change. Kennedy provides a simple explanation of the use of recursive residuals to test for non-linearity based on the concept of the U-shaped that suggest that there is a structural change. To test a structural stability of the model there are different tests based on recursive residuals. The two most important are the CUSUM and the CUSUM-OF-SQUARES, with the data ordered chronologically, rather than according to the value of an explanatory variable.

3.5.6.1. CUSUM Test

The CUSUM test is based on a plot of the sum of the recursive residuals. If this sum goes outside a critical bound, one concludes that there was a structural break at the point at which the sum began its movement toward the bound. The CUSUM test is based on the cumulated sum of the residuals:

$$W_t = \sum_{j=k+1}^{t} \frac{W_t}{\hat{\sigma}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (10)$$

With

$$\partial^2 = \frac{\sum_{j=k+1}^{T} (Wt - \bar{W})^2}{T-k-1} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (11)$$

And

$$\bar{W} = \frac{\sum_{j=k+1}^{T} W_t}{T-k} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (12)$$

Where k is the minimum sample size for which we can fit the model.

3.5.6.2 CUSUM-OF-SQUARES Test

The CUSUM-OF-SQUARES test is similar to the cusum test, but plots the cumulative sum of squared recursive residuals, expressed as a fraction of these squared residuals summed over all observations. CUSUMSQ the second test statistic, the CUSUMSQ, is based on cumulative sums of squared residuals:

$$S_t = \frac{\sum_{k+1}^{t} {W_j}^2}{\sum_{k+1}^{T} {W_j}^2} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (13)$$

With, t = k + 1, … , T

The expected value of St is

$$E(S_t) = \frac{t-k}{T-k} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (14)$$

which goes to zero at t = k. The significance of departures from the expected value line is assessed by reference to a pair of lines drown parallel to the E(St) line at a distance cs above and below. This value depends on both the sample size T − k and the significance level α. The CUSUM of Square test provides a plot of against and the pair of 5 percent critical lines. As with the CUSUM test, movement outside the critical lines suggests that parameter of variance of instable.

3.5.7. Granger Causality Test

Granger causality is a statistical concept of causality that is based on prediction. According to Granger causality, if a signal X_1 "Granger-causes" a signal X_2, then past values of X_1 should contain information that helps predict X_2 above and beyond the information contained in past values of X_2 alone. Its mathematical formulation is based on linear regression modelling of stochastic processes (Granger 1969).

Granger causality is normally tested in the context of linear regression models. For illustration, consider a bivariate linear autoregressive model of two variables X_1 and X_2:

$$X_1(t) = \sum_{i=1}^{k} A_{11}\,, iX_1(t-i) + \sum_{i=1}^{k} A_{12}\,, iX_2(t-i) + \varepsilon_1(t) \dots\dots\dots\dots\dots (15)$$

$$X_2(t) = \sum_{i=1}^{k} A_{21}\,, iX_1(t-i) + \sum_{i=1}^{k} A_{22}\,, iX_2(t-i) + \varepsilon_2(t) \dots\dots\dots\dots\dots (16)$$

Where k is the maximum number of lagged observations included in the model

The matrix A contains the coefficients of the model (i.e., the contributions of each lagged observation to the predicted values of $X_1(t)$ and $X_2(t)$, and ε_1 and ε_2 are residuals (prediction errors) for each time series. If the variance of ε_1 (or ε_2) is

reduced by the inclusion of the X_2 (or X_1) terms in the first (or second) equation, then it is said that X_2 (or X_1) Granger causes X_1 (or X_2). In other words, X_2 Granger causes X_1 if the coefficients in A_{12} are jointly significantly different from zero.

This can be tested by performing an F-test of the null hypothesis that $A_{12} = 0$, given assumptions of covariance stationarity on X_1 and X_2 . The magnitude of a Granger causality interaction can be estimated by the logarithm of the corresponding F-statistic (Geweke 1982). Note that model selection criteria, such as the Bayesian Information Criterion (BIC, (Schwartz 1978)) or the Akaike Information Criterion (AIC, (Akaike 1974)), can be used to determine the appropriate model order *k*.

3.5.8. Serial Correlation LM Test

The lag correlation of the residual series is called serial correlation. The null hypothesis of the serial correlation LM test is that there is no serial autocorrelation. The alternative hypothesis is there is serial autocorrelation in the model. The residual series of the VECM model should not contain serial autocorrelation for the model to be valid.

3.5.9. Heteroskedasticity Test

One of the important properties of OLS method is that the variance of the random term is constant. If this property is violated, then it is called heteroskedasticity. It means that heteroskedasticity exists when values of variance of the random term are different for different observations. The null hypothesis of the heteroskedasticity test is that there is no heteroskedasticity in the residual series of VECM model. The alternative hypothesis is there is heteroskedasticity in the model. If the residual series of the VECM have no heteroskedasticity, then the model is considered better.

3.5.10. Normality Test

The null hypothesis of the test is that the residual series of VECM model is normally distributed. If the residual series of the VECM are normality distributed, then the model is considered better. In this study, the Jarque-Berra (JB) test is performed to check whether the residual series are normality distributed. If Jarque-Berra is greater than probability then ,series is normally distribted.

3.6. Specification of Model

Model is specified based on the various dependent and independent variables since the economic literature and some of the econometric tools. Econometric tools will be discussed on the model selection criteria and economic variables will be discussed in the relationship between government capital expenditure and economic growth.

3.6.1 Model selection Criteria

Model selection criteria are used to choose a model from the alternative models. This research used adjusted R^2 criterion. It can be calculated as:

$$\bar{R}^2 = 1 - \frac{RSS/n-k}{TSS/n-1}$$

Where,

RSS= residual sum of square

TSS= total sum of square.

n= number of observations

k= number of parameters in regression model on the basis of this method a model with highest $\bar{R}^2$ is chosen.

3.6.2 Relationship Between Capital Expenditure and Economic Growth

The general objective of the research is to find out the relationship between government capital expenditure and economic growth in Nepal. Since, there exists other variables too that determine the economic growth of the country. For this thesis, it has used gross fixed capital formation, gross national saving, government revenue and terms of trade as the control variables. So, the general model that shows the relationship between the government capital expenditure and economic growth can be written as

$$GDP_t = \alpha + \beta_1 GCE_t + \beta_2 GFCF_t + \beta_3 GNS_t + \beta_4 GR_t + \beta_5 TOT_t + \varepsilon_t \dots\dots\dots\dots (17)$$

Where;

GDP_t = Gross Domestic Product

GCE_t = Government Capital Expenditure

$GFCF_t$ = Gross Fixed Capital Formation

GNS_t = Gross National Saving

GR_t = Government Revenue

TOT_t =Terms of Trade

α, β_1, β_2, β_3, β_4, β_5 =Parameters to be estimated

t = time period

ε_t= Stochastic Error Term

Since, the unit of the variables in the equation (17) are not same. So, it is necessary to take logarithm. It can be written in the logarithm form as

$$\log GDP_t = \alpha + \beta_1 \log GCE_t + \beta_2 \log GFCF_t + \beta_3 \log GNS_t + \beta_4 \log GR_t + \beta_5 \log TOT_t + \varepsilon_t \ldots\ldots\ldots \quad (18)$$

Where;

$\log GDP_t$ =Log of GDP

$\log GCE_t$ =Log of Government Capital Expenditure

$\log GFCF_t$ =Log of Gross Fixed Capital Formation

$\log GNS_t$ =Log of Gross National Saving

$\log GR_t$ =Log of Government Revenue

$\log TOT_t$ =Log of Terms of Trade

α, β_1, β_2, β_3, β_4, β_5 =Parameters to be estimated

t =time period to be estimated

ε_t =Stochastic Error Term

3.6.3. Causal Relationship between Capital Expenditure and Economic Growth

The third objective of the research is to find out the causal relationship between the government capital expenditure and economic growth in Nepal. By using Granger Causality approach, the basic model applied for this purpose can be written as:

$$RGDP = \alpha + \sum_i^n \beta_i RGCE_{t-i} + \sum_j^k \gamma_j RGDP_{t-j} + \mu_{i1} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (19)$$

And,

$$RGCE = \varphi + \sum_i^n \delta_i RGCE_{t-i} + \sum_j^k \theta_i RGDP_{t-j} + \mu_{i2} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (20)$$

Where, n is the lag length.

Hypothesis:

The following hypothesis has been tested to find the direction of causality among the variables. First hypothesis for Granger Causality test:

Null Hypothesis (H_0): If all $\beta_i = 0$ RGCE does not have effect on the RGDP.

Alternative Hypothesis (H_1): If at least $\beta_i \neq 0$ RGCE has effect on the RGDP.

Second hypothesis for Granger Causality Test:

Null Hypothesis (H_0): If all $\theta_i = 0$ RGDP does not have effect on the RGDP.

Alternative Hypothesis (H_1): If at least $\theta_i \neq 0$ RGDP does not has effect on the RGDP.

CHAPTER- IV
PRESENTATION AND ANALYSIS OF DATA

4.1. Nature and Trend of Capital Expenditure and GDP

The nature and trend of government capital expenditure and GDP in Nepal are analysing by descriptive way. The descriptive analyse is mainly based upon the different volume of economic survey published by Ministry of Finance and various publication of Nepal Restra Bank. For public capital expenditure and GDP has been adjusted by consumer price index (CPI) and GDP deflator respectively.

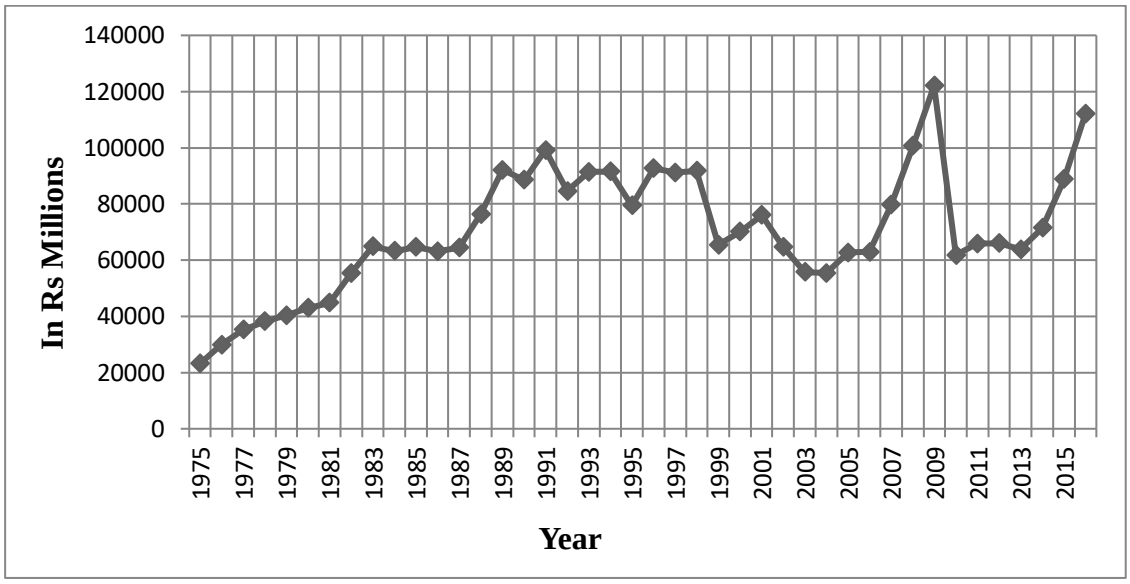
4.1.1. Trend and Nature of Capital Expenditure

Over the past four decades, government capital expenditures in 42 years from 1975 to 2016 consider in this study experiences an erratic pattern. The public capital expenditure has been increasing during the study but it is decreased in eleven fiscal years i.e. in 1986, 1990, 1992, 1995, 1997, 1999, 2002, 2003, 2004, 2010 and 2013. The public capital expenditures are an essential input in the short-run and long-run effects in an economy. The impact of government capital expenditures on growth of economy in short-run is negative. In the short-run, public capital expenditures reduce private investment and thus hamper growth. But the impact of the public capital expenditures in the long-run is positive because government invests in the projects where social returns are higher than private returns when such project is financed by private parties. Increases in government capital expenditures are beneficial for economic growth. The increasing trend of the government capital expenditure can be seen in the following Figure 4.1.

In the Figure 4.1, it can be seen the erratic trend of Real Government Capital Expenditure (RGCE) in the country. RGCE were increasing still in 1985 from the beginning but RGCE were decreased in 1986 in first time over the study period. In the entire period of the study, RGCE were decreased eleven times. In 2008, Nepal has successfully completed the first constitutional assembly election. In 2009, Nepal has made a historic new turn. The end of the era of feudal monarchy has been matched with the beginning of that of federal democratic republic in the country. New elected government has allocated big amount of money for development of the nation as the

capital expenditure with the higher economic and social development. So the RGCE has reached in top point in the entire study period.

Figure 4.1: Trend and Nature of Capital Expenditure in Real Term

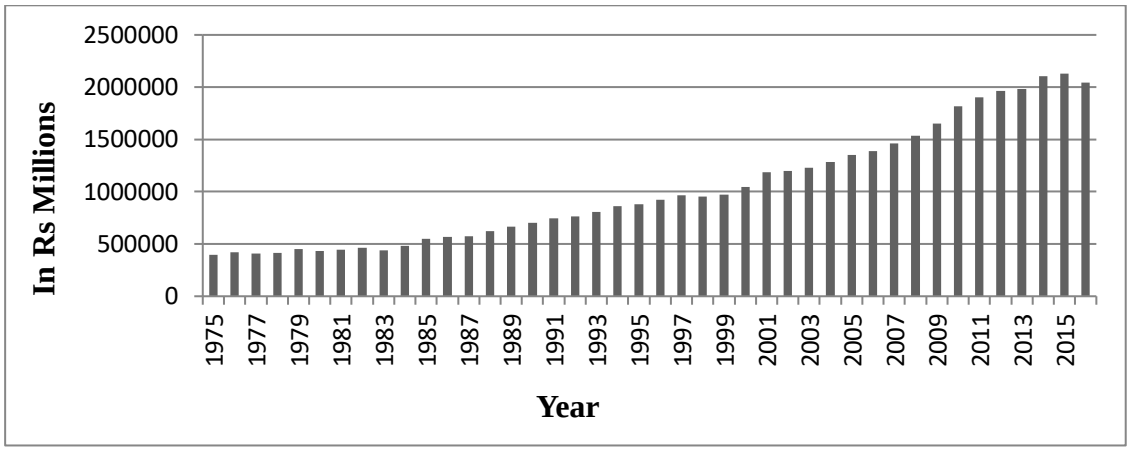


Source: Researcher's calculation

4.1.2. Trend and Nature of Real GDP

GDP of Nepalese economy has been steadily growing over the entire study period. But in case of real GDP, it decreased in the five fiscal years i.e. 1977, 1980, 1983, 1998 and 2016. In the year, real GDP is decreased because there was people and students movement. There were a series of protests amongst the student community in the country. The clashes that occurred had a significant historical impact, as they forced the monarchy to concede to holding a referendum on the possibility of a multi party system in the country. On the other hand, it is increasing over the study period. Because, on the span of time there was development of lots of things such as; electricity, ability of new and advance technology in the international market, access of road, drinking water in rural areas etc. and improvement in the education, health conditions of the people, and also the improvement in the Human Development Index (HDI). There is also positive improvement in social indicators of development, which impact is the effect of increase in real GDP over the period of time. The nature and trends of economic growth is can be traced in Figure 4.2.

Figure 4.2: Trend and Nature of Real GDP



Source: Researcher's calculation

In the above Figure 4.2, we can see the growing trend of Real GDP. Beside the fiscal years 1977, 1980, 1983, 1998 and 2016 there is increase in Real GDP, this is because of the development of lots of things such as; electricity, ability of new and advance technology in the international market, access of road, drinking water in rural areas etc. and improvement in the education, health conditions of the people, and also the improvement in the HDI.

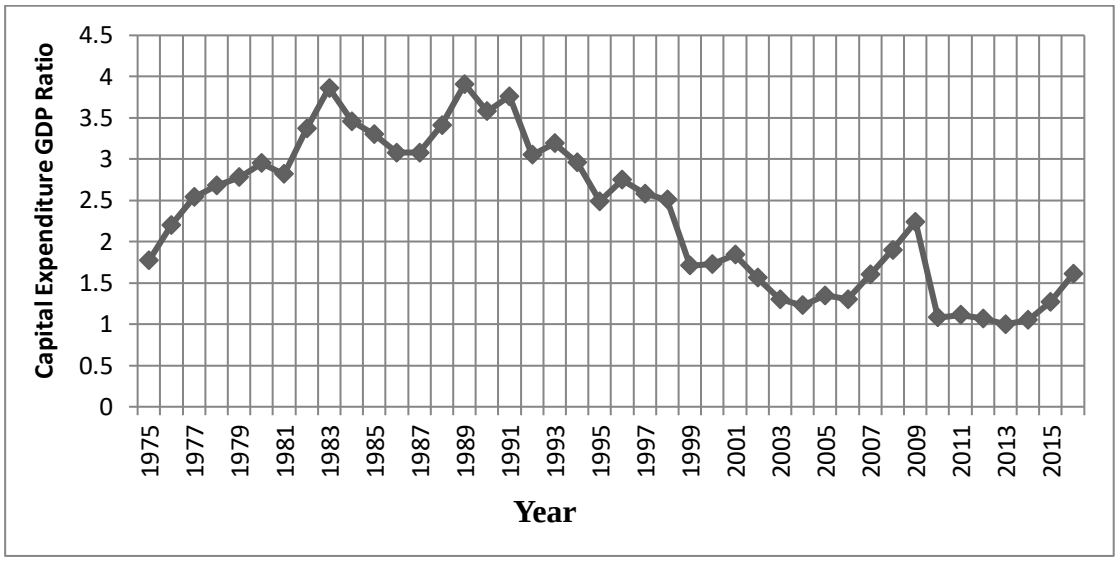
4.1.3. Trend of Capital Expenditure to GDP Ratio (CE_GDPR)

Ratio of government capital expenditure to GDP has an increasing trend over the time but it was fluctuating in some period of the times. It had increased from 1975 to 1981, it had fluctuated between the 1988 and 2013 and it was started to increase from 2014. The trend of ratio of government capital expenditure to GDP is presented in Figure 4.3.

Figure 4.3 shows that the ratio of government capital expenditure and RGDP is fluctuating over the period of time but it continuously increases until 1980 and again start to fluctuating and decreasing the period from 1990 to until 2014 and finally started to increase from 2014 because of in this decade Nepal adopts the economic liberalization policy and there was also Nepalese civil war between the Communist Party of Nepal (Maoist) and Government of Nepal. In that time lots of the government expenditure were spent on the war and only recurrent expenditure. The ratio of government capital expenditure to RGDP was 1.77 in 1976 and 1.61 in 2016. The fluctuating and decreasing trend of ratio of government capital expenditure to GDP is

due to the unstable political and economic environment of Nepal. More and more government expenditure were not spent in development functions.

Figure 4.3: Trend of Ratio of Government Capital Expenditure to GDP



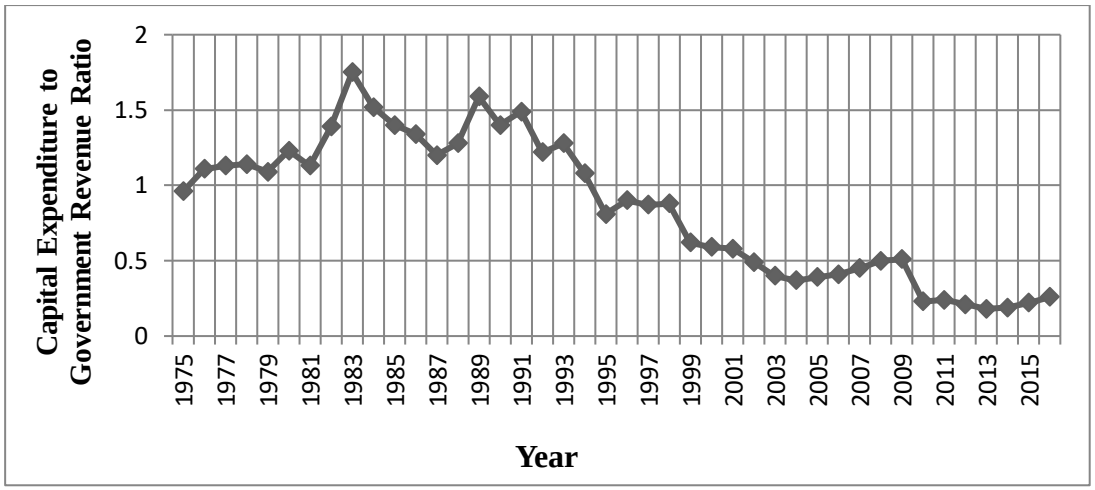
Source: Researcher's calculation

4.1.4. Trend of Capital Expenditure to Government Revenue Ratio (CE_GRR)

Ratio of government capital expenditure to government revenue was decreasing over the period of time. In the beginning it is increasing until in 1978. In the second stage it was decreased from 1983 to 1987. In the third stage it was fluctuated for almost one and half decade and decreased thereafter. This is because government has increased its capacity to collect government revenue faster than its capital expenditure. Government has increased its capacity to collect tax by the increase in the tax base and tax rate in the different time period. The trend of government capital expenditure to government revenue is presented in Figure 4.4.

Figure 4.4 shows that there were fluctuating and decreasing trend of the ratio of capital expenditure to government revenue (CE_GRR) in over of the period. In initial stage from 1975 to 1978, there was increasing trend of CE_GRR; after this in two years 1979 and 198 it was decreased. At that stage, it was fluctuating and decreasing due to the political and other circumstances of the country, but the method and system of revenue collection at that time hadn't been advanced and the most of the sources of the revenue had not identified.

Figure 4.4 Trend of Capital Expenditure to Government Revenue Ratio



Source: Researcher's calculation

CE_GRR has increased from 2012 to 2016. Due to the unfavourable political environment, unstable government and the weak policy economic activities cannot take place in the country.

4.1.5 Trend and Nature of Capital Expenditure in Different Political Regime

Trend and nature of government capital expenditure in different political period of time is also analyzed here. The real government capital expenditure has been increasing from the Panchayat to democracy and from democracy to republic regime. Similarly, the real government revenue has been also increasing from Panchayat to democracy and from democracy to republic system. But, the ratio of total real government capital expenditure to RGDP was decreasing from Panchayat to democracy and from democracy to republic system. On the same way, the ratio of government capital expenditure to the government revenue has been decreasing from Panchayat to democracy and from democracy to republic. This can be shown in Table 4.1.

Table 4.1: Trend of public expenditure (Average in Panchayat, Democracy and Republican system)

Regime	RGCE (In Millions)	RGDP (In Millions)	RGR (In Millions)	RGCE/RGDP	RGCE/RGR
Panchayat (1975-1991)	58030.38	18200.01	43545.68	3.1885	1.3326
Democracy (1992-2006)	75717.41	37941.65	115163.69	1.9956	0.6575
Republic (2007-2016)	83228.75	60694.36	305753.53	1.3713	0.2722

Source: Researcher's calculation

Table 4.1 shows the trend of public capital expenditure and ratio of RGCE to the RGDP and RGR for the period ranging 1975 to 2016 under the different system of the government that is exercised. For the Panchayat system data ranging from1975-1991 is taken similarly for the Democracy period of 1992-2006 is taken and for the republic period data from 2007-2016 is taken under consideration. GDP is changed into real and under the base of 2016; expenditure is adjusted with NCPI published by Nepal Rastra Bank as a base of 2016. All the values presented in the table reflect the average values over the period of each system of the government. The real values are given in the appendix. From the table, it is clear that average real government capital expenditure in democratic system is higher than that of Panchayat system and the real government capital expenditure in republican system is higher than that of democratic system. This is because in the democratic time, democratic government increases the number of the works such as; social services, providing the facilities of education, health, drinking water and local and infrastructure development in that period. Republican system was completed in 2017 and the country is reached in federal democratic republican system of governance. There are three layers of governments in federal democratic republican system of governance i.e. central, province and local. In republican system of government, government capital expenditure is higher than Panchayat and democratic system.

But, ratio of real government capital expenditure to real GDP is decreasing from Panchayat to democracy and from democracy to republican system. In the Panchayat period, there is more government expenditure were spent in development functions such as; roads, hydro powers, schools, hospitals etc and in that time the RGDP of the

country is also lower than other two system i.e. democratic and republican system. The ration of RGCE to RGDP in panchayat period was 3.1885, in democratic system was 1.9956 and in republican period was 1.3713. This shows that government capital expenditure to GDP ratio was decreasing over the period of time.

On the same way, the ratio of government capital expenditure to RGR is decreasing from panchayat system to democratic system and also from democratic system to republican system. This is happened due to the rate of growth of public revenue is higher than growth rate of government capital expenditure on all systems. Government has developed new tax bases and advanced the methods of tax collection. The ratio of RGCE to RGR in panchayat period is 1.3326, in democratic period is 0.6575 and in republican period is 0.2722. This shows that government capital expenditure to government revenue ratio was decreasing over the period of time.

4.1.6 Distribution of Capital Expenditure on Six Years Average

Table 4.2 shows that average of government capital expenditure is increasing in first four years average from 1975 to 1998. But, it is decreasing in fiscal year 1999-2004. Again it is increasing in fiscal year 2005-2010. But ultimately, again it is decreasing in fiscal year 2011-2016. In first six years average government capital expenditure is Rs. 34982.38 millions and last six years average government capital expenditure is Rs. 78014.87 millions. It is increasing from beginning to ending but it is fluctuating in middle of the period.

Table 4.2: Distribution of Government Capital Expenditure on Six Years Average

Fiscal Year	Average (Rs. In Millions)
1975-1980	34982.38
1981-1986	59349.87
1987-1992	84191.75
1993-1998	89668.58
1999-2004	64580.52
2005-2010	81639.57
2011-2016	78014.87

Source: Researcher's calculation

4.2. Relationship between Capital Expenditure and Economic Growth

The data of government capital expenditure and economic growth are the time series data. Thus, in order to checking the short run and long run relationship between the government capital expenditure and economic growth it is necessary to check order of integration of the variable. Before testing the stationary of the data, it is better to see the nature of the data. Nature of data is given in Figure 4.5.

Figure 4.5 shows the graphical representation of each time series variables that are used in the study in their common logarithm form i.e. log RGDP, log RGCE, log RGFCF, log RGNS, log RGR and log TOT. All variables except log TOT are in increasing trend. RGDP of the country is continuously increasing trend over the period of time. Real government capital expenditure is also in increasing trend with high degree of fluctuations. Log GRFCF, log GNS and log RGR are increasing with the low degree of fluctuations. But log TOT is decreasing with fluctuations. The figure only helps to show the general properties of time series data. Now, it is necessary to test the stationary of the data by using the econometric tools. In this study, ADF test is used to test the unit root of the data, i.e.; to test the stationary of the data.

Figure 4.5: Multiple Graphs of log RGDP, log RGCE, log RGFCF, log RGNS, log RGR and log TOT

Source: Researcher's calculation

4.2.1. Descriptive Statistics

The Table 4.3 shows the result of the descriptive statistics of all variables which is carried out before entering into the time series analysis.

Table: 4.3: Descriptive Statistics of All Variables

	log RGDP	log RGCE	log RGFCF	log TOT	log RGNS	log RGR
Mean	4.4914	4.8234	5.2378	-0.1253	5.2557	4.9753
Median	4.5153	4.8172	5.2785	-0.1069	5.1856	5.0046
Maximum	4.8433	5.0867	5.7751	0.1828	5.9838	5.6418
Minimum	4.1176	4.3651	4.7265	-0.6368	4.7380	4.3832
Standard Dev.	0.2312	0.1532	0.2998	0.1905	0.4087	0.3576
Skewness	-0.1241	-0.9194	-0.0038	-0.8773	0.4499	0.2265
Kurtosis	1.7256	3.8438	1.9218	3.2598	1.7229	1.9793
Jarque-Bera	2.9502	7.1636	2.0346	5.5058	4.2714	2.1823
Probability	0.2288	0.0278	0.3616	0.0637	0.1181	0.3358

Source: Researcher's Calculation

The data set contains the 42 year of observation starting 1975 to 2016. The descriptive statistics shows that the mean of log RGDP is 4.4914 with standard deviation of 0.2312 similarly the mean of log RGCE and log RGFCF is 4.8234 and 5.2378 with standard deviation of 0.1532 and 0.2998 respectively. The mean of log TOT is negative i.e. -0.1253 with positive standard deviation i.e. 0.1905. Finally, mean of log RGNS and log RGR are 5.2557 and 4.9753 respectively with standard deviation 0.4087 and 0.3576 respectively. The four variables i.e. log RGDP, log RGCE, log RGFCF and log TOT are leftward skewed and remaining two variables i.e. log RGNS and log RGR are rightward skewed. The two variables i.e. log RGCE and log TOT are normally distributed with the value of Kurtosis are higher than three and remaining four variables i.e. log RGDP, log RGR, log RGFCF and log RGNS are not normally distributed because their Kurtosis values are less than three.

4.2.2.1. Augmented Dickey Fuller Test of Integration

Unit root test of the variables has been done through ADF test. The result of the ADF test can be shown in the Table 4.4.

Table 4.4: Augmented Dickey Fuller (ADF) test to test Integration Order

Variables	Level		First Difference		Remarks
	Intercept	Intercept and Trend	Intercept	Intercept and Trend	
log RGDP	-0.7925 [0.8107]	-1.0169 [0.9304]	-5.8657* [0.0000]	-5.7923* [0.0001]	I(1)
log RGCE	-2.9609 [0.0472]	-2.9322 [0.1635]	-6.1075* [0.0000]	-6.0360* [0.0001]	I(1)
log RGR	0.5587 [0.9868]	-1.6640 [0.7491]	-6.1407* [0.0000]	-6.1996* [0.0000]	I(1)
log TOT	-0.5780 [0.8645]	-1.1090 [0.9151]	-5.5011* [0.0000]	-5.4867* [0.0003]	I(1)
log RGFCF	0.3294 [0.9770]	-3.4159 [0.0632]	-9.5339* [0.0000]	-9.4598* [0.0000]	I(1)
log RGNS	0.1329 [0.9645]	-1.9595 [0.6054]	-6.6318* [0.0000]	-6.7205* [0.0000]	I(1)

Source: Researcher's calculation

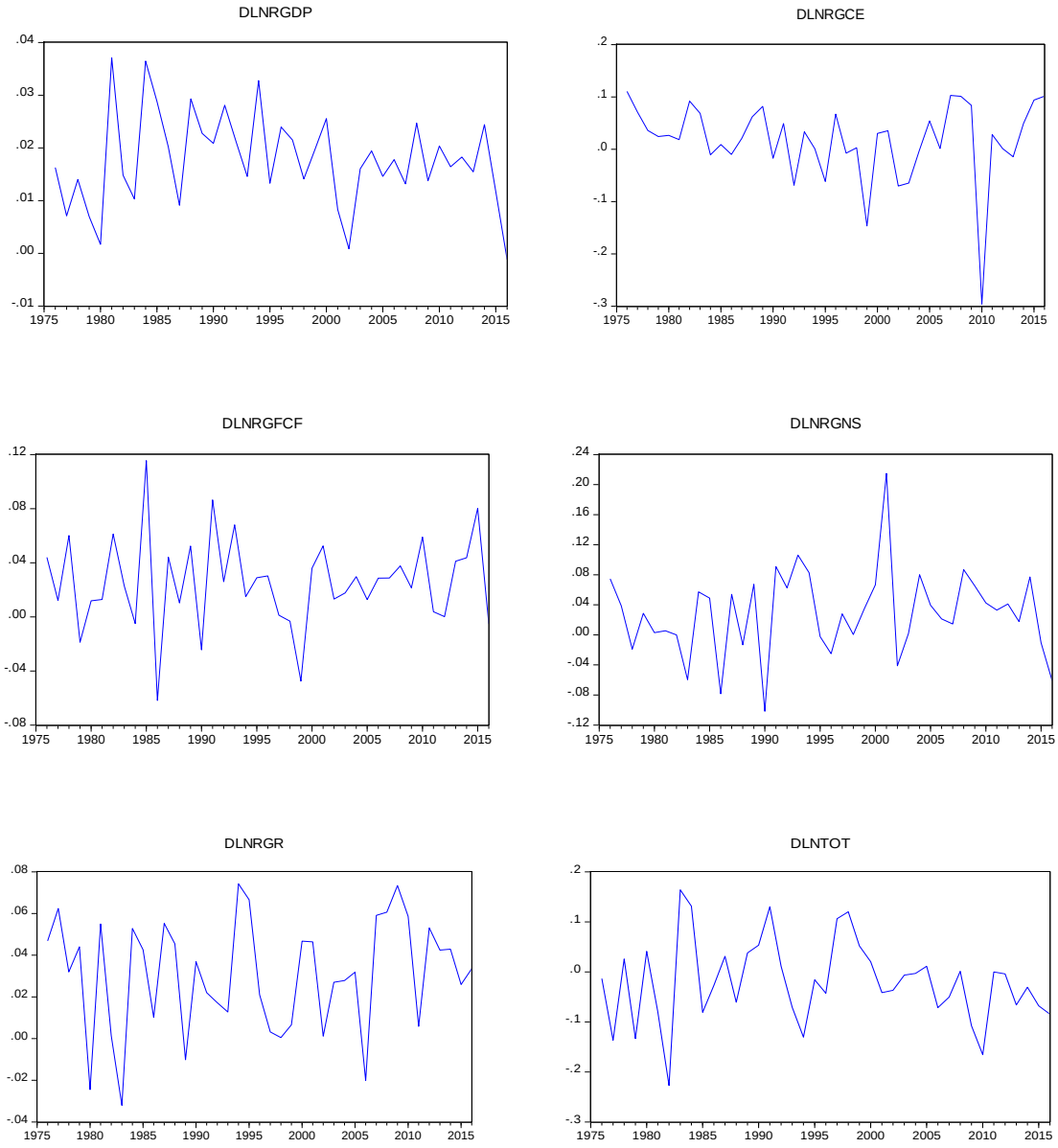
**Represents stationary.*

The Table 4.4 shows the result of the ADF t- statistics of the concerned variables that are used in the study. If each of the variables are found significant at their level then that variables are known as I (0), and if each of the given variables are found significant at their first difference then the variables are known as I (1). In the above table, all variables log RGDP, log RGCE, log RGR, log TOT, log RGFCF and log RGNS are found to be stationary at first difference. All the variables are significant at less than 5% level of significance. The graph of the variables that becomes stationary at first difference is given in Figure 4.6.

4.2.2.2. Differenced Data Graph

Different differed data of different variables LNRGDP, LNRGCE, LNRGCE, LNRGNS, LNRGR and LNTOT are presented in Figure 4.6. It seems that the first differences of logarithmic real variables are stationary.

Figure 4.6: Multiple Differenced Graphs of Variables



Source: Researcher's calculation

Accordingly, the figure 4.6 shows the trends of first difference of LNRGDP, LNRGCE, LNRGFCF, LNRGNS, LNRGR and LNTOT. It seems that the first differences of logarithmic real variables are stationary.

Table 4.5: The Ordinary Least Square Model

Variable	Coefficient	Std. Error	t-Statistic	Probability
C	0.575626	0.105216	5.470895	0.0000
log RGCE	0.010514	0.034240	0.307079	0.7606
log TGFCF	0.374866	0.081168	4.618399	0.0000
log RGNS	-0.076587	0.040152	-1.907441	0.0645
log RGR	0.467349	0.076404	6.116778	0.0000
log TOT	0.168596	0.018377	9.174200	0.0000
R-squared	0-995972	Mean dependent var.		4.491350
Adjusted R-squared	0.995298	S.D. dependent var.		0.231322
S.E. of regression	0.015861	Akaike info criterion		-5.318309
Sum squared residual	0.009057	Schwarz criterion		-5.070070
Log likelihood	117.6845	Hannan-Quinn criteria		-5.227320
F-statistic	1736.895	Durbin-Watson stat		1.260036
Probability(F-statistic)	0.00000			

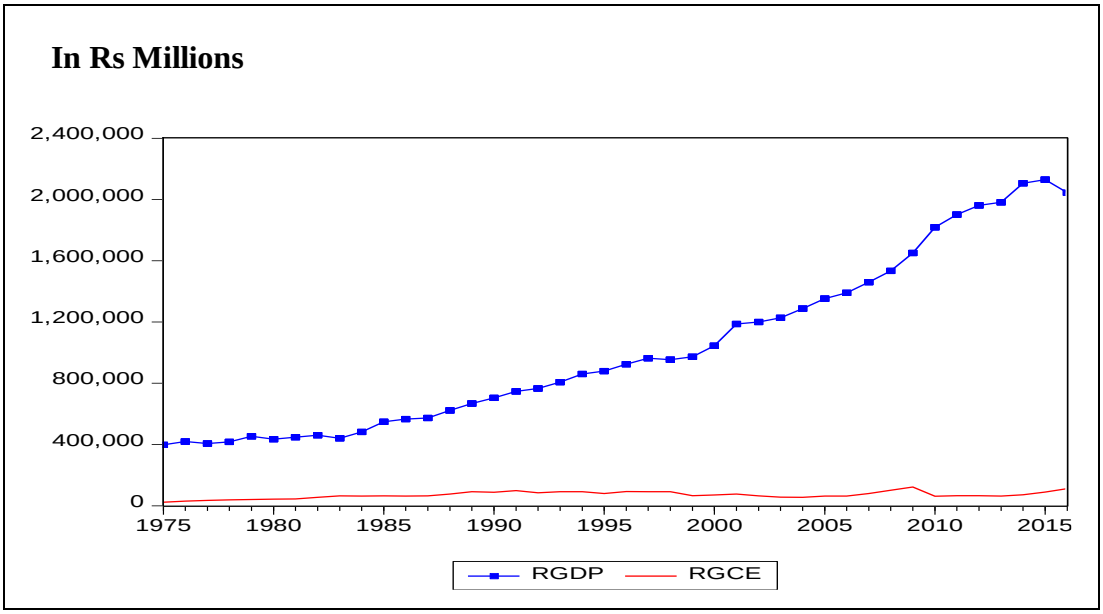
Source: Researcher's calculation using E-views

The result shows that there is positive and statistically significant relationship between real government capital expenditure, real gross fixed capital formation, real government revenue and terms of trade whereas there is insignificant or negative relationship between real gross national saving and Real GDP. The value of R-square is 99 percent which states 99 percent of the variations of GDP is explained by total variations in independent variables. But non-stationary of the variable biases the OLS estimation as well as the low value of Durbin Watson can be the sign of spurious regression. The all variables are stationary at first difference Johansen Co-integration test is conducted.

4.2.2. Graphical Representation of Capital Expenditure and Economic Growth

The relationship between government capital expenditure and economic growth can be shown in the Figure 4.7. Both data are the time series data having the increasing trend, RGDP is increasing in increasing rate and real government capital expenditure is also increasing with slower rate than RGDP.

Figure 4.7: Graphical Representation of relationship between Real Government Capital Expenditure and Real GDP.

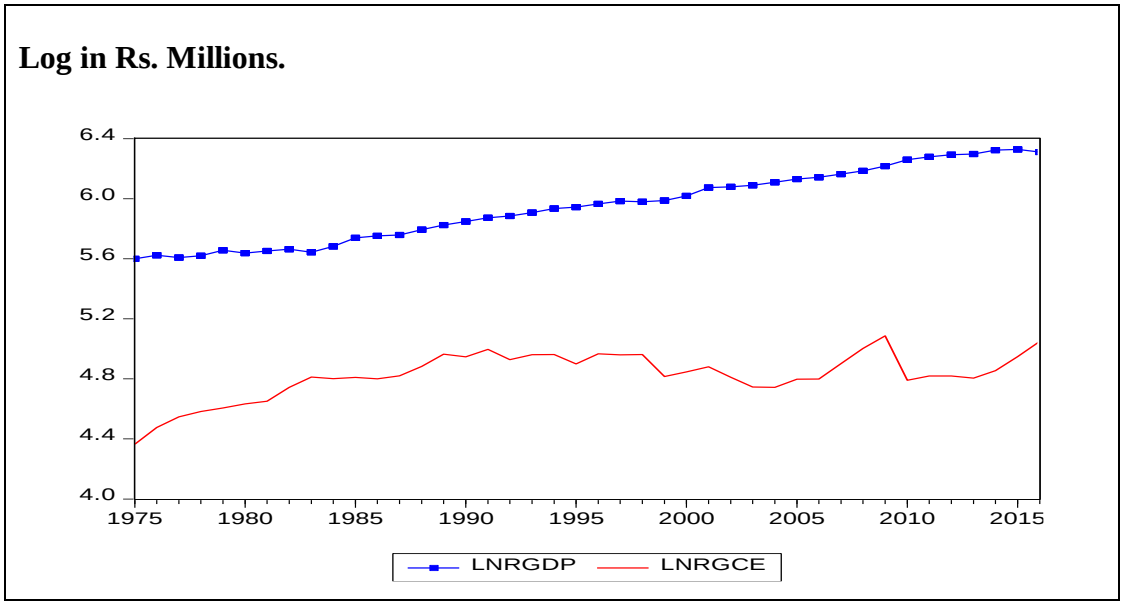


Source: Researcher's calculation using E-views

In Figure 4.7 both the RGDP and RGCE are showing increasing trend over the period of time. The increasing rate of RGDP is higher than RGCE. The RGDP is an increase slowly in the beginning until 1983 but after that RGDP is increases rapidly. On the other RGCE is increase slowly over the period of time.

The figure shows the data for log RGDP and log RGCE; there is strong correlation between these variables. They are moving almost in the same direction in each state. The relationship between log RGDP and log RGE is given in Figure 4.8.

Figure 4.8: Graphical Representation of relationship between log RGDP and log RGCE



Source: Researcher's calculation through appendix using E-views

Figure 4.8 shows that there is no strong and prefect correlation between the log RGDP and log RGCE but it doesn't mean that there is no any correlation between log RGDP and log RGCE. There is positive relation between log RGDP and log RGCE because both are increasing at increasing rate without fluctuations and with fluctuations respectively. log RGDP is increases continuously in increasing rate without high degree of fluctuations. But on the other hand, log RGCE is also increases in increasing rate with high degree of fluctuations than log RGDP. They move together in same directions from the beginning. In the beginning from 1975 to 1983 gap between them seems to be higher and it started to decrease in the 1984. Gap between them is decreases from 1984 to 1995. After that the gap between log RGDP and log RGCE is increases but from 2009 the gap between them is decreases to 2016. They have increasing trend overall time period of the study.

4.2.3 Lag Selection Test

Lag selection test is the first step to run Johansen Cointegration Test and Vector Error Correction Model (VECM). Before conduction Johansen Cointegration Test it should be necessary to determine the appropriate lag that is to be considered on conducting Johansen cointegration and VECM. The lag selection criterion is presented in Table 4.6.

Table 4.6: Lag Selection Criterion.

Lag	LR	FPE	AIC	SC	HQ
0	------	9.72e+44	120.6161	120.8721	120.7080
1	386.0774	3.63e+40	110.3974	112.1889*	111.0402*
2	35.32430	6.66e+40	110.8849	114.2120	112.0786
3	65.52799*	2.38e+40*	109.4546*	120.3174	112.1994

Source: Researcher's calculation through E-views

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information Criterion

HQ: Hannan-Quinn information criterion.

Table 4.6 shows that lag selection criterion by using LR, FPE, AIC, SC and HQ criterion. Based on the Vector Auto-regression, appropriate lag length selection is important in order to assure the research findings reflect real economic situation and importantly the findings are consistent with economic as well as econometric theories.

LR, FPE and AIC criterion suggested that the optimum lag would be 3. And SC and HQ criterion suggested that the optimum lag would be 1. In this research three lag would be considered as suggested by AIC criterion. Three lag lengths have been used for Johansen Cointegration Test and Vector Error Correction Model.

4.3. Cointegration Analysis

After making the all variables stationary and have the same order of the integration, we are going to test all the six variables are cointegrating or not or whether the six variables have long run association ship or not. To test cointegration, we used Johansen Multivariate Cointegration Test. The results of the Johansen Trace Test are in the Table 4.7.

Table 4.7: Values of t-Statistic and Max-Eigen Statistic of Cointegrating

	Null Hypothesis	Trace Statistic	0.05 Critical Value	Max-Eigen Statistic	0.05 Critical Value	Results
Lag length 3	r ≤ 0	132.5448	95.75366	55.97683	40.07757	Trace test indicates three and Max-Eigen test indicates one cointegrating equation(s) at the 5 percent critical value.
	r ≤ 1	76.56794	69.81889	28.00106*	33.87687	
	r ≤ 2	48.5668	47.85613	19.34902	27.58434	
	r ≤ 3	29.21786*	29.79707	17.17600	21.13162	
	r ≤ 4	12.04186*	15.49471	11.66924	14.26460	
	r ≤ 5	0.37262*	3.841466	0.372624	3.841466	

Source: Researcher's calculation through using E-views

**denotes significant at 5 percent level of critical value.*

Table 4.7 shows the values of Trace (t) statistic and Max-Eigen Statistic of conintegrating at the 5 percent level of critical value. The 'P' value of t-Statistic Test shows that the null hypothesis of none cointegration was rejected in the favour of alternative hypothesis because of the 'P' value is less than 5 percent, we reject null hypothesis. The t- statistic shows that null hypothesis of at most one and at most two numbers of cointegrating equations among the variable is rejected in favour of alternative hypothesis at 5 percent level of significance because their value is greater than the critical value at the stated level of significance. The t- Statistic Test suggested that the variables are cointegrated with r = 3, on the other hand, the value of Max-Eigen Statistic Test shows that null hypothesis of none cointegration was rejected because the 'P' value is greater than the critical value at 5 percent level of significance. The Max-Eigen Statistic Test suggested that the variables are cointegrated with r=1. The results of this table are Trace test indicates three and Max-Eigen test indicates one cointegrating equation(s) at the 5 percent critical value. The variables are cointegrated or having long run associationship, then we can run restricted VAR i.e. VECM model.

4.3.1. Vector Error Correction Model

A Vector Error Correction Model (VECM) is a restricted VAR designed for use with non-stationary series that are known to be cointegrated. The VECM has cointegration relations built into the specification so that it restricts the long-run behaviour of the

endogenous variables to converge to their cointegrating relationships while allowing for short-run adjustment dynamics. The cointegration term is known as the error correction term since the deviation from long-run equilibrium is corrected gradually through a series of partial short-run adjustments.

The results of VECM are presented in table 4.8. The ECT is the Error Correction Term or speed of adjustment towards equilibrium. The value of ECT-1 is negative and significant, and then it indicates that there is long run causality from log RGCE, log RGFCF, log RGNS, log RGR and log TOT to log RGDP. Or there is long run causal relationship among the variables. This also indicates that government capital expenditure, gross fixed capital formation, gross national saving, government revenue and terms of trade are long run Granger causality for GDP or economic growth. We can say that GDP can correct any deviation in the relationship between GDP and other explanatory variables. The speed of adjustment of the error correction term is 0.9 percent indicating that the previous level of disequilibrium is corrected by 0.9 percent in one period (one year in our case).

Table 4.8: Result of Vector Error Correction Model (VECM)

Variables	Coefficient	Standard Error	t-Statistic	Probability
ECT-1	-0.003991	0.003480	-1.146770	0.2665
D(log RGDP(-1))	0.465719	0.319096	1.459495	0.1617
D(log RGDP(-2))	-0.585583	0.231997	-2.524095	0.0212
D(log RGDP(-3))	0.465837	0.252133	1.847587	0.0812
D(log RGCE(-1))	-0.041958	0.058624	-0.715715	0.4833
D(log RGCE(-2))	-0.033758	0.053802	-0.627449	0.5382
D(log RGCE(-3))	0.038721	0.050726	0.763352	0.4551
D(log RGFCF(-1))	-0.070508	0.119816	-0.588468	0.5635
D(log RGFCF(-2))	-0.149600	0.115453	-1.295768	0.2114
D(log RGFCF(-3))	0.046396	0.117041	0.396405	0.6965
D(log RGNS(-1))	-0.054287	0.099014	-0.548277	0.5902
D(log RGNS(-2))	0.112307	0.071258	1.576063	0.1324
D(log RGNS(-3))	-0.075127	0.072221	-1.040233	0.3120
D(log RGR(-1))	0.035344	0.173082	0.204204	0.8405
D(log RGR(-2))	0.079478	0.136021	0.584303	0.5663
D(log RGR(-3))	-0.084811	0.140242	-0.604750	0.5529
D(log TOT(-1))	0.121783	0.048865	2.492224	0.0227
D(log TOT(-2))	-0.045459	0.056449	-0.805316	0.4311
D(log TOT(-3))	0.049503	0.046247	1.070412	0.2986
Constant	0.017784	0.007813	2.276321	0.0353
R-squared	0.652238	Mean dependent var.	0.018171	
Adjusted R-squared	0.285156	S.D. dependent var.	0.017276	
S.E. of regression	0.014607	Akaike info criterion	-5.309268	
Sum squared residual	0.003840	Schwarz criterion	-4.447380	
Log likelihood	120.8761	Hannan-Quinn criterion.	-5.002615	
F-statistic	1.776819	Durbin-Watson statistics	2.028685	
Probability(F-statistic)	0.114338			

Source: Researcher's calculation using E-views

4.3.2. Target Equation

Wald test is conducted to investigate short run causal relationship among the variables.

D(log RGDP) = C(1)*(log RGDP(-1) - 18.3379360162*log RGCE(-1) + 17.5510029721*log RGFCF(-1) - 26.5788963823*log RGNS(-1) + 19.6771990405*log RGR(-1) + 0.723564088538*log TOT(-1) + 32.4470768039) + C(2)*D(log RGDP(-1)) + C(3)*D(log RGDP(-2)) + C(4)*D(log RGDP(-3)) + C(5)*D(log RGCE(-1)) + C(6)*D(log RGCE(-2)) + C(7)*D(log RGCE(-3)) + C(8)*D(log RGFCF(-1)) + C(9)*D(log RGFCF(-2)) + C(10)*D(log RGFCF(-3)) + C(11)*D(log RGNS(-1)) + C(12)*D(log RGNS(-2)) + C(13)*D(log RGNS(-3)) + C(14)*D(log RGR(-1)) + C(15)*D(log RGR(-2)) + C(16)*D(log RGR(-3)) + C(17)*D(log TOT(-1)) + C(18)*D(log TOT(-2)) + C(19)*D(log TOT(-3)) + C(20)

4.3.3. VECM Granger Causality Tests

Table 4.9 shows the results of VEC Granger Causality Test. The third objective of study is concerned to determine the causality of GDP with government capital expenditure. For this objective vector auto regression granger causality test is used. For this purpose an endogenous variable is considered as exogenous variable. The study shows GDP doesn't Granger Cause government capital expenditure and similarly government capital expenditure does not Granger Cause GDP.

Table 4.9: Results of VEC Granger Causality/Block Exogeneity Wald Tests

Dependent Variable	Excluded	Chi- Sq	df	Prob.
D(log RGDP)	D(log RGCE)	2.853793	3	0.4147
	D(log RGFCF)	2.465083	3	0.4816
	D(log RGNS)	5.482286	3	0.1397
	D(log RGR)	1.038468	3	0.7919
	D(log TOT)	10.20332	3	0.0169
	All	23.38999	15	0.0762
D(log RGCE)	D(log RGDP)	0.680336	3	0.8778
	D(log RGFCF)	0.154621	3	0.9846
	D(log RGNS)	1.288815	3	0.7318
	D(log RGR)	4.378303	3	0.2234
	D(log TOT)	5.896251	3	0.1168
	All	13.21476	15	0.0024
D(log RGFCF)	D(log RGDP)	2.265640	3	0.5191
	D(log RGCE)	0.238315	3	0.9712
	D(log RGNS)	0.328931	3	0.9545
	D(log RGR)	2.105632	3	0.5508
	D(log TOT)	0.294364	3	0.9611
	All	10.30670	15	0.8000
D(log RGNS)	D(log RGDP)	2.401226	3	0.4934
	D(log RGCE)	3.581833	3	0.3103
	D(log RGFCF)	2.293134	3	0.5138
	D(log TOT)	2.336407	3	0.5056
	D(log RGR)	1.944752	3	0.5840
	All	15.04354	15	0.4483
D(log RGR)	D(log RGDP)	2.376137	3	0.4981
	D(log RGCE)	1.133150	3	0.7691
	D(log RGFCF)	2.072828	3	0.5574
	D(log RGNS)	0.335479	3	0.9532
	D(log TOT)	4.895068	3	0.1796
	All	17.33287	15	0.2994
D(log TOT)	D(log RGDP)	15.04953	3	0.0018
	D(log RGCE)	3.214997	3	0.3596
	D(log RGFCF)	2.831109	3	0.4184
	D(log RGNS)	1.747079	3	0.6265
	D(log RGR)	6.417466	3	0.0930
	All	35.04379	15	0.0024

Source: Researcher's calculation using E-views

4.3.4. Serial Correlation Test

There are many way to check serial correlation. Durbin Watson (DW) Statistic is one way to check serial correlation. DW Statistic cannot be valid in all cases because dependent variable GDP becomes one period lag. In this study we developed autoregressive model. The model is:

$$RGDP = C + RGCE + RGFCF + RGNS + RGR + TOT + RGDP(-1)$$

This model is known as the auto regressive model. The DW Statistic cannot apply in auto regressive model. So we can apply the Breusch-Godfrey Serial Correlation LM Test. The results of Breusch-Godfrey Serial Correlation LM Test are presented in Table 4.10.

Table 4.10: Results of Breusch-Godfrey Serial Correlation LM Test

F-statistic	2.014079	Prob. F(3,31)	0.1324
Obs*R-squared	6.687818	Prob. Chi-Square(3)	0.0825

Source: Researcher's calculation using E-views.

In Table 4.10, we can see the results of Breusch-Godfrey Serial Correlation LM Test. In the table p value is 13.24 percent, it more than 5 percent. So we can say that there is no presence of serial correlation.

4.3.5. Heteroskedasticity Test

To test Heteroskedasticity, Breusch-Pagan-Godfrey Test is applied. The results of Breusch-Pagan-Godfrey Heteroskedasticity Test are presented in Table 4.11.

Table 4.11: Results of Heteroskedasticity Test: Breusch-Pagan Godfrey

F-statistic	1.274642	Prob. F(20,17)	0.2949
Obs*R-squared	7.528884	Prob. Chi-Square(20)	0.2747
Scaled explained SS	4.241781	Prob. Chi-Square(20)	0.6440

Source: Researcher's calculation using E-views.

In Table 4.11, Breusch-Pagan Godfrey of Heteroskedasticity Test was presented. The results of the test indicate that there is no presence of heteroskedasticity.

4.3.6. Normality Test

According to the Jarque Beara test the value Jarque-Bera is less than probability, our data is not normally distributed. But according to Central Limit Theorem, when the numbers of observations are more than thirty, we can conclude that our date is normally distributed.

4.3.7. Test of Parameters Stability

The stability of the long -run parameters together with short run movements for the estimated equations should be examined. Hypothesis of stability testing are as follows:

Null Hypothesis (H_0) = Parameters are stable.

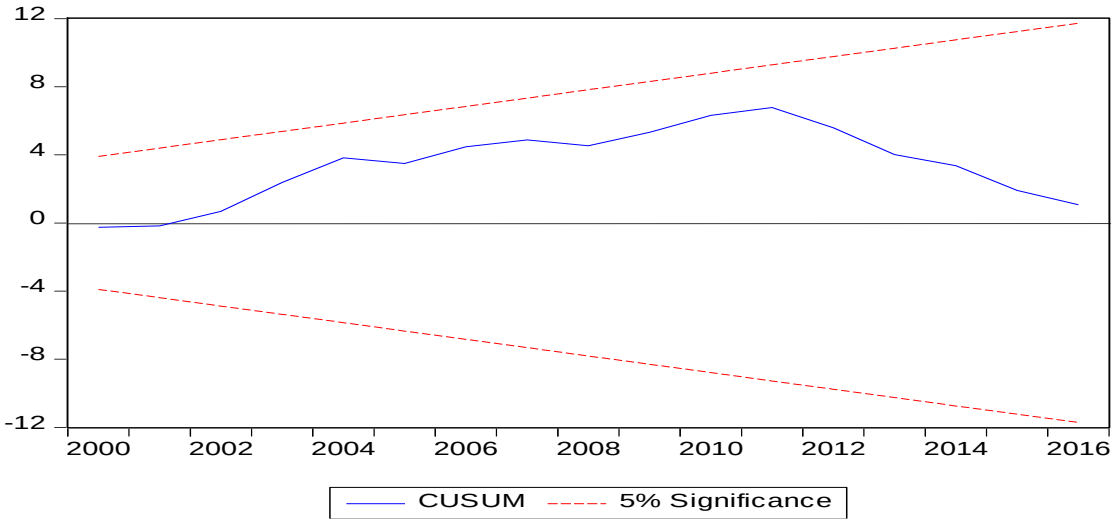
Alternative Hypothesis (H_1) = Parameters are not stable.

For this the thesis relied on cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMSQ) tests are applied. The test applies to the residuals of the ECM.

4.3.7.1. CUSUM Test

The graphical presentation of CUSUM test is given in Figure 4.9.

Figure 4.9: Cumulative Sum of Recursive Residuals (CUSUM) Test



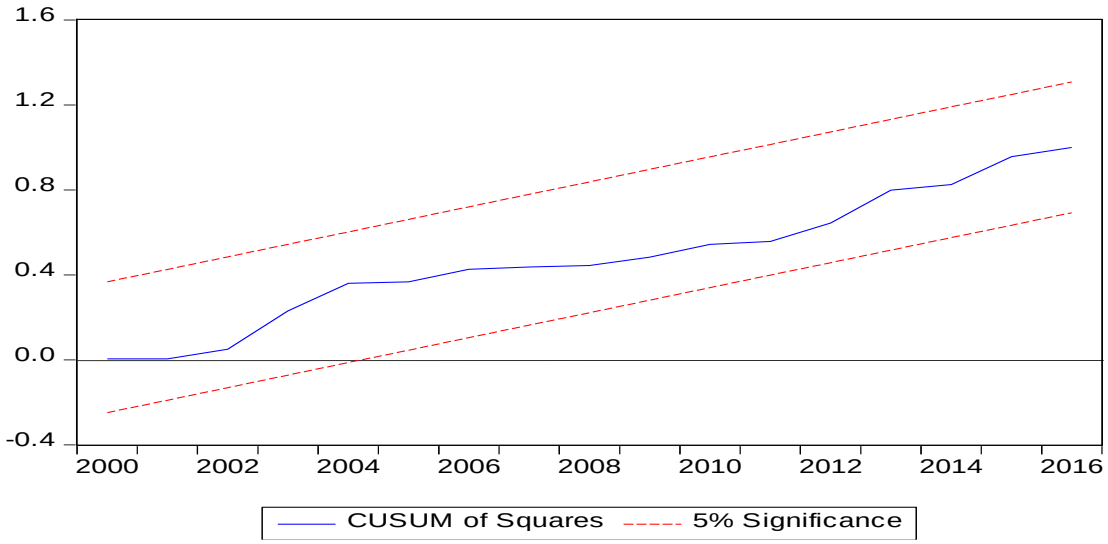
Source: Researcher's calculation through E-views

Figure 4.9 shows that the plots of CUSUM statistic for log RGDP are within the critical lines at the 5% significance level, long run coefficient of the RGDP function is stable, because we find non dotted line between or within the dotted lines. So we accept the null hypothesis, which is desirable.

4.3.7.2. CUSUMSQ Test

Similarly, the graphical representation of the CUSUMSQ is given in Figure 4.10.

Figure 4.10: Cumulative Sum of Square of Recursive Residuals (CUSUMSQ) Test



Source: Researcher's calculation

CUSUMSQ of log RGDP is presented in Figure 4.10. The figure shows that there is no structural break because log RGDP non-dotted is within critical dotted lines at 5% significance level. Long run coefficient of the RGDP function is stable, because we find non dotted line between the two dotted lines. So we accept the null hypothesis, which is desirable.

CHAPTER–V
SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Summary

The economic growth of any country is directly affected by the government capital expenditure of that country. This paper was an attempt to examine the relationship between government capital expenditure and economic growth in Nepal. This paper was able to do empirical study on the relationship between government capital expenditure and economic growth from 1975-2016.

In this thesis, descriptive analysis has used to check the nature and trend of the government capital expenditure and economic growth in Nepal. All the variables are stationary at first difference Johansen Co-integration test is conducted. It has used government capital expenditure and GDP in real form for the analysis. Real GDP is taken as the proxy of the economic growth is dependent variable and government capital expenditure is taken as the proxy of independent variable to find out the relationship between government capital expenditure and economic growth; whereas gross fixed capital formation, gross national saving, government revenue and terms of trade are taken as the control variables. The study is based in time series data analysis. So in this process ADF test is conducted to check the stationarity of the all variables. Since all the variables are found to be non-stationary at level, first difference of variable is done and it is seen that first difference is found to be stationary. Since all the variables are found to be stationary at first difference, Johansen test of cointegration is conducted. Johansen test showed that there exists long run relationship between the variables, so we have vector error correction for further analysis. VEC Granger causality test of output is done to determine the causal relationship among the variables. It employed the CUSUM and CUSUM of square to test the stability of long run coefficient in the model and used the LM test to check the serial correlation in the model. Furthermore with the essentiality of check of the autocorrelation to check whether there exists autocorrelation or not, Breusch-Godfrey Serial Correlation LM Test is carried out and to check the heteroskedasticity Breush-Pagan Godfrey test is done.

The nature and trend of both government capital expenditure and economic growth is found increasing in the study period. The government capital expenditure has been increasing during the study but it is decreased in eleven fiscal years. There is positive and statistically significant relationship between real government capital expenditure, real gross fixed capital formation, real government revenue and terms of trade whereas there is insignificant or negative relationship between real gross national saving and Real GDP. The value of R-square is 99 percent which states 99 percent of the variations of GDP is explained by total variations in independent variables. But non-stationary of the variable biases the OLS estimation as well as the low value of Durbin Watson can be the sign of spurious regression.

5.2. Conclusions

The following conclusions are made based on thesis.

i. There is increasing trend and nature of the government capital expenditure throughout the study period experiences an erratic pattern. The government capital expenditure has been increasing during the study but it is decreased in eleven fiscal years i.e. in 1986, 1990, 1992, 1995, 1997, 1999, 2002, 2003, 2004, 2010 and 2013. The government capital expenditures are an essential input in the short-run and long-run effects in an economy. The impact of government capital expenditures on growth of economy in short-run is negative. In the short-run, public capital expenditures reduce private investment and thus hamper growth. But the impact of the public capital expenditures in the long-run is positive because government invests in the projects where social returns are higher than private returns when such project is financed by private parties. Increases in government capital expenditures are beneficial for economic growth.

ii. GDP of Nepalese economy has been steadily growing over the entire study period. But in case of real GDP, it is decreased in five fiscal year i.e.1977, 1980, 1983, 1998 and 2016. In the year, real GDP is decreased because there was people and students movement. There were a series of protests amongst the student community in the country. The clashes that occurred had a significant historical impact, as they forced the monarchy to concede to holding a referendum on the possibility of a multi party system in the country.

On the other hand, it is increasing over the study period. Because, on the span of time there was development of lots of things such as; electricity, ability of new and advance technology in the international market, access of road, drinking water in rural areas etc. and improvement in the education, health conditions of the people, and also the improvement in the Human Development Index (HDI). There is also positive improvement in social indicators of development, which impact is the effect of increase in real GDP over the period of time.

iii. There is positive and statistically significant relationship between real government capital expenditure, real gross fixed capital formation, real government revenue and terms of trade whereas there is insignificant or negative relationship between real gross national saving and Real GDP. Both the government capital expenditure and GDP having the increasing trend, RGDP is increasing in increasing rate and real government capital expenditure is also increasing with slower rate than RGDP.

iv. The causality between the government capital expenditure and economic growth has been found. The study shows GDP doesn't Granger Cause government capital expenditure and similarly government capital expenditure does not Granger Cause GDP.

5.3. Recommendations

The following recommendations are postulates to expedite capital expenditure for the acceleration of economic growth in Nepal through the thesis.

i. There is increasing trend of government capital expenditure. Most of the study period, government capital expenditure successively increases but it is not enough to develop the economy of the Nepal. It is necessary to increase the government capital expenditure than recurrent expenditure of the government.

ii. Most of the government expenditures are spend in unproductive sectors. Excessive unproductive government expenditure should be minimized as far as possible, because this does not help to increase economic growth only increase in inflationary rate.

iii. The development program has end the delay in acceptable process that means, by implementing the probability study and map design when the budget is

being appropriated. To start the program immediately after financing arrangement of probability studies and after the budget is deployed.

iv. Saving and investment have positive impact on the economic growth, so it should be increase gross national saving and gross fixed capital formation.

v. Little bit government expenditure is allocated in capital expenditure but all allocated government capital expenditure is not spent in pre-determined time. It should be spend in pre-determined time.

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Appendix-A

Concerned Variables in Nominal Form (Excerpts TOT all variables GDP, GR, CE, GNS, GFCF are in Rs. Millions)

Year	GDP	GR	CE	TOT	GNS	GFCF
1975	16,601	1008.4	967.3	1.5235	2,283.0	2223.0
1976	17,394	1115.6	1,238.9	1.4769	2,692.0	2443.0
1977	17,280	1322.9	1,498.3	1.0786	3,022.0	2580.0
1978	19,727	1582.9	1,808.8	1.1446	3,216.0	3294.0
1979	22,215	1811.9	1,978.8	0.8418	3,554.0	3263.0
1980	23,351	1880.0	2,308.6	0.9250	3,929.0	3681.0
1981	27,307	2419.2	2,731.1	0.7701	4,512.0	4299.0
1982	30,988	2679.5	3,726.9	0.4565	4,981.0	5465.0
1983	33,821	2841.6	4,982.1	0.6659	4,957.0	6576.0
1984	39,290	3409.3	5,163.8	0.9013	6,009.0	6907.0
1985	46,587	3916.8	5,488.7	0.7482	7,003.0	9386.0
1986	55,734	4644.5	6,213.1	0.7031	6,773.0	9431.0
1987	63,864	5975.1	7,378.0	0.7554	8,690.0	11825.0
1988	76,906	7350.4	9,428.0	0.6568	9,335.0	13414.0
1989	89,270	7776.8	12,328.8	0.7164	11,807.0	16392.0
1990	103,416	9287.5	12,997.5	0.8098	10,249.0	17002.0
1991	120,370	10729.5	15,979.5	1.0927	13,879.0	22780.0
1992	149,487	13512.7	16,512.8	1.1214	19,407.0	29277.0
1993	171,492	15148.4	19,413.6	0.9526	26,984.0	37278.0
1994	199,272	19580.9	21,188.2	0.7053	35,578.0	42032.0
1995	219,175	24575.2	19,794.9	0.6799	38,101.0	48370.0
1996	248,913	27893.1	24,980.5	0.6161	38,892.0	56081.0
1997	280,513	30373.5	26,542.6	0.7871	44,831.0	60794.0
1998	300,845	32937.9	28,943.9	1.0378	48,621.0	65375.0
1999	342,036	37251.0	22,992.1	1.1691	58,648..0	65269.0
2000	379,488	42893.8	25,480.7	1.2249	70,702.0	73324.0
2001	441,519	48893.6	28,307.2	1.1130	118,797.5	84750.6
2002	459,443	50445.5	24,773.4	1.0223	111,180.6	89889.3
2003	492,231	56229.8	22,356.1	1.0072	116,997.9	98072.8
2004	536,749	62331.0	23,095.6	1	146,268.5	109181.3
2005	589,412	70122.7	27,340.8	1.0260	167,451.3	117538.9
2006	654,084	72282.1	29,606.6	0.8701	189,858.1	135532.0
2007	727,827	87712.1	39,729.9	0.7747	207,876.3	153336.9
2008	815,658	107622.4	53,516.1	0.7767	270,951.6	178445.5
2009	988,272	143474.5	73,088.9	0.6059	354,466.0	211039.0
2010	1,192,774	179945.8	40,509.8	0.4137	428,354.0	264887.5
2011	1,366,954	199819.0	47,327.7	0.4135	506,331.0	292730.4
2012	1,527,344	244561.1	51,390.7	0.4096	602,868.2	317184.6
2013	1,695,011	296189.0	54,598.4	0.3518	689,661.6	382971.8
2014	1,964,540	356620.7	66,694.7	0.3279	898,479.4	462013.4
2015	2,130,150	405866.4	88,754.7	0.2804	940,302.0	595822.6
2016	2,247,427	481961.6	123,251.0	0.2308	898098.0	647293.9

Source: Various Economic Survey, website of Ministry of Finance and Nepal Rastra Bank

Appendix - B

Concerned Variables in Real Term (Excerpts TOT all variables RGDP, RGR, RGCE, RGFCF and RGNS are in RS. Millions)

Year	Deflator	NCPI	RGDP	RGR	RGCE	TOT	RGFCF	RGNS
1975	12.64	4.1733	397790.7	24163.18	23178.3	1.5235	53267.2	54704.90
1976	12.78	4.1444	419698.9	26918.17	29893.3	1.4769	58947.0	64955.12
1977	12.49	4.2565	405967.3	31079.85	35200.7	1.0786	60613.2	70997.30
1978	13.81	4.7318	416902.7	33452.42	38226.5	1.1446	69614.1	67965.68
1979	15.3	4.8944	453886.1	37020.02	40430.0	0.8418	66668.0	72613.60
1980	16.02	5.3731	434590.8	34988.82	42965.5	0.9250	68507.9	73123.52
1981	17.2	6.0924	448214.2	39708.81	44828.3	0.7701	70563.3	74059.48
1982	18.62	6.7271	460644.3	39831.45	55401.3	0.4565	81238.6	74043.79
1983	20.07	7.6802	440366.1	36999.06	64869.4	0.6659	85622.8	64542.59
1984	21.53	8.1592	481542.3	41784.71	63288.0	0.9013	84652.9	73646.93
1985	22.73	8.4972	548263	46095.06	64594.0	0.7482	110459.9	82415.38
1986	25.98	9.8436	566195.3	47182.95	63118.2	0.7031	95808.4	68806.13
1987	29.23	11.150	572771.3	53588.15	66170.4	0.7554	106053.8	77937.22
1988	32.7	12.353	622559.3	59502.09	76320.4	0.6568	108587.2	75567.46
1989	36.4	13.380	667174.9	58121.44	92141.7	0.7164	122508.6	88241.67
1990	40.3	14.679	704540.7	63273.03	88548.2	0.8098	115829.3	69823.21
1991	44	16.119	746772.4	66565.38	99136.2	1.0927	141326.5	86104.96
1992	52.3	19.512	766116.8	69252.07	84627.5	1.1214	150043.8	99460.34
1993	57.7	21.242	807332.7	71314.27	91393.6	0.9526	175493.6	127032.55
1994	62	23.143	861050.3	84608.82	91553.9	0.7053	181619.4	153731.81
1995	65.9	24.915	879687.4	98635.81	79449.4	0.6799	194139.3	152923.33
1996	71.1	26.942	923891.5	103530.9	92720.1	0.6161	208156.1	144355.61
1997	76.2	29.122	963243.9	104298.6	91143.8	0.7871	208758.4	153943.62
1998	79.3	31.546	953664.8	104411.5	91750.7	1.0378	207235.7	154126.33
1999	86.3	35.136	973465.9	106019.7	65437.6	1.1691	185761.6	166917.60
2000	90.3	36.328	1044616	118073.6	70140.6	1.2249	201838.8	194621.23
2001	100	37.213	1186480	131390.2	76069.0	1.1130	227747.7	319240.85
2002	103.9	38.288	1199969	131753.3	64703.0	1.0223	234772.1	290380.51
2003	107.1	40.106	1227316	140202	55742.1	1.0072	244532.2	291719.51
2004	111.4	41.696	1287301	149490.2	55390.8	1	261852.7	350799.96
2005	118	43.588	1352228	160875.3	62725.2	1.0260	269657.6	384166.58
2006	126.2	47.059	1389926	153599.1	62913.9	0.8701	288005.0	403447.81
2007	135.4	49.835	1460462	176003.6	79722.2	0.7747	307686.7	417125.78
2008	142.94	53.177	1533866	202386.8	100638.5	0.7767	335571.5	509531.64
2009	166.77	59.867	1650774	239654.6	122085.0	0.6059	352511.9	592087.15
2010	189.56	65.601	1818249	274307	61752.6	0.4137	403791.0	652977.17
2011	210.34	71.871	1901950	278023.9	65850.8	0.4135	407298.6	704497.77
2012	224.13	77.847	1961977	314155.1	66014.8	0.4096	407445.1	774425.03
2013	237.77	85.506	1982328	346395.3	63853.2	0.3518	447888.3	806564.21
2014	259.18	93.271	2106275	382349.8	71506.5	0.3279	495346.2	963301.91
2015	272.42	100	2130150	405866.4	88754.7	0.2804	595822.6	940302.00
2016	285.93	109.94	2044262	438392.8	112,109.2	0.2308	588779.3	816910.94

Source: Researcher's Calculation

Appendix - C

Calculation of Terms of Trade (TOT)

Concerned Variables is in Nominal Form (All Variables Export and Import are in Rs. Millions). The base year is 2003/04 to calculate index of exports and imports

Year	Export	Import	Index of Export Price (58705.7)	Index of Import Price (149473.6)	Terms of Trade (TOT)
1975	1185.8	1981.7	0.020199	0.013258	1.523533
1976	1164.7	2008.0	0.01984	0.013434	1.47685
1977	1046.2	2469.6	0.017821	0.016522	1.078622
1978	1296.8	2884.7	0.02209	0.019299	1.144619
1979	1150.5	3480.1	0.019598	0.023282	0.841766
1980	1608.7	4428.2	0.027403	0.029625	0.924996
1981	1491.5	4930.3	0.025406	0.032984	0.770252
1982	1132.0	6314.0	0.019283	0.042242	0.456489
1983	1703.9	6514.3	0.029024	0.043582	0.665963
1984	2740.6	7742.1	0.046684	0.051796	0.901305
1985	2745.0	9341.2	0.046759	0.062494	0.748216
1986	3011.4	10905.2	0.051297	0.072957	0.703113
1987	4114.6	13869.6	0.070089	0.09279	0.755351
1988	4195.3	16263.7	0.071463	0.108807	0.656787
1989	5156.2	18324.9	0.087831	0.122596	0.716426
1990	7387.5	23226.5	0.12584	0.155389	0.809839
1991	13706.5	31940.0	0.233478	0.213683	1.092637
1992	17266.5	39205.6	0.29412	0.262291	1.12135
1993	19293.4	51570.8	0.328646	0.345016	0.952553
1994	17639.2	63679.5	0.300468	0.426025	0.705283
1995	19881.1	74454.5	0.338657	0.498111	0.679883
1996	22636.5	93553.4	0.385593	0.625886	0.616075
1997	27513.5	89002.0	0.468668	0.595436	0.787101
1998	35676.3	87525.3	0.607714	0.585557	1.037839
1999	49822.7	108504.9	0.848686	0.725913	1.169129
2000	55654.1	115687.2	0.948019	0.773964	1.224888
2001	46944.8	107389.0	0.799663	0.718448	1.113042
2002	49930.6	124352.1	0.850524	0.831934	1.022346
2003	53910.7	136277.1	0.918321	0.911714	1.007247
2004	58705.7	149473.6	1	1	1
2005	60234.1	149474.0	1.026035	1.000003	1.026032
2006	59383.1	173780.0	1.011539	1.162613	0.870057
2007	59266.5	194795.0	1.009553	1.303207	0.774668
2008	67697.5	221938.0	1.153167	1.484797	0.77665
2009	67698.0	284470.0	1.153176	1.903145	0.605932
2010	60824.0	374335.0	1.036083	2.504355	0.413713
2011	64339.0	396176.0	1.095958	2.650475	0.413495
2012	74261.0	461668.0	1.264971	3.088626	0.409558
2013	76917.2	556740.3	1.310217	3.724673	0.351767
2014	91991.3	714365.9	1.566991	4.779211	0.327877
2015	85319.1	774684.2	1.453336	5.182749	0.280418
2016	70117.1	773599.1	1.194383	5.17549	0.230777

Source: Ministry of Finance and researcher's calculation

Appendix - D

Distribution of Government Capital Expenditure on 6 Years Average

Fiscal Year	Average (Rs. In Millions)
1975-1980	34982.38
1981-1986	59349.87
1987-1992	84191.75
1993-1998	89668.58
1999-2004	64580.52
2005-2010	81639.57
2011-2016	78014.87

Source: Researcher's calculation

Appendix - E

Capital Expenditure to GDP Ratio (CE_GDP):

$$\text{CE\_GDP} = \frac{\text{Real Government Capital Expenditure}}{\text{Real GDP}}$$

Year	RGCE (In Millions)	RGDP (In Millions)	CE_GDP
1975	23178.3	13109.97	1.77
1976	29893.3	13610.33	2.20
1977	35200.7	13835.07	2.54
1978	38226.5	14288.2	2.68
1979	40430.0	14519.61	2.78
1980	42965.5	14576.15	2.95
1981	44828.3	15876.16	2.82
1982	55401.3	16427.5	3.37
1983	64869.4	16821.62	3.86
1984	63288.0	18295.4	3.46
1985	64594.0	19551.69	3.30
1986	63118.2	20483.06	3.08
1987	64376.5	20916.87	3.08
1988	76320.4	22376.15	3.41
1989	92141.7	23579.95	3.91
1990	88548.2	24739.95	3.58
1991	99136.2	26392.5	3.76
1992	84627.5	27711.85	3.05
1993	91393.6	28656.85	3.19
1994	91553.9	30902.58	2.96
1995	79449.4	31862.82	2.49
1996	92720.1	33669.2	2.75
1997	91143.8	35376.64	2.58
1998	91750.7	36544.51	2.51
1999	65437.6	38240.79	1.71
2000	70140.6	40559.36	1.73
2001	76069.0	41342.8	1.84
2002	64703.0	41424.06	1.56
2003	55742.1	42980.86	1.30
2004	55390.8	44946.05	1.23
2005	62725.2	46481.78	1.35
2006	62913.9	48424.56	1.30
2007	79722.2	49915.73	1.60
2008	100638.5	52837.34	1.90
2009	122085.0	54537.87	2.24
2010	61752.6	57154.2	1.08
2011	65850.8	59355.42	1.11
2012	66014.8	61905.23	1.07
2013	63853.2	64146.91	1.00
2014	71506.5	67857.78	1.05
2015	88754.7	69711.81	1.27
2016	112,109.2	69521.35	1.61

Source: Researcher's calculation

Appendix - F

Capital Expenditure to Government Revenue Ratio (CE_GR):

$$\text{CE\_GR} = \frac{\text{Government Capital Expenditure}}{\text{Government Revenue}}$$

Year	RGCE (In Millions)	RGR (In Millions)	CE-GR
1975	23178.3	24163.18	0.96
1976	29893.3	26918.17	1.11
1977	35200.7	31079.85	1.13
1978	38226.5	33452.42	1.14
1979	40430.0	37020.02	1.09
1980	42965.5	34988.82	1.23
1981	44828.3	39708.81	1.13
1982	55401.3	39831.45	1.39
1983	64869.4	36999.06	1.75
1984	63288.0	41784.71	1.52
1985	64594.0	46095.06	1.40
1986	63118.2	47182.95	1.34
1987	64376.5	53588.15	1.20
1988	76320.4	59502.09	1.28
1989	92141.7	58121.44	1.59
1990	88548.2	63273.03	1.40
1991	99136.2	66565.38	1.49
1992	84627.5	69252.07	1.22
1993	91393.6	71314.27	1.28
1994	91553.9	84608.82	1.08
1995	79449.4	98635.81	0.81
1996	92720.1	103530.9	0.90
1997	91143.8	104298.6	0.87
1998	91750.7	104411.5	0.88
1999	65437.6	106019.7	0.62
2000	70140.6	118073.6	0.59
2001	76069.0	131390.2	0.58
2002	64703.0	131753.3	0.49
2003	55742.1	140202	0.40
2004	55390.8	149490.2	0.37
2005	62725.2	160875.3	0.39
2006	62913.9	153599.1	0.41
2007	79722.2	176003.6	0.45
2008	100638.5	202386.8	0.50
2009	122085.0	239654.6	0.51
2010	61752.6	274307	0.23
2011	65850.8	278023.9	0.24
2012	66014.8	314155.1	0.21
2013	63853.2	346395.3	0.18
2014	71506.5	382349.8	0.19
2015	88754.7	405866.4	0.22
2016	112,109.2	438392.8	0.26

Source: Researcher's calculation

Appendix - G

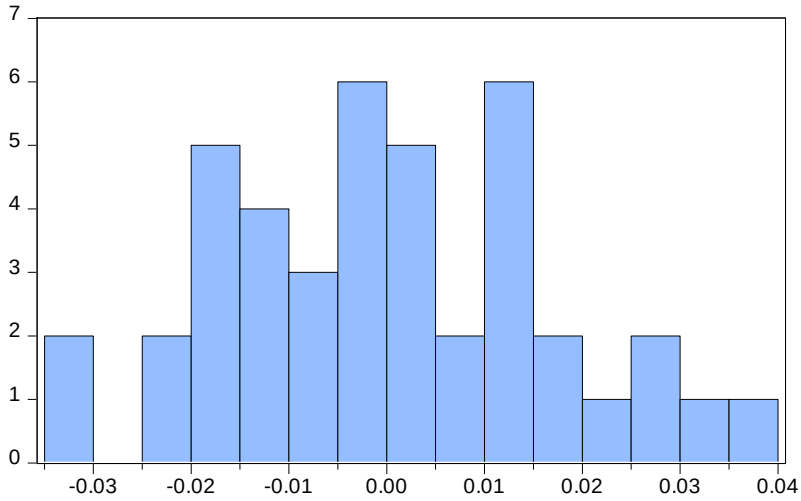
Concerned Variables in Logarithmic Form

Year	log RGDP	log RGR	log RGCE	log TOT	log RGFCF	log RGNS
1975	5.599655	4.383154	4.365082	0.182842	4.72646	4.738026
1976	5.622938	4.430046	4.475574	0.169351	4.770462	4.812613
1977	5.608491	4.492479	4.546551	0.03286	4.782567	4.851242
1978	5.620035	4.524428	4.582365	0.058654	4.842697	4.83229
1979	5.656947	4.568437	4.606704	-0.07479	4.823917	4.861018
1980	5.638081	4.543929	4.63312	-0.03386	4.835741	4.864057
1981	5.651486	4.598887	4.651552	-0.11345	4.848579	4.869581
1982	5.663366	4.600226	4.74352	-0.34056	4.909762	4.869489
1983	5.643814	4.568191	4.81204	-0.17659	4.932589	4.809846
1984	5.682634	4.621017	4.801321	-0.04513	4.927642	4.867155
1985	5.738989	4.663654	4.810192	-0.12598	5.043205	4.916008
1986	5.752966	4.673785	4.800155	-0.15298	4.981404	4.837627
1987	5.757981	4.729069	4.820664	-0.12182	5.025526	4.891745
1988	5.794181	4.774532	4.882641	-0.18257	5.035779	4.878335
1989	5.82424	4.764336	4.964456	-0.14484	5.088167	4.945674
1990	5.847906	4.801219	4.94718	-0.09162	5.063818	4.844
1991	5.873188	4.823248	4.996232	0.038501	5.150224	4.935028
1992	5.884295	4.840433	4.927512	0.049761	5.176218	4.99765
1993	5.907053	4.853176	4.960916	-0.02109	5.244261	5.103915
1994	5.935029	4.927416	4.961677	-0.15163	5.259162	5.186764
1995	5.944328	4.994035	4.900091	-0.16755	5.288113	5.184474
1996	5.965621	5.01507	4.967174	-0.21035	5.318389	5.159434
1997	5.983736	5.018278	4.959727	-0.10397	5.319644	5.187362
1998	5.979396	5.018748	4.962609	0.016114	5.316465	5.187877
1999	5.988321	5.025387	4.815827	0.067852	5.268956	5.222502
2000	6.018957	5.072153	4.845969	0.088101	5.305005	5.28919
2001	6.074261	5.118563	4.881208	0.046495	5.357454	5.504118
2002	6.07917	5.119762	4.810924	0.009578	5.370646	5.462967
2003	6.088956	5.146754	4.746183	0.003116	5.388336	5.464965
2004	6.10968	5.174613	4.743438	0	5.418057	5.54506
2005	6.13105	5.206489	4.797442	0.011147	5.430813	5.58452
2006	6.142992	5.186389	4.798747	-0.06043	5.4594	5.605787
2007	6.16449	5.245522	4.901579	-0.11087	5.488109	5.620267
2008	6.185788	5.306182	5.002764	-0.10975	5.525785	5.707171
2009	6.217688	5.379586	5.086662	-0.2176	5.547174	5.772386
2010	6.259653	5.438237	4.790655	-0.38331	5.606157	5.814898
2011	6.279199	5.444082	4.818561	-0.38352	5.609913	5.84788
2012	6.292694	5.497144	4.819641	-0.38764	5.610069	5.888979
2013	6.297175	5.539572	4.805183	-0.4537	5.65117	5.906639
2014	6.323515	5.582461	4.854346	-0.48426	5.694909	5.983762
2015	6.32841	5.608383	4.948191	-0.55222	5.775117	5.973267
2016	6.310537	5.641863	5.049641	-0.63676	5.769953	5.912175

Source: Researcher's calculation.

Appendix - H

Normality Check of the VECM Model



Series: Residuals	
Sample 1975 2016	
Observations 42	
Mean	6.44e-16
Median	-0.000948
Maximum	0.038816
Minimum	-0.034875
Std. Dev.	0.016985
Skewness	0.095390
Kurtosis	2.589072
Jarque-Bera	0.359202
Probability	0.835604

Source: Researcher's calculation through E-views.