A TIME SERIES ANALYSIS OF INVESTMENT AND ECONOMIC GROWTH IN NEPAL

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in

ECONOMICS

By

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LETTER OF RECOMMENDATION

This thesis entitled “A Time Series Analysis of Investment and Economic Growth in Nepal” has been prepared by Sharmila Kaphle under my supervision. I hereby recommend this thesis for examination by the Thesis Committee as a partial fulfillment of the requirements for the Degree of Master of Arts in Economics.

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APPROVAL LETTER

We certify that this thesis entitled **"A Time Series Analysis of Investment and Economic Growth in Nepal"** submitted by **Sharmila Kaphle** to the Central Department of Economics, Faculty of Humanities and Social Sciences, Tribhuvan University, in partial fulfillment of the requirements for the Degree of MASTER OF ARTS in ECONOMICS has been found satisfactory in scope and quality. Therefore, we accept this thesis as a part of the said degree.

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July, 2015 **Sharmila Kaphle**

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LIST OF ABBREVIATIONS

ADF	Augmented Dickey Fuller test
AIC	Akaike Information Criteria
ARDL	Autoregressive Distributive Lag
CBS	Central Bureau of statistics
CE	Co-integrating Equation
CPI	Consumer Price Index
DI	Domestic Investment
DW	Durbin Watson
ECM	Error Correction Model
ECT	Error Correction Term
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
IMF	International Monetary Fund
MPC	Marginal Propensity to consume
MPS	Marginal Propensity to Consume
NRB	Nepal Rasta Bank
NPC	Nepal Planning Commission
OECD	Organization for Economic Co-operation and Development
PI	Private Investment
PP	Phillips Peron
TFP	Total Factor Productivity
USD	United States Dollar
VECM	Vector Error Correction Model

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Economic growth refers to an increase in the productive capacity of an economy as a result of which the economy is capable of producing additional quantities of goods and services. Country with sustained higher growth rates is considered a developed nation with higher per-capita income signifying the standard of living.

Economists have been interested in economic growth for several decades and the result they propounded many growth theories. Growth theories in general ask three basic questions: i) Why different countries have different growth rate? ii) What should be the equilibrium growth rate so that cycles can be avoided and iii) what are the determinants of growth? Therefore, these theories analyses the disparity in the rates of economic growth between countries, in order to identify the factors that affect the growth of output. These factors differ in terms of their impact on growth depending on economic circumstances. Determinants of growth are not identical in all countries, differing from one country to another, and from one time period to another. The type of economic system also affects the extent of the impact of these determinants.

Harrod and Domar growth model considered capital as the major determinant factor for economic growth. However, growth theories underline the important role of the investment and capital accumulation. These theories therefore, suggest to increase the saving in the economy so as to find the investment and capital requirement. However Solow (1956) argues that saving being important determinant of growth it has limitation too. Saving is the residual after consumption and hence it cannot be increased indefinitely over time. Alternatively, technology is identified as major determinant of growth can be generated continuously with new ideas and innovation. Hence, all growth models focus on the role of saving and capital accumulation.

Investment is the most important and strategic factor in the process of economic growth. It creates employment opportunities among people and thus increase in income. The raised income will create demand, and the result increase in investment. Again the raised investment will increase income and so on. In this way investment helps to boost the economic growth of the country.

In Nepal, the most powerful factor underlying deficiency of investment is low income. Low income restricts investment and hence output and employment, which in turn obstruct efforts to raise the income level. To overcome this low level of income, emphasis should be given to raise the government as well as private investment is vital. Private investment is often seen as the engine that drives a country's economy, while public investment provides the necessary infrastructure. The two are related, as public investment may crowd in (if it provides the infrastructure to support the private sector) or crowd out (by increasing costs of borrowing or 'cherry-picking' the best investment opportunities) private investment. Public investment itself affects growth either directly, via its productivity, or indirectly via its effect on private investment. Public investment in human capital (health and education), law and order, research and development, and social and economic infrastructure leads to creation of productivity of private investment. Thus, one would expect a positive relationship between public investment and economic growth.

1.2 Statement of the Problem

Nepal started its planned development effort from 1956. During almost six decades of formal development effort, the country has achieved satisfactory progress in the areas such as poverty, road, irrigation, drinking water, communication, literacy and life expectancy. However, Gross Domestic Product as proxy for economic growth is not at desired level. The Gross Domestic Product(GDP) annual growth rate in Nepal averaged 4.40 percent from 1994 until 2014 ,reaching an all time high of 8.60 percent in 1994 and a record low of 0.16 percent in 2002, amidst civil war in the country. Likewise, the average growth rates of agriculture and non agriculture sectors remained at 3.2 percent and 4.7 percent respectively in the previous decade. The average growth rates of industry and services sectors under non-agriculture sector stood at 2.9 percent and 5.2 percent respectively in the last ten years. Per capita gross

national income at constant price (2000/01) account USD 717 in fiscal year 2013/2014, which is very low among South Asian nation.

Nepalese economic growth is determined by favorable monsoon, improvement in investment environment, political consensus and cooperation, and execution of timely budget. However, the availability and use of natural resources, capital formation and human resource are among major, input to economic growth. The rational and conducive fiscal and monetary policies are prerequisite to score a high growth rate. The physical infrastructures in particular have importance to expand the business activities. While different factors have important implications for growth in terms of impact and scale, capital formation is the crux affecting, growth through investment**.**

Investment is only possible if nation has a great amount of saving. The share of Gross Domestic Saving to GDP is 8.9 percent in fiscal year 2013/2014, whereas in the same period, the percentage share of gross capital formation in GDP is 37.1, which shows huge saving-investment gap. Government investment in gross fixed capital formation as a percentage of GDP is 4.7 whereas, private investment in gross fixed capital formation as a percentage of GDP is18.5 in 2013/14. We see that the low growth in Nepal is attributed to low level of investment. Therefore, this study aims to answer following questions:

a) How far investment is important for Economic Growth in Nepal?

b) Which type of investment (public/private) is more growth elastic?

1.3 Objectives of the Study

The general objective of the paper is to examine the relationship between investment and economic growth in Nepal. The specific objectives are:

a) To analyze the trend and structure of investment and GDP in Nepal.

b) To estimate growth elasticity of public and private investment in Nepal using time series econometric analysis.

1.4 Significance of the Study

The engine of GDP growth is investment. After government had adopted various economic reform programs like Structural Adjustment Program in 1985 and Enhanced structural Adjustment Facility in 1992, the ratio of total investment to GDP had increased. Likewise, when government launched fiscal year 2012/13 as investment year, economic growth rate got increased. Therefore, the rationale behind this study is to establish the relationship between investment and economic growth. Besides this, the study tries to establish which sector, either public or private contribution has great role in capital formation.

1.5 Limitations of the Study

a. The study did not include investment climate such as Investment unfriendly environment, political instability, war etc.

b. Government Investment only includes gross fixed capital formation made by government.

c. Private domestic investment only includes gross fixed capital formation made by private sector.

1.6 Areas for Further Research

Even though this study has tried to address different issues regarding the relationship between investment and growth, it is obvious that all the problems of this topic area are not addressed in this paper. Thus, it is worth mentioning some of these areas that need further assessment in order to fill the gap. The relationship between investment and growth is not a onetime study but it is continuous and it is important to observe the dynamics in the relationship between the two macro-economic variables. By doing so, it is possible to foresee the path of the two variables in the long-run so that corrections can be made before occurrence of shock. In further studies it is also recommended to include more explanatory variables that can explain the current GDP as well.

The other issue that is out of the scope of this study is the causality analysis. There exists large disagreement on whether economic growth triggers investment or investment causes the economic growth. This causality analysis is necessary in order to control the variable that is affecting the other.

1.7 Organization of the Study

The whole study is divided into six chapters. Chapter one includes background of the study, statement of the problem, objectives of the study, significance of the study, limitation of the study and organization of the study. Chapter two presents the review of different literatures related to this study. Chapter three presents research methodology which includes theoretical model, empirical model, research design, nature and sources of data, methods and techniques of data analysis, Phillips Peron test, Engle-Granger co integration test, test, and error correction model. Chapter four presents trends of the GDP and investment in Nepal. Chapter five shows the relationship between GDP and investment through figures and empirical literature. Chapter six includes summary, conclusion, recommendations.

CHAPTER TWO

REVIEW OF LITERATURE

This chapter provides review of both theoretical and empirical studies related to investment and economic growth. Theoretical review consists classical theory, Keynesan, Neo classical growth model, new classical growth model, and Institutional perspective, related to economic growth and empirical review consists review of published article, Reports, unpublished thesis and dissertations of national and international context.

2.1 Theoretical Review

2.1.1 Classical Theory of Economic Growth

Classical economics refers to work done by a group of economists in the eighteenth and nineteenth centuries. The theories developed mainly focused on the way market economies functioned. Classical economics mainly concentrates on the dynamics of economic growth.

Adam Smith's theory of Growth

Adam smith identified three major sources of growth (Wikipedia,2015)

i) Growth in the labor force and stock of capital

ii) Improvement in the efficiency with which capital is used in labor through greater division of labor and technological progress

iii) Promotion of foreign trade that widens the market.

Adam smith has identified the rate of capital formation as the strategic factor in the economic growth process. He stressed on the point that the rate of economic were primarily dependent on the excess of market rate of profit over minimum compensation for bearing risk. Since these factors depended mainly on the socio-economic framework in the country, Institutions were his solution to the problem of economic growth. Adam smith was firmly in favor of the policy of free trade and did not approve of any sort of government intervention.

David Ricardo's Theory of Economic Growth

Ricardo was much less interested in economic growth .Production function considers only three factors of production land, labor and capital. His production function is characterized by diminishing marginal product unless it is monitored by technological progress as Smith was assuming. He argues that population increases faster than economic growth. In Ricardo's theory of growth, capital accumulation plays a strategic role. In his system, capital includes both fixed capital and circulating capital (the portion of an organization investment that is continually used and replenished in ongoing operation), which grows at a proportional rate to the fixed capital. It is an increase in this variety of capital which determines the increase in the demand of labor. He argues that capital accumulation is an increasing function off excess profits (Wikipedia,2015).

Malthus Theory of Growth

Unlike both Adam smith and Ricardo, Thomas Malthus was more interested in the problems of growth of an economy and population. According to him no inquiry could be more important than that which identifies the causes differences between the potential and actual growth of a country. The concepts that would help understand Malthus theory of growth are his views on human resources and capital accumulation ,the identification of the growth retarding factors and the interaction of different sectors in underdeveloped countries.

According to Malthus (Wikipedia,2015)

$Y=R+ W$…….. (1)

Where,

Y represents national income

R denotes profit

W denotes wages

We may rewrite this equation as $R=Y-W$……..(1a)

Thus we can deduce from above equation that profits are equal to total output minus the worker wages.

Workers getting subsistence wages are too poor to save any amount from their income, while we can denote as cw. Capitalist earning are greater than they need for consumption. Hence they save their excess income. According to Malthus the total amount of capitalists saving are not invested, and saving only produce income to the extent they are invested, we can substitute this equation (1a) as,

R= (I+Cc+Cw)-Cw=I+Cc …… (1b)

Cc represents capitalist consumption

I denote investments

Identifying equation (1) as equation (1b) helps in forming Malthus argument.

According to him, national income (Y) is created by investment and consumption, which is divided into capitalist consumption Cc and workers consumption Cw. As the wages of workers equals their consumption level, profits are equal to investment plus capitalist consumption. If saving cannot be converted into investment it reduced effective demand and reduces the possibility of growth.

2.1.2 Keynesian Growth Model

Growth models have emerged according to Harrod (1939) and Domar (1946). Harrod growth model assumes that the economy is always less than full employment (Dhungel and Bista 2013)

Harrod Growth Model

It is based on following assumptions.

Saving is unlagged function of income

a) $S_t=sY_t$ …… (1)

Where

S=saving

s=marginal propensity to save

Yt =income at time period t

b) $It=v\ [Y_t-Y_{t-1}]$ ……(2)

V=accelerator coefficient which is always positive

Y_t-Y_{t-1}=change in level of income

Y_{t-1}=income at time period t-1

c) Investment is change in capital stock.

I=dk/dt

d) There is no capital depreciation.

e) There is no technological progress.

f) Production function is of Leontief type or economy operates with fixed coefficient technology.

Yt=min [kt/v,lt/α] ……(4)

Where,

Yt =output

V=capital output ratio

α = labor output ratio

It means production function is right angled isoquant.

g) Labor force grows at a constant.

1dL/Ldt=λ …….(5)

The equilibrium condition of an economy is

Saving=investment

S=I ……..(6)

Now from equation (1) (2) and (6)

sYt =v(Yt-Yt-1)

s/v =Yt-Yt-1/Yt

s/v =dYt/Yt ……..(7)

This equation 7 is fundamental equation of Harrod growth model. Growth rate of this model depends on marginal propensity to save and capital output ratio.

The implication of this model is that growth depend on the quantity of labor and capital; more investment leads to capital accumulation, which generates economic growth.

Domar Growth Model

Domar growth model is the integration between classical and Keynesian income determination model with dynamic analysis on them. This model is considered as highly unstable model. This model shows dual effect of investment both demand and supply side. The demand side of economy is income generating force which is based on Keynesian school. On the other hand ,capacity generating force which is supply side and based on classical school(Dhungel and Bista 2013).

Assumptions:

a) Demand side effect: Demand side or income generating force works through multiplier time level of investment.

$Y=1I/s$ …… (1)

Y=income

S=MPS

I=investment

1/s=multiplier

where differentiating equation (1) with respect to 't'

$dY/dt = 1/s\ dI/dt$ ……..(2)

b) Supply side effect: Supply side or capacity generating force works through accelerator б times capital stock.

$Yp=бk$ …… (3)

Differentiating with respect to't'

$dYp/dt=бdk/dt$

$dYp/dt=бI$ ……..(4)

Where,

б is capacity output ratio.

c) MPC remains constant.

d) The capital output ratio remains constant.

e) There is no capital depreciation.

f) There is no technological change.

g) The production function given as;

$$Y=\min [k/v, l/\mu]$$

Where, v= capital output ratio

μ=labor output ratio

It gives right angle iso-quant.

Equilibrium condition of Economy

Demand side=supply side

$dY/dt=dYp/dt$ …….(5)

From equation (2) (4) and (5)

$1/s\ dI/dt=\sigma I$ …… (6)

This is the fundamental equation of Domar growth model. Growth rate of economy depends on growth rate of saving and investment.

The basic conclusion of the Harrod-Domar is that the growth of any country is determined by the parameters such as level of saving and investment, productivity of capital and labor force. Given the policy target of economic growth and productivity of capital, often measured by incremental capital-output ratio, 'v', the model helps the planner to estimate required saving for the achievement of targeted growth.

2.1.3 Exogenous Growth

Solow Swan Growth model

This model is the representative of neoclassical growth model. This model is considered as highly stable model. Output under Harrod -Domar model is only function of capital .Both labor and capital are assumed to be perfect complements and constant capital-output ratio. However, production function of Solow-swan model is

multi factors of production. Labor and capital are assumed to be closed substitutes for each other. The coefficient of capital –output is variable (Dhungel and Bista 2013).

Assumptions of Solow swan growth model are

a) Production function is multi-factor of production;

Y=f (L, K, T) ……..(1)

Where,

Y= national output

L=labor supply

T=technological progress

For simplicity, let us take production function of Land K, then production

Y=f (L, K) ……..(2)

Features of production function:

- Linearly homogenous
- Constant returns to scale
- MPL,MPK>0 and MPPL,MPKK<0

Now,

Y=f (l, k)

λ Y= f(λ L, λ k)

Y*=λ Q

Which is homogenous production function, Production function can be written as capital-labor ratio

i.e. k*=k/l

Y=L ϕ (K*) ……..(3)

b) Saving is the part of output.

S=s Y ……. . (4)

Where,

S=saving

s =mps

Y=level of output

c) Investment is change in capital stock

$I=dk/dt = K^*$ …….. (5)

d) Market equilibrium condition is saving is equal to investment.

$S=I$ ……. (6)

From above we get

$sY=k^*$ …….(7) Labor growth rate is constant n.

$n=1/L\ dl/dt$

$L=l_0e^{nt}$ ……. (8)

$K= s\ \phi\ (K^*) – n\ K^*$ ……..(9)

Equation (9) is fundamental equation of Solow growth model. This model states that change in per capital labor depends on saving rate and population growth rate. Rise in saving rate leads to rise per capita output and rise in population growth lead to fall in per –capita output.

The basic conclusion of Solow growth model is that the long run steady state growth rate in the economy is determined by the rate of growth of labor and technological change and the rate of investment will only lead to a short-run increase in the rate of growth.

Kaldor Growth Theory

Kaldor growth model is extended version of Solow growth model .Under Kaldor growth model MPC and MPS is not constant. Kaldor claimed that deviation of MPC and MPS also deviate income and employment.(Dhungel and Bista 2013).

The main factors which changes value of MPC are fiscal policy, monetary policy, and unexpected change in price of securities. For example: expansionary fiscal policy i.e. low tax rate which increase the level of disposable income.

$Y_d=Y-T$

Similarly, tight monetary policy i.e. high interest rate leads to fall in MPC or rise in MPS.

Assumptions:

a) Production function is based on multi –factors of production.

$$Y=f(L, K, T) \ldots\ldots (1)$$

For simplicity,

$$Y=f(L, K) \ldots\ldots. (2)$$

b) Market should be perfect competition,

c) Saving is the part of income.

$$S=s\ Y \ldots\ldots.(3)$$

Where,

S=total saving

Y=national income

s=mps

d) Investment is change in capital stock.

K2*=k/l

Then fundamental equation of kaldor becomes

$$n= Y/k\ s_w + (s_p - s_w)\ p$$

The basic conclusion of Kaldor growth model is that, wages and profits constitute the income where wages comprises salaries and earnings of manual labor , and profit comprises income of entrepreneur as well as property owners further total savings consists the savings out of wages and savings out of profit, and he further opines that the technical progress depend on the rate of capital accumulation.

2.1.4 Endogenous Growth (New Classical Growth Model)

New classical growth model assumed that factors of production are human capital and physical capital. Human capital refers those labors which are skilled, labor that can operate new or sophisticate ideas and machine, labor that can created new ideas and methods of new in economic activities. (.(Dhungel and Bista 2013).

Production function under this is given by Cobb- Douglas;

$$Y=k^{\alpha} h^{1-\alpha} \ldots\ldots\ldots\ldots\ldots (1)$$

Where,

Y=output

K=physical capital

α = capital elasticity

1-α=human capital elasticity

H=human capital

By taking natural log

LnY=αlnk+ (1-α) lnh……..(2)

Change in physical capital stock depends on income or output

$K_{t+1}-k_t=s\ Y$ …….. (3)

Where,

s=mps [0<s<1]

Change in human capital is also a part of income

$h_{t+1}-ht=q\ Y$……(4)

Dividing equation (2) by $k_t=k$

$$=s\ (h/k)^{1-\alpha}$$

$$=S(h/k)\ 1-\alpha$$

$$=s(r)\ 1-\alpha \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ (5)$$

$$r=h/k$$

Equation (5) states that rise in human capital of an economy lead to rise in saving as well as rise physical capital.

Dividing equation (4) by h_t both sides,

$H_{t+1}-h_t/h_t=q/Y/h_t$

$=q\ (h/k)^{-\alpha}$

For long run growth, both physical capital growths must be equal to human capital. For sustainable economic growth, investment on human and physical capital is inevitable. Developed countries follow the path of new growth theory so became developed countries. However, developing countries like Nepal must follow the new growth path.

2.1.5 Economic Growth- Institutional Economics Prospectives.

Wehinger (2011) in his research titled "Fostering Long term investment and Economic Growth" presents in OECD 50th anniversary summarizes,

- Financial reforms to foster stability and long term growth.
- The contribution of institutional investors to long-term growth.
- Creating a better environment for financing business, innovation and green growth.

Warner (2014) in his research titled "promoting growth in sub-Saharan Africa Learning what works" reveals that

- To enhance the region's growth performance, countries should seek to boost the ratio of private investment to GDP.
- Government should also continue to implement sound macroeconomic policies in order to fully restore and consolidate macroeconomic stability.
- Enhance privatization programs.
- Financial sector reform can help to enhance growth by mobilizing increased savings, financing productive investments, and containing inflation.
- Trade liberalization can also help accelerate growth by promoting the competitiveness of domestic producers and speeding up sub Saharan Africa's integration into global economy.

From the above growth model from classical to new classical and various research papers we can conclude that capital formation is most important factor to enhance economic growth.

2.2 Empirical Review

2.2.1 International Context

Robinson (1971), taking 39 less developed countries for the 1958-66, found that growth rate is significantly influenced by the investment ratio. The coefficients of investment ratio took values ranging between 0.08 and 0.9 and were statistically significant. In his specification, the rate of growth of labor force was also included as additional explanatory variables, but it did not appear to be significant. Similarly, Thirlwall (1974) also found significant positive relation between the growth of income and investment ratio in a sample of 68 developed and developing countries for the period 1958-68.This study also worked with two samples and found that the impact of investment on growth was higher in the developed countries group than in the developing countries group. From the above review of empirical studies, it thus seems that there is a significant relationship between growth and investment.

Sinha(1999) in his study had used unit root test for stationary and cointegration for long run relationship. For Japan, Malaysia, Philippines and Sri Lanka, we find a negative relationship between export instability and economic growth. For (South) Korea, Myanmar, Pakistan and Thailand, we find a positive relationship between the two variables. For India, we get mixed results. In most cases, economic growth is found to be positively associated with domestic investment. The only general story from these regressions is that the growth rate of investment is positively related to the growth rate of GDP. In all cases, the coefficient is significant at least at the 5% level. This study recommends that to uplift the economic growth of the country investment level should be raised.

Amanja and Morrissey (2002) in their study titled “Foreign Aid, Investment, and Economic Growth in Kenya: A Time Series Approach” over the period 1964 – 2002, had used multivariate approach in time series. The econometric results revealed two long run relations representing the reduced form growth equation. Investment, and imports have strong beneficial effects on per capita income in Kenya. Private investment appears to have a stronger influence on growth than public investment a 10% increase in private investment leads to about 0.57% increase in output while a similar increase in government investment leads to a 0.30% increase. However, aid in

the form of net external loans is found to have a significant negative impact on long run growth. Private investment relates to government investment and imports negatively, but positively to foreign aid. Output depends positively on private and government investment and imports, but negatively on net external loans. Private investment on the other hand appears to be positively related to foreign loans, but negatively to both government investment and imports. The implication for policy is that in order for Kenya to foster and sustain growth, closer attention should be given to factors that promote private investment.

James and Okubal (2005) in their research paper titled “Education expenditure, Human capital and economic growth in Uganda” over the period 1962-2002, had used descriptive statistics, Cointegration technique and Error Correction Model. The study found a very strong association i.e. 0.69 (69%) between education expenditure and average years of schooling implying that education expenditures are positively correlated with human capital stock and based on econometric analysis that average years of schooling have a positive and significant relationship with real GDP. The results indicate that human capital stock proxy by average years of schooling is positively correlated to increase in real GDP in Uganda. We conclude that a one percent increase in the average years of schooling, ceteris paribus would lead to 0.36% increase in real GDP in the long run and 0.27% increase in real GDP in the short run. Other factors also such as investment in physical capital, labor input, and openness contribute to increase in real GDP in Uganda. The study therefore accepts the alternative hypothesis that there is a positive relationship between in education expenditure and human capital stock proxy by average years of schooling and human capital stock with economic growth (real GDP). The government of Uganda's long term commitment to human capital stock accumulation is worthwhile Private investment and increased role of the private sector in education should be promoted further since it has contributed largely to expansion in education attainment in Uganda.

Tang and Selvanathan (2008) in their study titled “Foreign Direct Investment, Domestic Investment and Economic Growth” A Time Series Analysis in china over the period 1988-2003, had used a multivariate VAR system with Error Correction Model (ECM) and the innovation accounting (variance decomposition and impulse

response function analysis) techniques are used. The results show that there is a bi-directional causality between domestic investment and economic growth, there is only single-directional causality from FDI to domestic investment and to economic growth. Rather than crowding out domestic Investment. FDI is found to be complementary with domestic investment. FDI has not only assisted in overcoming shortage of capital, it has also stimulated economic growth through complementing domestic investment in china. Since FDI complements domestic investment, less-developed countries ought to encourage and promote FDI inflows, for which appropriate FDI policies and regulations are required. The host governments should not only encourage FDI inflows, they should also impose regulations on MNEs to urge them to undertake export obligations or encourage direct foreign investors to invest in high risk areas or in resource industries where domestic investment is limited.

Yusuf and Usman (2010) shows in his study titled " Foreign Direct Investment, Domestic Investment and Other Complementary Determinants Of Economic Growth In Nigeria: A Time Series Analysis",investigates the relationship between Foreign Direct Investment and Domestic Investment in Nigeria using time series data spanning 1981 to 2010. The study applied the ADF stationary test, Johansen Co-integration test, and the Granger Causality test. The result for stationary shows that all series are stationary at first difference and integrated of order one 1(1), the result for Johansen test shows no long-run relationship between FDI and DI, conversely, Public Debt and debt service have no long-run relationship with DI. However, the result for Granger Causality indicates no causality between FDI and DI in the short-run; Public debt granger causes Debt Service in the short-run. Policy implication is the gross increase in FDI flow in the country may have little or no change on dynamics of domestic investment. FDI flow tends to .discourage domestic investors in the economy thus; this crowds out investment of healthy economies. Sustainable economy succeeds with less FDI, Public Debt and Debt Services. Nigerian economy should concentrate much on growing domestic investment and not FDI. There should also be low public debt and debt service profile as none appears to be cointegrated with domestic investment within the sample period used.

Huisan et.al (2011) in their study titled "public spending, Foreign Direct investment and economic growth" a time series analysis over the period 1975-2008, had used

Cobb Douglas production as theoretical model, ADF unit root test and OLS procedure for regression analysis .The study recorded that trade openness in Pakistan stimulates economic growth like other developing countries of the world. Population growth has negative effect on economic development of this country. They found that FDI affects growth positively while public spending retards economic growth. In addition it is found that as government involvement exceeds a certain level, the positive effect of FDI on economic growth becomes fragile. The bench mark growth rate in public investment has been found at 6%. Therefore, they suggest that the current structure of public expenditure is not conducive to growth and needs to be reorganized and restructured. In addition annul growth in public spending should not exceed 6% to have beneficial effect of foreign capital inflows. To gain the spillovers of knowledge and technology that stem from FDI, it is necessary to have strong infrastructure of human and physical capital. This calls for the efficient use of public resources. The results also suggest that growing population is a threat and needs to be checked. Improvement in skill can also be an effective measure to enhance productivity. Small population is expected to reduce burden on natural resources that will have positive effect on economic development. We provided a text book analysis of the FDI, public spending, and growth nexus.

Antwi and zhao (2012) in their study titled “Impact of Foreign Direct Investment and Economic Growth in Ghana: A Co integration Analysis” over the period 1980-2010 uses the unit root test where it found all the data series to be stationary at first difference and it uses Johansen co integration test of that I(1) variables and found long run relationship between the GDP GNI and FDI. After that they uses VECM model for long run causality and short run dynamics and finally they use granger causality between the variables .GDP granger cause FDI whereas reverse does not. So, the Ghana government should focus on the policy related to attract foreign investment.

Haque (2012) in his study titled “Effect of Public and Private Investment on Economic Growth in Bangladesh: An econometric Analysis” had adopted Cobb Dogulas Production Function as theoretical model. The model had implemented empirically utilizing macroeconomic data for Bangladesh from 1972/73 to 2010/11 period. The empirical implementation follows a co-integration approach that makes use of long-run and short-run analysis. The unit analysis tests conducted confirm that

both variables are stationary in first difference and the co-integration tests also confirm the existence of long term relationship between the variables. The findings of the study concluded that there exist a short-run and long-run relationship between public and private investment and economic growth in Bangladesh. This implies that public and private investment impact positively economic growth in the short and long run process. Another main finding of the study confirms that, the error correction term (ECM) is negative and significant (-0.36), which indicates that 36% of the disequilibrium will be adjusted annually and approximately after 3 (three) years short term dynamics will reach at equilibrium level. It implies that the gestation period of most of the public and private capital investment in Bangladesh is three years. The Bangladesh government should enhance private sector, factor productivity, technology and shifting the sectoral balance from Agriculture to Manufacturing and Services to raise the GDP of the country.

Meliha, Ceneyt and Feyza(2013) in their research titled' The Effects of Public and Private Capital Investments on Sectoral Output: A Panel Approach for the Case of Turkey' over the period 1998 – 2012 emphasized that both public and private investment plays an important role in increasing GDP. Specially, the study pointed out that the public investments have larger effect when compared to the size of the effect of the private investment. Public investment will increase economic growth simply by increasing the rate of national savings. A government can raise the share of national income that is saved by taxing consumption and investigating the revenues. In order to raise this effect, the rate of private saving mustn't fall noticeably in the event that public investment decreases the returns to private investment. Public investments have more important role in improving GDP for Turkish economy. The government must encourage stronger investment by the private and public sectors.

Chibe (2013) in his dissertation titled " public investment, private investment and economic growth in Zambia over the period 1980-2008 had utilized Cointegrated Vector Autoregressive model to characterize the short run and long run relationships among the variables, as well as the adjustment to long run equilibrium. The study reveals that public investment has a positive and significant effect on both private investment and real output in the long run. However the effects of inefficiencies and constraints inherent in the nature of public investment in Zambia would seem to be

pervasive on the short run dynamics as well as the adjustment mechanism towards the long run. This is evident from the VECM, Granger causality and variance decomposition analyses, which all reveal a surprisingly weak causal effect of public investment on private investment and real output in the short run. These results imply that the beneficial effects of public on private investment and real output only accrue with a substantial time lag. Zambiyan government should focus on public investment for the infrastructural lag.

2.2.2 Nepalese Context

Budha (2007) titled "Long-run relationships of macroeconomic variables in Nepal :A VAR Approach" over the period 1975-2000 had utilized cointegration procedure of Johansen and Juselius in estimating the long run economic relationships of macroeconomic variables comprising M2 monetary aggregate, Real Gross Domestic Product (RGDP), Consumer Price Index (CPI) and Interest Rate . One cointegrating vector is found to be statistically significant among the variables under consideration; the result is tantamount to deducing the coefficients of Error Correction Model (ECM). In an application of the Augmented Dickey and Fuller (ADF) test to examine the presence of unit roots in the variables prior to the variables used in estimating long run relationships, the ADF sequential search procedure supports an existence of unit roots in all the variables. This paper also estimates the demand for money function in Nepal as an application of long run relationships between the variables using the said procedure. The coefficients of income and interest rate elasticity of M1 so estimated as depicted by the normalized cointegrating vector are in line with theoretical underpinning. The coefficients estimated in this paper rely on restricted VAR method that are contrary to the past practices in estimating cointegrating vector using the Engle-Granger (1987) two-step procedure in Nepal, the coefficients are supposed to be robust and consistent owing to the stronger restrictions imposed by cointegrating vector as against the theoretical VAR approach.

Majagaiya (2010) shows in his study titled' A Time series Analysis of Foreign Direct Investment and Economic Growth: A Case study of Nepal" had used Granger causality test, unit root test and co-integration test. The empirical analysis on the basis of OLS method, suggests that there is positive but small relationship even considered negligible whereas unit root reveals non stationary in their levels. The results showed

that from FDI to GDP showed that there exist long term relationship between the variable and FDI granges the GDP after four year. This study reveals that Nepal GDP especially does not depends on FDI but may depend on others factors like agriculture inputs ,industrial inputs, remittances so the further research most be done in these subject.

Kharel and pokheral (2012) in NRB working paper titled "Does Nepal's Financial Structure Matter for Economic Growth?" using the fiscal year 1993/ 1994 to 2010/2011.The study uses ADF unit root test for order of integration, Johansen co-integration for long run relationship .Our empirical result suggests that Nepalese banking sector is more growth enhancing relative to capital market. The main implication of the findings is that the policy should focus on banking sector development by enhancing products and service quality along with the expansion of its outreach. The policy should focus on banking sector development as it better promotes economic growth compared to capital market. The banking sector development does not necessarily mean the increment of number of banks and financial institutions, but it is the expansion in the outreach of their financial services and product in terms of quality as well as quantity. The role of capital market seems to be insignificant. It may be either the size of market is too small .The insignificant impact of capital market on growth may be attributed to its size and poor linkage with the real sector implying that capital market should be further expanded to real economic activities so as to channelize its impact on growth.

Bista (2013) in his study titled "Government Domestic Borrowing and private investment in Nepal" a time series analysis over the period 1975-2011 had focused to examine the empirical relationship of government domestic borrowing with private investment, commercial banks loan to private sector, lending interest rate and economic growth of Nepal. The econometric techniques employed in the study are Augmented Dickey-Fuller (ADF) test for unit root, Autoregressive Distributed Lag (ARDL) approach to co integration and its error correction representations. The empirical results show that government domestic loan (DL) has positive effect on private investment (PINV) in short run and long run. The government borrowing from commercial banks (CBSLG) has also positive and significant effect on PINV in long run and short run. The effect of DL on Commercial banks loan to private sector

(CBSLP) is not significant showing that DL does not affect CBSLP. It is also observed that CBSLP significantly depends on PINV in positive direction and it has no relationship with lending interest rate in long run and short run. The effect of domestic as well as foreign loan on economic growth rate is positive and statistically significant in long run and short run. However, the positive effect of government foreign loan is higher than the effect of government domestic loan in long run and short run in Nepal. The overall results empirically verify that the effect of domestic borrowing on private investment and economic growth rate is positive and confirms the Crowding-in effect as described by Keynesians in the case of Nepalese economy. Nepal, as being a developing country needs huge government fund for economic development. Government of Nepal can further utilize the domestic loan for government budget deficit financing.

Timsina (2014) in her study titled "Impact of Bank Credit on Economic Growth in Nepal" time series analysis over the period 1975-2013, had examined the impact of commercial bank credit to the private sector on the economic growth in Nepal from supply side perspectives. The study has applied Johansen co-integration approach and Error Correction Model. The empirical results show that bank credit to the private sector has positive effects on the economic growth in Nepal only in the long run. Nevertheless, in the short run, it has been observed a feedback effect from economic growth to private sector credit. More specifically, the growth in real private sector credit by 1 percentage point contributes to an increase in real gross domestic product by 0.40 percentage point in the long run. The empirical results imply that policy makers should focus on long run policies to promote economic growth – development of modern banking sector, efficient financial market, and infrastructure so as to increase the private sector credit which is instrumental to promote growth in the long run.

Gautam (2014) in his study titled "Financial Development and Economic Growth in Nepal" time series analysis over the period 1975-2012 had used Augmented Dickey-Fuller and Philips-Peron tests to test for the existence of unit root, Co-integration test to examine long run relationship and Granger Causality test to find out causal relationship. In addition, vector error correction method has been applied to find out the speed of adjustment and the dynamics of relationship. The empirical evidence

confirms that the financial development causes economic growth. In fact, financial development is the cause for economic growth in terms of short-term dynamics, while economic growth sustains financial development in the long-run. Based on the empirical findings, this study recommends that it is necessary to launch the reform programs in the financial system to consolidate and improve the efficiency and effectiveness of the financial system as well as to cope with the emerging changes. Thus, it asks for the consolidation of the system not only for the positive reinforcement between economic growth and financial development but also for the post crisis resilience and sustainability.

From the above literatures we can find that various study have done in relation with investment various component and economic growth. But the variables like public and private fixed capital formation as a proxy for public and private investment was not taken in any study.

CHAPTER THREE

RESEARCH METHODOLOGY

This chapter provides an overview of the methodology adopted in the study. It highlights theoretical and empirical model, nature and sources of data and various methods of data analysis. In this study descriptive as well as analytical research design has been employed. A descriptive research design has been employed to examine and analyze trend, structure and position of long run relationship between investment and economic growth. Also, this study employs the analytical and inferential research methods through time series econometric analysis. The study covers the 40 years time period between the fiscal year 1974/75 to 2013/2014 for the purpose of testing the relationship of investment (including GI, PI) and economic growth

3.1 Theoretical Model

Harrod-Domar model is considered as the theoretical model because output under this model is only function of capital. Both labor and capital are assumed to be perfect complements and constant capital-output ratio .Whereas, neo-classical growth model, assumes multi factors of production. Likewise endogenous growth model also focus both on physical as well as human capital, which signifies that the economic growth model which considers capital that affects economic growth model is only the Harrod-Domar growth model. .Here, in our growth model Gross Domestic Product (GDP) proxy for economic growth is the function of investment and its various components like private domestic investment and government investment.

GDP=f (PI, GI)

Where, GDP=Gross Domestic product

PDI=Private Investment

GI=Government Investment

3.2 Empirical Model

Double log linear model is used to find the growth elasticity between the dependent and various independent variables. The model estimated is

$LnGDP=\alpha+\beta 1LnPDI+\beta 2LnGI+U$

Where, LnGDP=Natural logarithm of gross domestic product (in constant price)

LnPI=Natural logarithm of private Investment (in constant price)

LnGI= Natural logarithm of Government Investment (in constant price)

U=error term

α =constant term

3.3 Nature and Sources of Data

This study has used a variety of secondary sources to obtain data. The data is collected from various Economic Survey of Ministry of Finance Government of Nepal.

3.4 Period of the Study

The fiscal year 1974/75 is the starting year of the study. On the other hand, 2013/2014 has been taken as the last year of the study. It covers 40 years of time.

3.5 Method and Techniques of Data analysis

The major part of this study is concerned with testing the relationship between economic growth and various components of investment. Analysis tools used in this study are statistical method. The employed statistic method is time series analysis as the gathered data is in the form time sequence. Trend analysis and other statistical tools have been used for the analysis. The empirical results have been estimated in the study by using annual data for 40 years between 1974/75 to 2013/2014 period. Time series variables are in constant prices and are in Rs billon. We use stata 12 version for empirical analysis.

3.5.1 Time Series Analysis

The time series is a relation between the two variables, one of them being time. Mathematically, a time series is defined by:

$$X = f(t)$$

Where; x is the value of the variable under the study in time t.

The value of 't' may be yearly, monthly, weekly or daily usually at equal interval of time.

A time series is defined as an arrangement of statistical data taken at its time of occurrence. In other words, if the value of the variable is recorded at different periods of time, then the series so formed is called time series. Time series is used to measure the change of economical and commercial data like population, sales, production, exports, imports etc over the period of time. Time series is the manner in which the maximum possible information can be drawn from the data collected is known as the analysis of time series. Time series analysis is also useful to study the past and future behavior of economic and business variables (Silwal, 1995, Sharma, 1995:162).

3.5.2 Unit Root Test

In a time series analysis, a great deal of attention is given to stationary of the variables in order to get rid of the problem of spurious regression. It is often said that most macro-economic variables follow a random walk model, i.e., exhibiting a unit root behavior. According to Studenmund (2011) a random walk process can be identified as stationary when its mean and variance are found to be constant across time; and the value of the co-variance between the two time periods is dependent on the lag between them and not the actual time of computing the covariance.

A random walk model can be justified when the following properties hold:

Mean: $E(Y_t) = \mu$ …….. (1)

Variance: $Var(Y_t) = E(Y_t - \mu)2 = \sigma^2$..... (2)

Co-variance: $\gamma_k = E[(Y_t - \mu)(Y_{t+k} - \mu)]$ …….. (13)

Where, Y_t is a series of random walk

Υ k is the auto covariance at lag k

If one or more of the above conditions fail, the random walk process Yt is said to be non stationary exhibiting a unit root problem. Mostly, macroeconomic and financial time series variables are found to be non-stationary (Koop 2009: 180 – 3).

The concern for stationary of time series variables gives rise to analysis of unit root tests. Unit root tests are statistical procedures that are designed to make judgment as to whether a given sample of time series data implies a unit root or the time series is found to be stationary. In most cases a time series that exhibits stationarity is denoted as I(0) and a series that shows unit root is indicated as I(1) (Wooldridge 2009: 192 – 5). The stationarity test that has become widely popular in time series econometric analysis is the unit root test. In this paper we use Phillips Perron test because it is best to correct autocorreleation than ADF test and address structural break in the data series.

Unit Root Tests with Structural Breaks

Zivot and Andrews Test

Zivot and Andrews endogenous structural break test is a sequential test which utilizes the full sample and uses a different dummy variable for each possible break date. The break date is selected where the t-statistic from the ADF test of unit root is at a minimum (most negative). Consequently a break date will be chosen where the evidence is least favorable for the unit root null. The critical values in Zivot and Andrews(1992) are different to the critical values in Perron (1989).The difference is due to that the time of the break is treated as the outcome of an estimation procedure, rather than predetermined exogenously.

Phillips Peron (PP) Test

The basic assumption of the Dickey and Fuller (1981) unit root test is that the error terms are assumed to be independently and identically distributed. The ADF test adjusts the DF test by adding lags of the dependent variable to generate errors in the model. The Phillips and Peron (1988) unit root test is the alternative approach that lets

non errors in the model. To deal with the problem of serial correlation in the errors, non parametric statistical methods are used in the Phillips Peron test without including the lag difference terms. The Phillips and Peron (1988) test solve the serial correlation problem among error terms by using a correction factor which estimates the long-run discrepancy of the error process with the modification of the Newey-West formula. The Peron test does not require the disturbance term to be serially uncorrelated or to be homogeneous. The test allows dependence and heterogeneity of disturbances of either autoregressive (AR) or moving average (MA) form (Phillips 1987: 286). Since the asymptotic distribution of the Phillips and Perron (1988) test is the same as the Dickey Fuller test, the same critical values are used for both ADF and Phillips Perron test. Generally, the Phillips Perron test is found to be more powerful than the ADF test.

$GDP_t = \alpha + \rho\ GDP_{t-1} + e_t$ …….. …….. (3)

Where $\rho = \phi - 1$. If $\phi = 1$, then $\rho = 0$ and GDP_t depends solely and randomly on α. If ϕ falls between one and negative one, a time series variable is stationary. The critical value to decide whether accepts or rejects the null hypothesis is -2.89 according to Phillips Perron test. A variable has a unit-root when test statistic of the variable is less negative than -2.89 and p-value is more than 0.05 at 95% confidence level (Koop, 2008).

3.5.3 Co-integration and Error Correction Mechanisms

The idea of co-integration was first introduced by Granger (1981) and developed by Engle and Granger (1987) giving it a foundation for representation, estimation, testing and modeling of cointegrated non stationary time series variables. In this approach of co-integration analysis non stationary time series data sets are allowed to be used and spurious regression can also be avoided. In doing so, long-run models can properly be estimated and tested. As discussed in the previous section, if individual time series variables are not stationary in levels there is a possibility that their first difference becomes stationary. If the variables utilized in the study are found stationary at the same order, say in their first difference I (1), it is possible to continue the regression. After the regression takes place if the error terms are found stationary at levels, then the linear combination of the individually non stationary I(1) variables is said to be

stationary I(0). In such a case, the two variables are integrated. This is simply the two step procedure of the Engle and Granger (1987) that will be discussed in detail in the coming subsection. The economic interpretation of co-integrated variables shows the long term relationship between the two variables under study (Engle and Yoo 1987: 149 – 51). The co-integration test in this study will be carried out using the Engle and Granger (1987).

The Engle – Granger Approach

Once relevant variables are checked for their stationary using unit root tests, the regression of the equation (2) takes place, even in the presence of the unit root. It is rational to worry about the spurious regression at this stage, but the regression still continues to see the combined effect of the two non stationary variables. After carrying out the regression on the equation (2) unit root test is applied on the residuals of the equation (μ's) obtained. Given that the error terms obtained are based on the estimated parameter. The Phillips Peron critical values are not suitable in this case. As a result, Engle and Granger (1987) calculated critical values that are appropriate to estimate stationary of the error terms. Continuing on the regression of equation (2) assuming that the variables are non stationary individually, and Engle-Granger approach checks for the mixed effect by checking the stationary of the error terms. If the error terms are found to be stationary I(0) at their levels, using the Engle and Granger (1987) critical values, then the regression of the equation will not be spurious. In the process of avoiding spurious regression, the regression of equation (2) can also be considered as a co-integration test. The co-integration relationship between the two variables can be interpreted as a static long-run equilibrium relationship and the co-integrating parameters are interpreted as long-run parameters (Campbell and Shiller 1988: 4). Long-run relationships are mostly explained in static equilibrium form. Due to these reasons it is difficult to explain the dynamics structural and institutional changes that occur in the economy in the short-run. Due to this reason, it is necessary to study the short-run relationships and short-run dynamism of the variables under study. The Error Correction Mechanism (ECM) is the best possible alternative for assessing the short-run dynamic structure of the model and hence is used in this study (Campbell and Shiller 1988: 5 – 6). As stated in the "Granger Representation Theorem" if two time series variables are co-integrated then

the relationship between the co-integrated variables can be expressed as an Error Correction Model. As mentioned above when error terms of the equation (2) are stationary at their levels, using PP unit root test, then the variables are said to be co-integrated (Engle and Granger 1987: 256 – 8). The PP test for the error term is computed as

$\Delta\mu t = \alpha + \pi\mu t\text{-}1 + \Sigma^{k}_{i+1} \Upsilon t\text{-}id\mu_{t-I} + vt$ …….(4)

where, α is the constant term

and ϖ implies the integral level. After having the co-integrating long-run relationship the basic

structure of ECM looks like

$\ln GDP = \dot{\omega} + \dot{\omega}1 \ln GIt + \dot{\omega}2 \ln PDIt + \dot{\omega}3 \ln GDPt\text{-}1 + \delta_1 ECTt\text{-}1 + \varepsilon t$

……(5)

where, ώ's capture the short-run effects of the explanatory variables on the dependent variable, δ1, captures the rate at which the dependent variable (GDP) adjusts to the equilibrium state after structural or institutional shocks that occur. In other words, δ1 captures the speed at which the error is corrected after shock that occurred (Engle and Yoo 1987: 148 – 52). However, it should be noted that the inclusion of the Error Correction Term (ECT) creates changes in all the variables in the ECM equation. At this stage it is important to discuss how the ECM equation is derived. To explain the derivation of the ECM equation a two variable model is developed for simplicity. As specified in Engle and Granger (1987) having Yt as the dependent variable (GDP in our case) and Xt as the explanatory variable, the long-run equilibrium relationship equation can be explained as

$Yt = \alpha 0 + \alpha 1Xt + \varepsilon t$ …… (6)

And the error correction mechanism for the short-run dynamics can be written as

$Yt = \beta 0 + \Upsilon 0Xt + \Upsilon 1Xt\text{-}1 + \beta 1Yt\text{-}1 + \varepsilon t$ ……. (7)

This equation helps to identify how changes in the independent variable affect the dependent variable in the short-run. Subtracting Yt-1 from both sides, equation (7) becomes

$Yt - Yt\text{-}1 = \beta 0 + \Upsilon 0Xt + \Upsilon 1Xt\text{-}1 – Yt\text{-}1 - \beta 1Yt\text{-}1 + \varepsilon t$

$dYt = \beta 0 + \Upsilon 0Xt + \Upsilon 1Xt\text{-}1 – (1\text{-}\beta 1)\, Yt\text{-}1 + \varepsilon t$ …… (8)

Again subtracting $\Upsilon 0Xt\text{-}1$ from both sides

$dYt – \Upsilon 0Xt\text{-}1 = \beta 0 + \Upsilon 0Xt – \Upsilon 0Xt\text{-}1 + \Upsilon 1Xt\text{-}1 – (1\text{-}\beta 1)\, Yt\text{-}1 + \varepsilon t$…… (9)

Or equation (26) can be re-written in another form as

$dYt = \beta 0 + \Upsilon 0dXt + (\Upsilon 0 + \Upsilon 1)\, Xt\text{-}1 – (1\text{-}\beta 1)\, Yt\text{-}1$…….. (10)

Equation (10) can be reduced as

$\Delta Yt = \Upsilon 0dXt\text{-}(1\text{-}\beta 1)\,(Y_{t\text{-}1} - \beta 0/1\text{-}\beta 1) – (\Upsilon 0 + \Upsilon 1/1\text{-}\beta 1)X_{t\text{-}1}$……(11)

If $\alpha 0 = \beta 0/1\text{-}\beta 1$

$\alpha 1 = \Upsilon 0 + \Upsilon 1/1\text{-}\beta 0$ …… (12)

then by substituting equations (12) in (11) equation (30) can be obtained as

$\Delta Yt = \Upsilon 0\, \Delta Xt – (1\text{-}\beta 1)\, [Yt\text{-}1\text{-}\alpha 0 – \alpha 1Xt\text{-}1] + \varepsilon t$ …….. (13)

Based on the co-integration equation with one lag

$E_{t\text{-}1} = Y_{t\text{-}1}\text{-}\alpha 0\text{-}\alpha 1X_{t\text{-}}$ ……. (14)

and hence equation (13) can be re-written as

$dYt = \Upsilon 0dXt\text{-}(1\text{-}\alpha 1)\varepsilon t\text{-}1 + \varepsilon t$…… (15)

The term $\varepsilon t\text{-}1$ is the error correction mechanism that measures how in the short-run structural and institutional changes affect the equilibrium. The term $(1\text{-}\alpha 1)$ can be expressed as $\delta 1$ and it indicates the speed of adjustment towards equilibrium. Thus, the error correction mechanism in its simplest form can be put as

$\Delta Yt = \Upsilon 0dXt\text{-}(\delta 1)\, \varepsilon t\text{-}1 + \varepsilon t$ ……. (16)

The value of $\delta 1$ is expected to be negative so that the system converges to equilibrium. The error correction mechanism is based on the assumptions of Classical Linear Regression Model (CLRM), that residuals are normally distributed, no autocorrelation on the residuals and absence of correlation among explanatory variables (Jarque and Bera 1980) .

3.6 Definition of Different Variables Used in Study

3.6.1: Gross Domestic Product: The gross domestic product, or GDP, of a country or of some other geographical region is one of the ways of measuring the size of its economy. GDP is defined as the total market value of all final goods and services produced within a given country or region in a given period of time (usually a calendar year).

3.6.2: Private Investment: It is the measure of investment used to compute GDP in economic measurement of nations. This is an important component of GDP because it provides an indicator of the future productivity capacity of the economy. Here, in our study private fixed capital formation is taken as proxy for private domestic investment.

3.6.3: Government Investment: The expenditure made by government in consumer and capital expenditures is considered as government investment whereas in our study it includes only government fixed capital formation as proxy for government investment and excludes consumer expenditure made by government .

CHAPTER FOUR

GROSS DOMESTIC PRODUCT AND INVESTMENT IN NEPAL

This chapter provides trend in Real Gross Domestic Product and real Investment in 2000/2001 price. Trend in Real GDP includes Gross Domestic Product at constant price and GDP growth rate. Likewise, it presents distribution of GDP in agriculture and in non-agricultural sector. Trend in Investment includes public fixed capital formation and private fixed capital formation. Likewise, it presents public and private fixed capital formation as a percentage of GDP.

4.1 Trend of GDP Growth

Table 4.1 shows that Nepal's GDP has raised nearly 410.10 times from 131.09 in 1974/1975 to 668.7 billion in 2013 /2014. GDP has increased substantially during the study period. During this forty year period, it reaches all time high at 8.89 percent in1980/81 and low at 0.16 percent in 2002 .The higher GDP growth during early 1990s was the result of government undertaking different reforms programs. Agriculture contribution in GDP is 34 percent so it has great role to affect economic growth rate. Besides, political stability also the major reasons for the increment of GDP. In 2001/02 growth rate was only 0.16 percent, because of Maoist insurgency, where every development work had affected. Capital flight was undertaken by private investors because of political unfriendly environment, power cuts in industrial sector..At the end of study period, i.e. in 2013/2014, GDP growth rate reaches to 5.14 percent because of political consensus among political parties, timely monsoon and different positive sign of growth affecting factors.

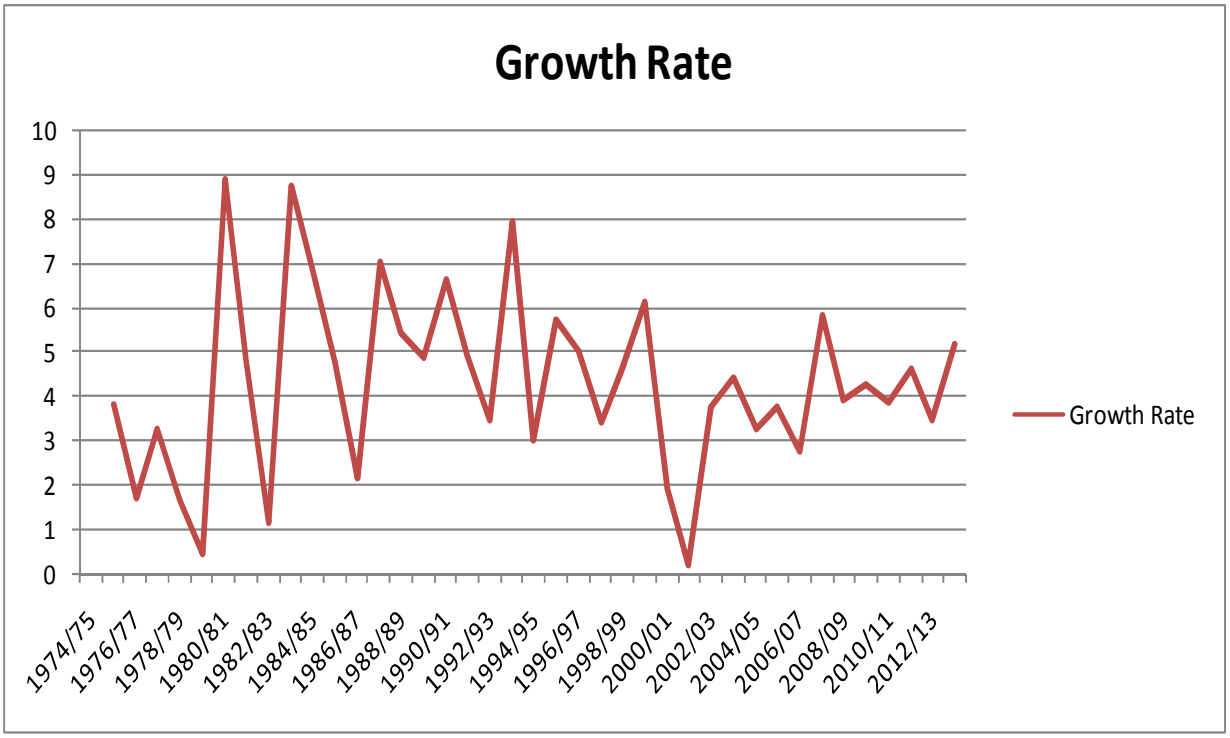
Table 4.1: Real GDP Growth Rate in Nepal (1974/75-2013/14

Rs in billion

Year	Gross Domestic Product	Growth Rate
1974/75	131.09	
1975/76	136.07	3.79
1976/77	138.35	1.67
1977/78	142.86	3.25
1978/79	145.16	1.6
1979/80	145.75	0.40
1980/81	158.72	8.89
1981/82	166.38	4.82
1982/83	168.21	1.09
1983/84	182.95	8.76
1984/85	195.52	6.87
1985/86	204.83	4.76
1986/87	209.15	2.10
1987/88	223.9	7.05
1988/89	235.97	5.39
1989/90	247.49	4.88
1990/91	263.95	6.65
1991/92	276.87	4.89
1992/93	286.44	3.45
1993/94	309.11	7.91
1994/95	318.4	3
1995/96	336.68	5.74
1996/97	353.58	5
1997/98	365.59	3.39
1998/99	382.34	4.58
1999/00	405.75	6.12
2000/01	413.42	1.89
2001/02	414.09	0.16
2002/03	429.69	3.76
2003/04	448.65	4.41
2004/05	463.16	3.23
2005/06	480.43	3.72
2006/07	493.65	2.75
2007/08	522.26	5.79
2008/09	542.65	3.90
2009/10	565.75	4.25
2010/11	587.53	3.84
2011/12	614.6	4.60
2012/13	635.9	3.46
2013/14	668.7	5.15

Source: Economic Survey various issues

Figure 4.1: Trend of GDP Growth Rate in Nepal (1974/1975-2013/2014)



Source: Economic Survey various issues

4.2 Distribution of GDP in Nepal (1974/1975-2013/2014)

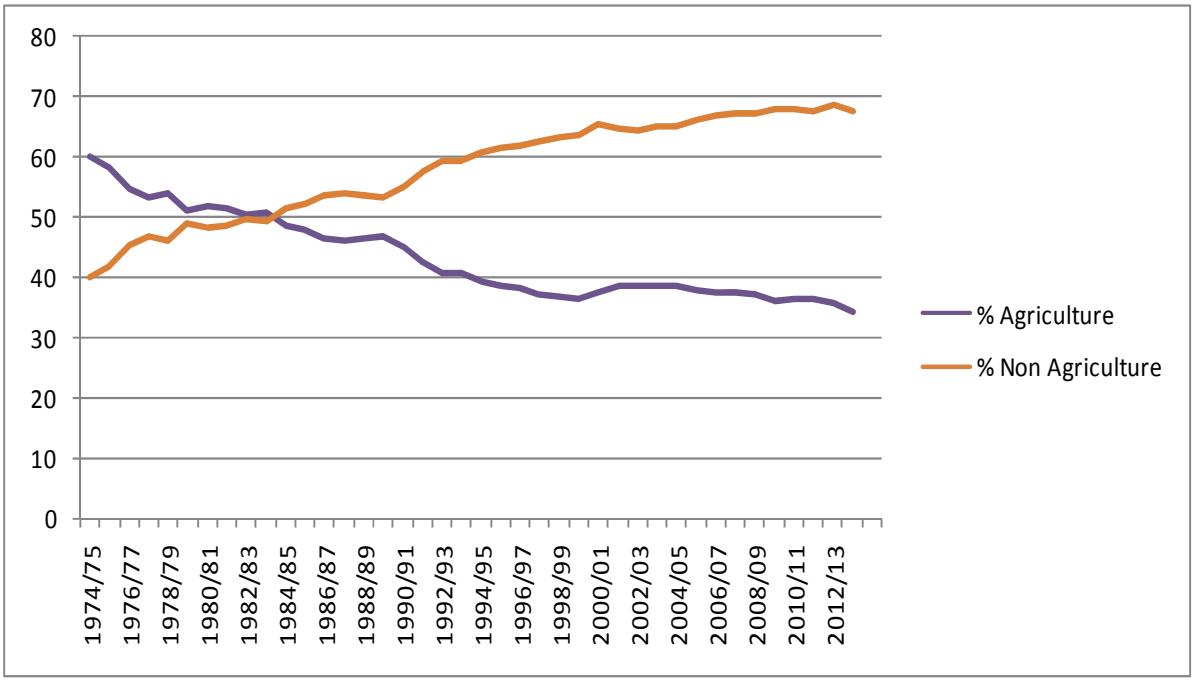
Table 4.2 shows that in the early of study period i.e.1974/75, percentage contribution of agriculture in GDP was 59.97, whereas, non agriculture sector contribution was 40. After fiscal year 1984/1985, the contribution of non agriculture sector to GDP has risen. At the end of the study period agriculture sector contribution to GDP reaches 34.40 percent whereas, non agriculture sector to GDP reaches 67.37 percent. This shows non agriculture sector greater contribution to GDP.

Table 4.2 Distribution of GDP in Nepal (1974/1975-2013/2014)

Year	Gross Domestic Product	Agriculture	% Agriculture	Non Agriculture	% Non Agriculture
1974/75	131.09	78.62	59.97	52.43	40.00
1975/76	136.07	79.06	58.10	57.02	41.90
1976/77	138.35	75.84	54.82	62.54	45.20
1977/78	142.86	75.81	53.07	67.04	46.93
1978/79	145.16	78.15	53.84	67.09	46.22
1979/80	145.75	74.42	51.06	71.30	48.92
1980/81	158.72	82.13	51.75	76.60	48.26
1981/82	166.38	85.88	51.62	80.55	48.41
1982/83	168.21	84.94	50.50	83.25	49.49
1983/84	182.95	93.04	50.86	89.95	49.17
1984/85	195.52	95.23	48.71	100.29	51.29
1985/86	204.83	97.81	47.75	107.02	52.25
1986/87	209.15	97.12	46.44	112.02	53.56
1987/88	223.9	103.49	46.22	120.40	53.77
1988/89	235.97	109.87	46.56	126.10	53.44
1989/90	247.49	116.21	46.96	131.27	53.04
1990/91	263.95	118.71	44.97	145.23	55.02
1991/92	276.87	117.45	42.42	159.42	57.58
1992/93	286.44	116.72	40.75	169.72	59.25
1993/94	309.11	125.59	40.63	183.51	59.37
1994/95	318.4	125.18	39.32	193.22	60.68
1995/96	336.68	129.95	38.60	206.73	61.40
1996/97	353.58	135.62	38.36	217.96	61.64
1997/98	365.59	136.77	37.41	228.81	62.59
1998/99	382.34	140.66	36.79	241.68	63.21
1999/00	405.75	147.54	36.36	258.20	63.64
2000/01	413.42	155.62	37.64	269.83	65.27
2001/02	414.09	160.42	38.74	266.97	64.47
2002/03	429.69	165.76	38.58	276.36	64.32
2003/04	448.65	173.73	38.72	291.09	64.88
2004/05	463.16	179.81	38.82	300.53	64.89
2005/06	480.43	183.01	38.09	316.52	65.88
2006/07	493.65	184.79	37.43	330.33	66.92
2007/08	522.26	195.55	37.44	349.74	66.97
2008/09	542.65	201.46	37.13	364.91	67.25
2009/10	565.75	204.01	36.06	384.57	67.98
2010/11	587.53	214.78	36.56	398.56	67.84
2011/12	614.6	225.48	36.69	415.11	67.54
2012/13	635.9	228.33	35.91	435.79	68.53
2013/14	668.7	230.00	34.40	450.50	67.37

Source: Economic Survey various issues

Figure 4.2 Distribution of GDP in Nepal (1974/1975-2013/2014)



Source: Economic survey various issues

4.3 Trend and Pattern of Investment in Nepal

Table 4.3 shows that total fixed capital formation was Rs 17.56 billion in 1974/1975 and has reached Rs 166.45 billion in 2013/2014, which is 847 percent increment in study period. Similarly, government fixed capital formation and private fixed capital formation has increased by 665.23 percent and 828 percent respectively. It shows that in compare to government fixed capital formation private fixed capital formation increases more.

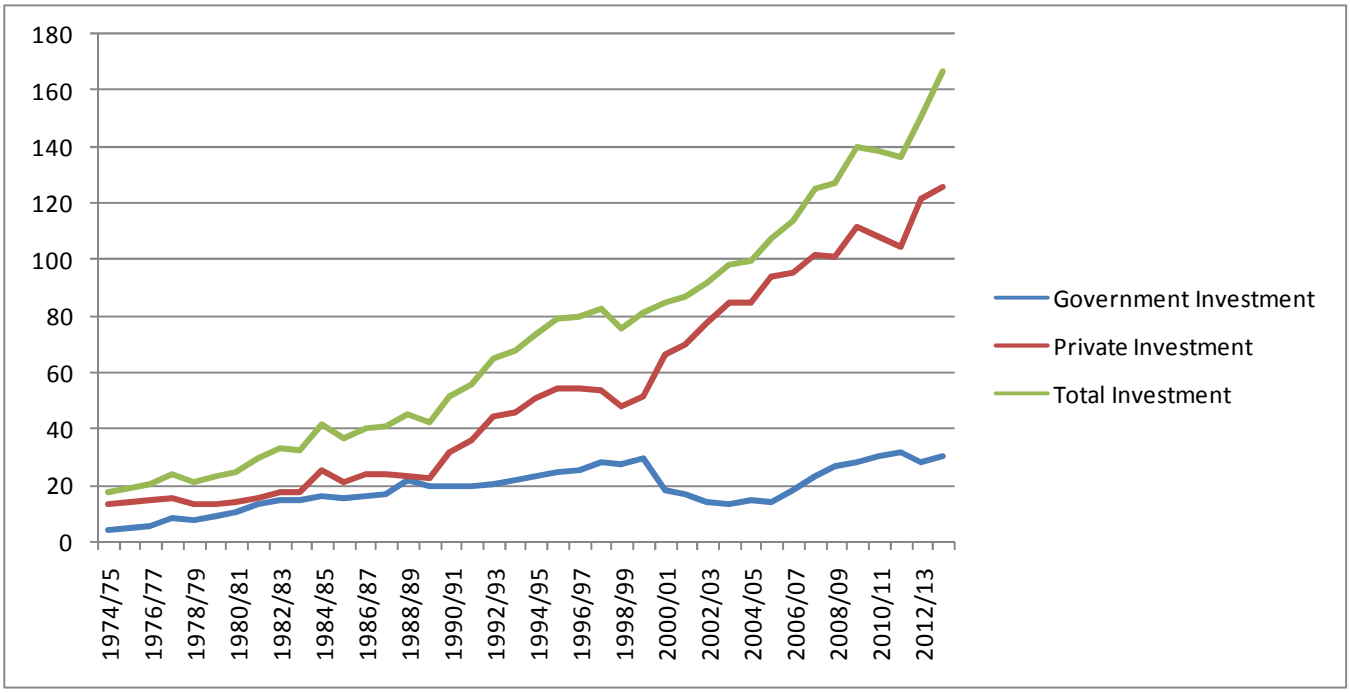
Table 4.3 Trend and Pattern of Investment in Nepal

Rs in billion

Year	Government Investment	Private Investment	Total Investment
1974/75	3.95	13.52	17.56
1975/76	4.92	14.16	19
1976/77	5.44	15.13	20.65
1977/78	8	15.78	23.82
1978/79	7.38	13.85	21.3
1979/80	9.11	13.79	22.97
1980/81	10.58	14.3	24.94
1981/82	13.31	15.95	29.32
1982/83	14.64	18.08	32.73
1983/84	14.5	17.46	32
1984/85	15.92	25.29	41.26
1985/86	15	21.24	36.29
1986/87	16.14	24.25	40.43
1987/88	16.75	24.25	41
1988/89	21.7	23.32	45
1989/90	19.75	22.4	42.18
1990/91	19.72	32	51.77
1991/92	19.75	36.2	55.96
1992/93	20.38	44.19	64.59
1993/94	21.58	46.2	67.79
1994/95	22.86	50.53	73.39
1995/96	24.782	54	78.87
1996/97	25.4	54.3	79.77
1997/98	28.46	53.97	82.43
1998/99	27.67	47.94	75.61
1999/00	29.26	51.91	81.19
2000/01	18.06	66.68	84.75
2001/02	16.77	69.73	86.5
2002/03	13.73	77.82	91.56
2003/04	13.42	84.57	98
2004/05	14.58	85	99.6
2005/06	13.86	93.5	107.39
2006/07	18.19	95	113.24
2007/08	23.60	101.78	124.87
2008/09	26.7	100.57	127.27
2009/10	27.96	111.40	139.7
2010/11	30.14	108.13	138.27
2011/12	31.68	104.43	136.12
2012/13	28.37	121.22	150.25
2013/14	30.27	125.56	166.45

Source: Economic survey various issues

Figure 4.3 Trend of Investment (1974/1975-2013/2014)



Source: Economic Survey various issues

4.4 Government and Private Fixed Capital Formation as a % of GDP

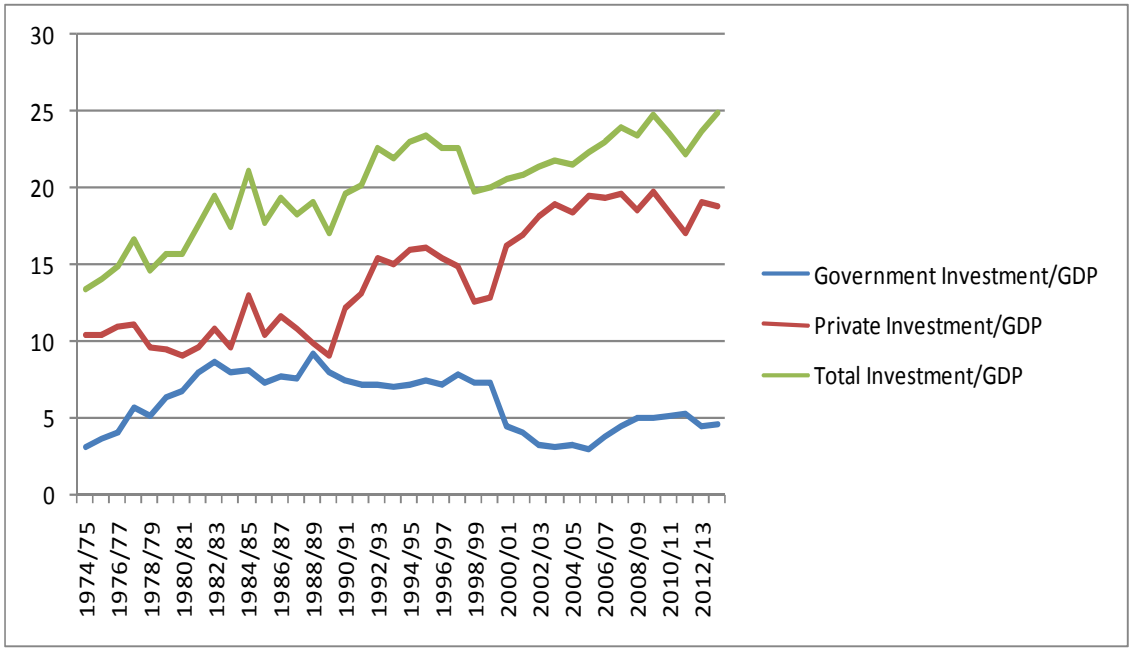
Table 4.3 shows that government fixed capital formation as a percentage of GDP was 3.01 in 1974/1975, as the initial of study period and has reached 4.53% in 2013/2014.Likewise, private fixed capital formation as a percentage GDP was 10.31 in 1974/1975 and has reached 18.78 percent in 2013/2014 .One interesting fact, in 2005/2006 government fixed capital formation reaches all time low as a percentage of GDP at 2.86 percent whereas, private fixed capital formation reaches all time high as 19.46 percent of GDP. It clearly shows that private fixed capital formation has great contribution in GDP rather than government fixed capital formation.

Table 4.4 Government and Private Fixed Capital Formation as a % of GDP

Year	Government Investment/GDP	Private Investment/GDP	Total Investment/GDP
1974/75	3.01	10.31	13.39
1975/76	3.62	10.40	14.03
1976/77	3.93	10.93	14.93
1977/78	5.62	11.04	16.67
1978/79	5.08	9.54	14.67
1979/80	6.25	9.46	15.76
1980/81	6.66	9.01	15.71
1981/82	8	9.58	17.62
1982/83	8.70	10.75	19.46
1983/84	7.94	9.54	17.51
1984/85	8.14	12.93	21.10
1985/86	7.32	10.37	17.72
1986/87	7.72	11.59	19.33
1987/88	7.48	10.83	18.31
1988/89	9.19	9.88	19.08
1989/90	7.98	9.053	17.04
1990/91	7.47	12.13	19.61
1991/92	7.13	13.07	20.21
1992/93	7.11	15.42	22.55
1993/94	6.98	14.94	21.9
1994/95	7.18	15.87	23.05
1995/96	7.36	16.06	23.42
1996/97	7.19	15.36	22.56
1997/98	7.78	14.76	22.54
1998/99	7.23	12.54	19.778
1999/00	7.21	12.79	20.01
2000/01	4.36	16.12	20.49
2001/02	4.05	16.83	20.890
2002/03	3.196	18.11	21.31
2003/04	2.99	18.85	21.84
2004/05	3.14	18.35	21.50
2005/06	2.88	19.46	22.35
2006/07	3.68	19.25	22.93
2007/08	4.42	19.48	23.90
2008/09	4.92	18.53	23.4
2009/10	4.94	19.69	24.69
2010/11	5.13	18.40	23.53
2011/12	5.15	16.99	22.149
2012/13	4.46	19.06	23.62
2013/14	4.52	18.77	24.891

Source: Economic survey various issues

Figure 4.4Trend in Government and Private Fixed Capital Formation as a % in GDP (1975-2014)



Source: Economic Survey various issues

CHAPTER FIVE

RELATIONSHIP BETWEEN INVESTMENT AND GROSS DOMESSTIC PRODUCT

This chapter presents the relationship between investment and gross domestic product through trend analysis and empirical analysi**s.** Trend analysis includes trend of investment and GDP and its growth rate. Whereas, empirical analysis includes Phillips Peron unit root test, Engle Granger Cointegration test and finally the error correction model.

5.1 Trend of Investment and Gross Domestic Product

In the initial stage of study period, GDP and total fixed capital formation was 131.0 billion, 17.56 billion respectively. Likewise, at the end of study period GDP reaches to 734.2 billion and total fixed capital reaches to 148.4 billion.GDP increases over time but investment fluctuates over time. From 1975 to 2014 total investment increases by 752.87 percent whereas, GDP increases by 410 percent.

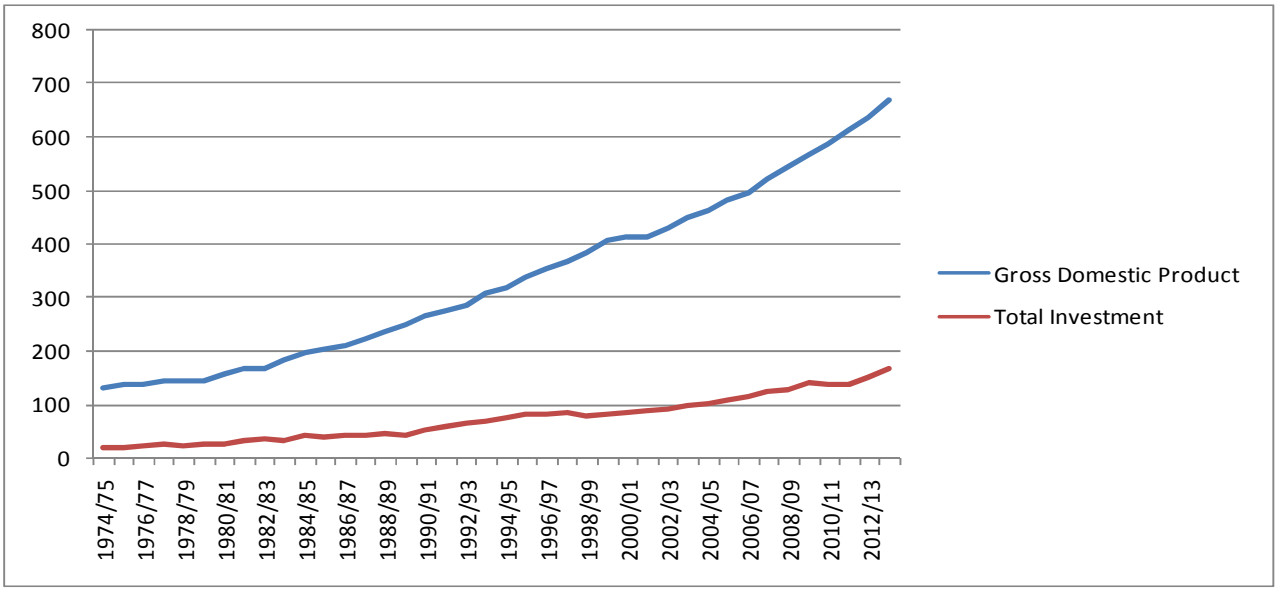
Table 5.1 Trend of Investment and Gross Domestic Product

Rs in billion

Year	Gross Domestic Product at Constant Price	Total Investment
1974/75	131.09	17.56
1975/76	136.07	19
1976/77	138.35	20.65
1977/78	142.86	23.82
1978/79	145.16	21.3
1979/80	145.75	22.97
1980/81	158.72	24.94
1981/82	166.38	29.32
1982/83	168.21	32.73
1983/84	182.95	32
1984/85	195.52	41.26
1985/86	204.83	36.29
1986/87	209.15	40.43
1987/88	223.9	41
1988/89	235.97	45
1989/90	247.49	42.18
1990/91	263.95	51.77
1991/92	276.87	55.96
1992/93	286.44	64.59
1993/94	309.11	67.79
1994/95	318.4	73.39
1995/96	336.68	78.87
1996/97	353.58	79.77
1997/98	365.59	82.43
1998/99	382.34	75.61
1999/00	405.75	81.19
2000/01	413.42	84.75
2001/02	414.09	86.5
2002/03	429.69	91.56
2003/04	448.65	98
2004/05	463.16	99.6
2005/06	480.43	107.39
2006/07	493.65	113.24
2007/08	522.26	124.87
2008/09	542.65	127.27
2009/10	565.75	139.7
2010/11	587.53	138.27
2011/12	614.6	136.12
2012/13	635.9	150.25
2013/14	668.7	166.45

Source: Economic survey various issues

Figure 5.1 Trend of Investment and Gross Domestic Product



Source: Economic survey various issues

Figure 5.1 shows that Real GDP and real investment trend upward over time. It shows, when total fixed capital formation increases , GDP also increases and when GDP increases in increasing rate investment also increases in increases rate and if GDP increases in decreasing rate investment also increases in decreasing rate.

5.2 Trend of GDP and Investment Growth Rate

GDP growth rates fluctuates over time and reaches all time high in fiscal year in fiscal year 1980.81 at 8.89 percent and all time low in fiscal year 2001/2002.Likewise, investment growth rate reaches all time high in fiscal year 1984/1985 at 28.81

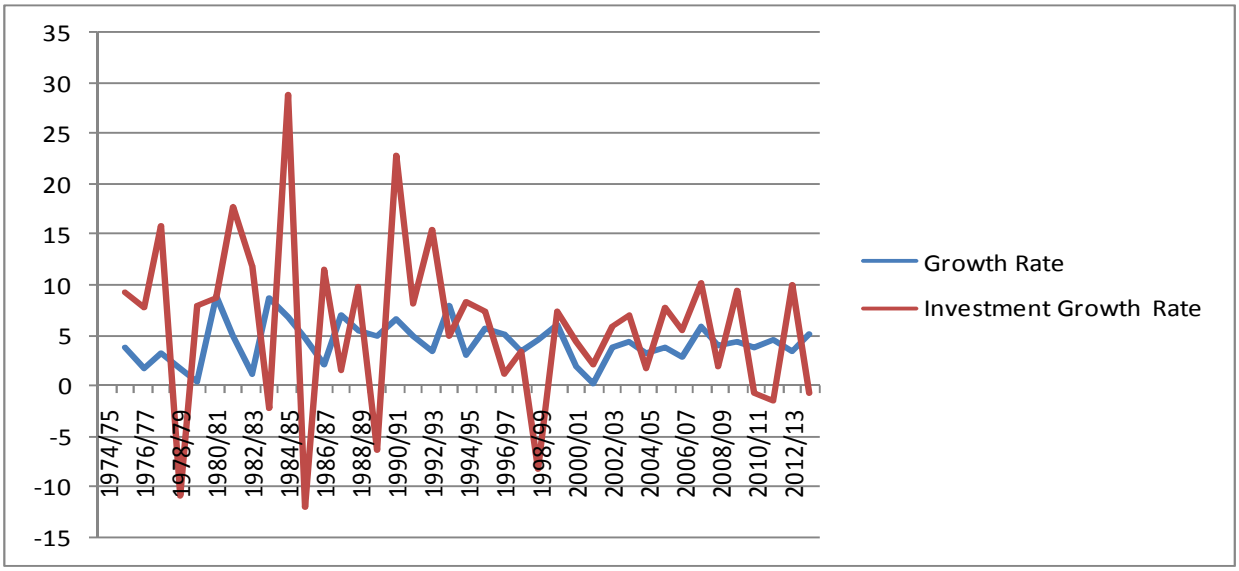
Table 5.2 Trend of GDP and Investment Growth Rate

Rs billion

Year	Growth Rate	Investment Growth Rate
1974/75		
1975/76	3.79	9.19
1976/77	1.67	7.77
1977/78	3.25	15.77
1978/79	1.6	-10.83
1979/80	0.40	7.847
1980/81	8.89	8.620
1981/82	4.82	17.62
1982/83	1.09	11.84
1983/84	8.76	-2.240
1984/85	6.87	28.81
1985/86	4.76	-12.04
1986/87	2.10	11.43
1987/88	7.05	1.498
1988/89	5.39	9.798
1989/90	4.88	-6.370
1990/91	6.65	22.75
1991/92	4.89	8.14
1992/93	3.45	15.38
1993/94	7.91	4.978
1994/95	3	8.27
1995/96	5.74	7.44
1996/97	5	1.16
1997/98	3.39	3.33
1998/99	4.58	-8.26
1999/00	6.12	7.35
2000/01	1.89	4.37
2001/02	0.16	2.08
2002/03	3.76	5.84
2003/04	4.41	7.03
2004/05	3.23	1.636
2005/06	3.72	7.81
2006/07	2.75	5.45
2007/08	5.79	10.26
2008/09	3.90	1.92
2009/10	4.25	9.49
2010/11	3.84	-0.782
2011/12	4.60	-1.555
2012/13	3.46	9.89
2013/14	5.15	-0.768

Source: Economic Survey various issues

Figure 5.2 Trend of GDP and Investment Growth rate



Source: Economic Survey various issues

5.3 Time Series Properties of Selected Variables

As mentioned in the previous chapter, in studying economic relationships one of the problems faced is spurious regression. This problem can be solved by checking if the variables are co_ integrated so that a long-run relationship exists between them. In co-integration analysis, the first step is to study the order of integration that is determined by unit root tests. In this paper Phillips Peron unit root tests is applied and the result is discussed below.

5.3.1 Phillips Peron Test of Variables

After time series (see annex) plot, we came to know that we see structural break in government investment. Phillips Peron test address these break while ordinary ADF test does not. PP unit root test has more power in correcting serial correlation problems.

Table 5.3: Phillips Peron Test Results

Variables in natural logarithm	From	test-statistic	P-value
lnGDP	Level with trend	-2.039	0.58
	First difference with trend	-5.74	0.0000
lnGI	Level with trend	-2.504	0.3261
	First difference with trend	-5.509	0.000
lnPI	Level with trend	-2.848	0.1800
	First difference with trend	-7.376	0.000

Above result shows that natural logarithm of Gross Domestic Product, Government Investment and private Investment have unit root in level form. lnGDP in the level accept the null hypothesis of unit root because test statics is low than its critical value -2.89 and also p-value is greater than 5 percent. After first differencing null hypothesis of unit root is rejected with greater critical value -5.74 and significant p-value. This shows lnGDP is stationary in first difference and known as integrated of order one i.e I(1). Likewise, lnGI also has unit root in level with test statistic -2.504 and p-value more than 0.05. After first difference, with test statistic -5.04 and p-value less than 0.05, it is also the integrated of order one. Lastly, lnPDI with its test statistic -2.84 and p value 0.18 in level form it accepts the null of unit root and after first differencing test statistic becomes -7.37 greater than its critical value and p value less than 0.05. So,this also exhibits integrated of order one. Therefore, being all variables integranated of order one or same order than we get permission to compute cointegration test.

5.3.2.1 The Engle - Granger Co-integration Test

From the first step Engle-Granger co-integration technique, it is shown that there exists a positive long-run relationship between investment and economic growth. Having the positive long run association between growth and investment, the short-run dynamics of the model on whether the economy converges to equilibrium or not

and if it converges the speed of adjustment to the equilibrium is studied using the error correction model that will be discussed in the next section.

Table 5.4: Regression Result after Correcting for Autocorrelation

Dependent Variable: ln(GDP)				
Method: Ordinary Least Square				
Number of observation: 40				
Variable	Coefficient	Std. Error	t-statistic	Prob.
C	3.04	0.096	31.48	0.001
ln(RGI)	0.147	0.041	3.56	0.001
ln(PI)	0.615	0.030	20.15	0.0000
R-squared	0.97			
Adjusted R-squared	0.96			
Prob. (F stat)	0.000000			
Durbin-Watson Stat	2.17			

The p values of the independent variables show a very small value (almost zero) which means that the regression coefficients are statistically significant both at 1% and 5% level. In addition to this the adjusted R2 has approximately a value of 0.96 which implies that the variation in GDP is well explained by changes in Real Government Investment and Real Private Investment. The value of the Durbin-Watson is 1.09 in the estimation before the first order Autoregressive is included in the equation. This shows the existence of a positive serial correlation problem and in order to avoid this, first order auto regression is used. Using first order auto regression the value of Durbin Watson statistic becomes 2.17 which show slight negative correlation. As shown in Table5.4, the new Durbin-Watson statistic is close to 2 implying that the problem of autocorrelation is treated. From the estimation result shown in Table 5.4, two important outcomes can be specified. There is the positive sign of the coefficient of RGI that implies the existence of a positive long run relationship between GDP and Government Investment. Likewise, the positive sign of the coefficent implies ,long run relation between PI and GDP. Having the positive direction of the relationship, the estimated coefficient of RGI suggests that if government Investment increases by one percentage the rate of GDP will increases by 0.14%. Similarly the estimated coefficient of RPI suggest if 1% increase in private

Investment the rate of GDP will increases by 0.61%.. However, it is necessary to discuss the findings of the coefficients of variables that explain GDP in the model. According to the estimation result given in Table 5.4, 14% of the variations in RGDP are explained by changes in the RGI and 61% variations in RGDP are explained by RPDI. The explanatory power of RPI is sufficiently high than RGI. The value of R^2 signifies that the model is best fit. So the Nepalese government should focus on boosting private investment through domestic as well from foreign sector.

ADF Test of Residual

E_t	Level	-3.764	0.0033

Above result shows that residual term is stationary because it rejects the null hypothesis of unit root. The result shows that test statistic is -3.764 which is greater than its critical value and the probability value is less than 5 percent. It is integrated of order zero i.e I(0). Thus, being residual term stationary at level form we can say there exist cointegration among the variables.

5.3.2.2 Short Run Relationship between GDP and Investment- Error Correction Model

To analyze the short-run adjustment of GDP towards equilibrium, the model given in equation (5) is estimated. The error correction model differs from the co-integration model given in equation (2) because it takes the first difference of dependent and independent variables in the regression process. In addition to this, the one term lagged value of the residuals in equation (2) is included in the error correction model as one of the explanatory variables at its levels.

In carrying out the error correction model, the first step is to take the residual series of the equation (2), and check for stationary of the residuals at levels. If the error term is found to be stationary at levels then, the dependent and independent variables are said to be co-integrated.

Accordingly, GDP and Investment are said to be co-integrated so that once again it can be proved that the long-run relationship between the two variables exist.

Table 5.5 The Estimation Result of the Error Correction Model

Dependent Variable: dln(GDP)				
Method: Ordinary Least Square				
Number of observation: 39 after adjustment				
Variable	Coefficient	Std. Error	t-statistic	Prob.
C	0.038844	0.0042839	9.07	0.000
dlog(GI)	0.0007537	0.023384	0.03	0.974
dlog(PDI)	0.0889755	0.0366584	2.43	0.021
ECTt-1	-0.1003322	0.064325	-1.56	0.128
R-squared	0.1487			
Adjusted R-squared	0.0.0758			

From the ECM estimation result, the coefficient of the lagged error correction term (εt-1) has a negative sign which satisfies the theoretical expectation that in the short-run the rate of GDP converges to its equilibrium point. In other words, the negative coefficient of (εt-1) can be interpreted that in case of any disequilibrium the GDP rate will be back towards its long-run. The speed of this adjustment however is determined by the magnitude of the coefficient. Based on the result of table, the value of the coefficient for the error correction term is - 0.100 implying 10% of the shock to the rate of GDP is adjusted in each year. This slow rate of adjustment process is also evidenced from the p-value of the coefficient which rule out the significant adjustment. On the other hand, the coefficient of RPDI in the error correction model shows the impact multiplier that measures the immediate impact that a change in log (RPDI) will have on RGDP. This shows the short-run effect of PDI on the rate of GDP. According to the ECM result given in Table 5.5, the coefficient for RPDI 0.088 and p- value is significant. It shows that PDI has short run impact on RDGP .But Government investment does not show short run impact to RDGP because of insignificant p-value. Although it shows long run relationship through Engle granger co- integration technique between private and government investment but in short run only private investment has relationship with economic growth. Though in the long-run 14% of the variation in GDP rate is explained by RGI, but in the short-run a one percentage point in the real GI leads to only 0.007% of variations in GDP. However, this result is statistically insignificant because the probability value of the t-statistic is

quite high, i.e., more than 0.05. Similarly, one percent point in RPDI leads to 8% of variations in GDP. This result is statistically significant because of low p-value.

Similar to the estimation in step 1 of the Engle Granger technique, it is worth discussing the short-run effects of other variables in the model, These results however, show that explanatory variables did not adequately describe the model as the co-integration test carried out in Table 5.4.

In conclusion, short-run changes in GI do not have a strong and significant impact on the change of the GDP rate as it has in the long-run. The other important economic interpretation in the error correction model is the coefficient of the lagged error correction term (ECT). It reveals that in a case of shock and disequilibrium, the model converges to its equilibrium position in the long-run. From the estimation result, it is revealed that 10% of the disequilibrium is adjusted in each year.

CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Summary and Conclusion

This thesis is motivated in time series analysis of investment and economic growth. The unstable macroeconomic historical condition of the country has made economic researchers and policy makers give much concern to the study of relationship between investment and economic growth. Due to this reason, even though the investment and economic growth literature is exhaustively assessed in international literature, a literature gap exists in Nepal in this area. This thesis is thus believed to contribute to fill this gap. The objective of this study is to examine the relationship between investment and economic growth in the long run and in the short run. In doing so, first we show trend analysis of real GDP and its growth rate, what we found from that trend analysis is, real GDP reached all time high in fiscal year 1980/81 with 8.89 percent, and reached low in fiscal year 2001/02 with 0.16 percent. Attainment of high growth rates was due to various reform programs and low due to Maoist insurgency. Likewise, agriculture sector to GDP declines from that fiscal period. In fiscal year 1974/75 the agriculture and non agriculture sector share of GDP was 59.997 and 40 percent respectively but at the end of the study period the agriculture sector declines and reaches to 34.40 percent and non agriculture sector contribution to GDP increases to 67.37 percent. Moreover, the study of trend analysis of trend and pattern of investment, we came to know that government fixed capital formation and private fixed capital formation increased by 665.23 percent and 828 percent respectively. The interesting facts that lies in this study is that in 2005/06 government fixed capital formation to GDP was at low level whereas, private fixed capital formation as a percentage of GDP had reached in high level. Lastly, we show the relationship through using econometrics tools and techniques. In doing so, firstly we check the stationary of the study variables using Phillips Peron test and found that in the level form all variables accept the null hypothesis of unit root and after first differencing all the variables become stationary. So, we can move onto the co-integration test for long run relationship. For co-integration test we use famous Engle-Granger co-

integration Test. The positive sign of coefficient shows that there is long run relationship among GDP and both government and private investment. The estimated coefficient of RGI suggests that if government Investment increases by one percentage the rate of GDP will increases by 0.14%. similarly the estimated coefficient of RPDI suggest if 1% increase in private Investment the rate of GDP will increases by 0.61%.

Since one of the aim of the study is to carry out the short-run relationship and short run dynamics. The results conclude that in the short-run, the relationship between the two variables GDP and private Investment is significant implies, short run relationship. Whereas, Government Investment is insignificant implies there is no short run relationship between GDP and Government Investment. However, regarding the dynamics the negative sign on the error correction term shows that in cases of any deviation of investment in the short-run, it will be adjusted to its long run equilibrium path. Concerning the speed of adjustment based on the Engle-Granger approach 10% of the deviation of GDP from its long-run path is adjusted in each year.

From this study we conclude that overall investment is important to economic growth but in comparison to government investment private sector investment has great role in nation capital formation.

6.2 Recommendations

From this study it can be strongly recommend that the investment and capital accumulation of the country should be increased, for that the level of saving should be increased. In the present scenario, the gross domestic saving is only 8.9 percent of GDP which is very low among other South Asian nations. Different fiscal and monetary policies should be addressed to increase the level of saving.

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Appendices

Appendix-1: Trend in GDP and Growth Rate

Year	Gross Domestic Product	Growth Rate
1974/75	131.09	
1975/76	136.07	3.79
1976/77	138.35	1.67
1977/78	142.86	3.25
1978/79	145.16	1.6
1979/80	145.75	0.40
1980/81	158.72	8.89
1981/82	166.38	4.82
1982/83	168.21	1.09
1983/84	182.95	8.76
1984/85	195.52	6.87
1985/86	204.83	4.76
1986/87	209.15	2.10
1987/88	223.9	7.05
1988/89	235.97	5.39
1989/90	247.49	4.88
1990/91	263.95	6.65
1991/92	276.87	4.89
1992/93	286.44	3.45
1993/94	309.11	7.91
1994/95	318.4	3
1995/96	336.68	5.74
1996/97	353.58	5
1997/98	365.59	3.39
1998/99	382.34	4.58
1999/00	405.75	6.12
2000/01	413.42	1.89
2001/02	414.09	0.16
2002/03	429.69	3.76
2003/04	448.65	4.41
2004/05	463.16	3.23
2005/06	480.43	3.72
2006/07	493.65	2.75
2007/08	522.26	5.79
2008/09	542.65	3.90
2009/10	565.75	4.25
2010/11	587.53	3.84
2011/12	614.6	4.60
2012/13	635.9	3.46
2013/14	668.7	5.15

Source: Economic survey various issues

Appendix- 2
Distribution of GDP in Nepal (1974/1975-2013/2014)

Rs in billion

Year	Gross Domestic Product	Agriculture	% Agriculture	Non Agriculture	% Non Agriculture
1974/75	131.09	78.62	59.97	52.43	40.00
1975/76	136.07	79.06	58.10	57.02	41.90
1976/77	138.35	75.84	54.82	62.54	45.20
1977/78	142.86	75.81	53.07	67.04	46.93
1978/79	145.16	78.15	53.84	67.09	46.22
1979/80	145.75	74.42	51.06	71.30	48.92
1980/81	158.72	82.13	51.75	76.60	48.26
1981/82	166.38	85.88	51.62	80.55	48.41
1982/83	168.21	84.94	50.50	83.25	49.49
1983/84	182.95	93.04	50.86	89.95	49.17
1984/85	195.52	95.23	48.71	100.29	51.29
1985/86	204.83	97.81	47.75	107.02	52.25
1986/87	209.15	97.12	46.44	112.02	53.56
1987/88	223.9	103.49	46.22	120.40	53.77
1988/89	235.97	109.87	46.56	126.10	53.44
1989/90	247.49	116.21	46.96	131.27	53.04
1990/91	263.95	118.71	44.97	145.23	55.02
1991/92	276.87	117.45	42.42	159.42	57.58
1992/93	286.44	116.72	40.75	169.72	59.25
1993/94	309.11	125.59	40.63	183.51	59.37
1994/95	318.4	125.18	39.32	193.22	60.68
1995/96	336.68	129.95	38.60	206.73	61.40
1996/97	353.58	135.62	38.36	217.96	61.64
1997/98	365.59	136.77	37.41	228.81	62.59
1998/99	382.34	140.66	36.79	241.68	63.21
1999/00	405.75	147.54	36.36	258.20	63.64
2000/01	413.42	155.62	37.64	269.83	65.27
2001/02	414.09	160.42	38.74	266.97	64.47
2002/03	429.69	165.76	38.58	276.36	64.32
2003/04	448.65	173.73	38.72	291.09	64.88
2004/05	463.16	179.81	38.82	300.53	64.89
2005/06	480.43	183.01	38.09	316.52	65.88
2006/07	493.65	184.79	37.43	330.33	66.92
2007/08	522.26	195.55	37.44	349.74	66.97
2008/09	542.65	201.46	37.13	364.91	67.25
2009/10	565.75	204.01	36.06	384.57	67.98
2010/11	587.53	214.78	36.56	398.56	67.84
2011/12	614.6	225.48	36.69	415.11	67.54
2012/13	635.9	228.33	35.91	435.79	68.53
2013/14	668.7	230.00	34.40	450.50	67.37

Source: Economic Survey various issues

Appendix- 3

Trend and Pattern of Investment in Nepal

Rs in billion

Year	Government Investment	Private Investment	Total Investment
1974/75	3.95	13.52	17.56
1975/76	4.92	14.16	19
1976/77	5.44	15.13	20.65
1977/78	8	15.78	23.82
1978/79	7.38	13.85	21.3
1979/80	9.11	13.79	22.97
1980/81	10.58	14.3	24.94
1981/82	13.31	15.95	29.32
1982/83	14.64	18.08	32.73
1983/84	14.5	17.46	32
1984/85	15.92	25.29	41.26
1985/86	15	21.24	36.29
1986/87	16.14	24.25	40.43
1987/88	16.75	24.25	41
1988/89	21.7	23.32	45
1989/90	19.75	22.4	42.18
1990/91	19.72	32	51.77
1991/92	19.75	36.2	55.96
1992/93	20.38	44.19	64.59
1993/94	21.58	46.2	67.79
1994/95	22.86	50.53	73.39
1995/96	24.782	54	78.87
1996/97	25.4	54.3	79.77
1997/98	28.46	53.97	82.43
1998/99	27.67	47.94	75.61
1999/00	29.26	51.91	81.19
2000/01	18.06	66.68	84.75
2001/02	16.77	69.73	86.5
2002/03	13.73	77.82	91.56
2003/04	13.42	84.57	98
2004/05	14.58	85	99.6
2005/06	13.86	93.5	107.39
2006/07	18.19	95	113.24
2007/08	23.60	101.78	124.87
2008/09	26.7	100.57	127.27
2009/10	27.96	111.40	139.7
2010/11	30.14	108.13	138.27
2011/12	31.68	104.43	136.12
2012/13	28.37	121.22	150.25
2013/14	30.27	125.56	166.45

Source: Economic survey various issues

Appendix-4

Government and Private Fixed Capital Formation as a % of GDP

Year	Government Investment/GDP	Private Investment/GDP	Total Investment/GDP
1974/75	3.01	10.31	13.39
1975/76	3.62	10.40	14.03
1976/77	3.93	10.93	14.93
1977/78	5.62	11.04	16.67
1978/79	5.08	9.54	14.67
1979/80	6.25	9.46	15.76
1980/81	6.66	9.01	15.71
1981/82	8	9.58	17.62
1982/83	8.70	10.75	19.46
1983/84	7.94	9.54	17.51
1984/85	8.14	12.93	21.10
1985/86	7.32	10.37	17.72
1986/87	7.72	11.59	19.33
1987/88	7.48	10.83	18.31
1988/89	9.19	9.88	19.08
1989/90	7.98	9.053	17.04
1990/91	7.47	12.13	19.61
1991/92	7.13	13.07	20.21
1992/93	7.11	15.42	22.55
1993/94	6.98	14.94	21.9
1994/95	7.18	15.87	23.05
1995/96	7.36	16.06	23.42
1996/97	7.19	15.36	22.56
1997/98	7.78	14.76	22.54
1998/99	7.23	12.54	19.778
1999/00	7.21	12.79	20.01
2000/01	4.36	16.12	20.49
2001/02	4.05	16.83	20.890
2002/03	3.196	18.11	21.31
2003/04	2.99	18.85	21.84
2004/05	3.14	18.35	21.50
2005/06	2.88	19.46	22.35
2006/07	3.68	19.25	22.93
2007/08	4.42	19.48	23.90
2008/09	4.92	18.53	23.4
2009/10	4.94	19.69	24.69
2010/11	5.13	18.40	23.53
2011/12	5.15	16.99	22.149
2012/13	4.46	19.06	23.62
2013/14	4.52	18.77	24.891

Source: Economic survey various issues

Appendix-5

Data Used In Regression Analysis

Rs in billion

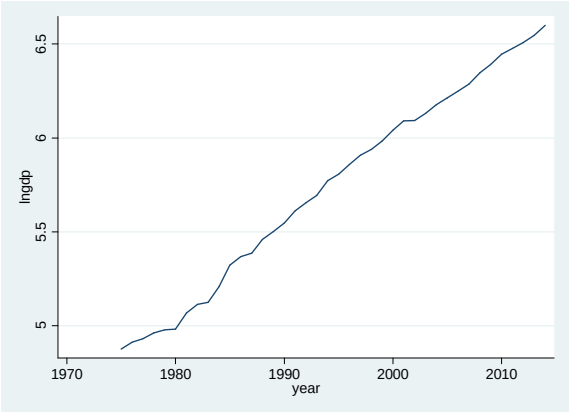
Year	Gross Domestic Product at Constant Price	Government Investment	Private Investment
1974/75	3.95	13.52	17.56
1975/76	4.92	14.16	19
1976/77	5.44	15.13	20.65
1977/78	8	15.78	23.82
1978/79	7.38	13.85	21.3
1979/80	9.11	13.79	22.97
1980/81	10.58	14.3	24.94
1981/82	13.31	15.95	29.32
1982/83	14.64	18.08	32.73
1983/84	14.5	17.46	32
1984/85	15.92	25.29	41.26
1985/86	15	21.24	36.29
1986/87	16.14	24.25	40.43
1987/88	16.75	24.25	41
1988/89	21.7	23.32	45
1989/90	19.75	22.4	42.18
1990/91	19.72	32	51.77
1991/92	19.75	36.2	55.96
1992/93	20.38	44.19	64.59
1993/94	21.58	46.2	67.79
1994/95	22.86	50.53	73.39
1995/96	24.782	54	78.87
1996/97	25.4	54.3	79.77
1997/98	28.46	53.97	82.43
1998/99	27.67	47.94	75.61
1999/00	29.26	51.91	81.19
2000/01	18.06	66.68	84.75
2001/02	16.77	69.73	86.5
2002/03	13.73	77.82	91.56
2003/04	13.42	84.57	98
2004/05	14.58	85	99.6
2005/06	13.86	93.5	107.39
2006/07	18.19	95	113.24
2007/08	23.60	101.78	124.87
2008/09	26.7	100.57	127.27
2009/10	27.96	111.40	139.7

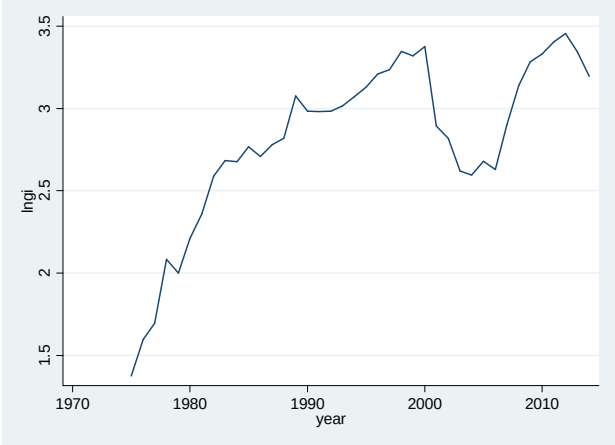
2010/11	30.14	108.13	138.27
2011/12	31.68	104.43	136.12
2012/13	28.37	121.22	150.25
2013/14	30.27	125.56	166.45

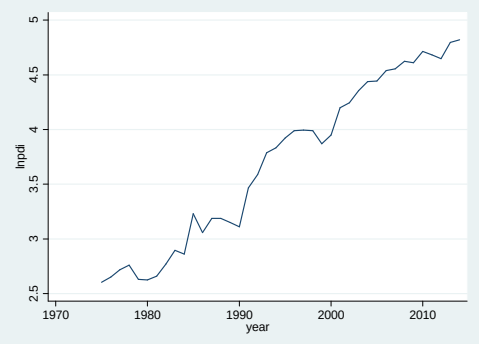
Source: Economic Survey Various Issues

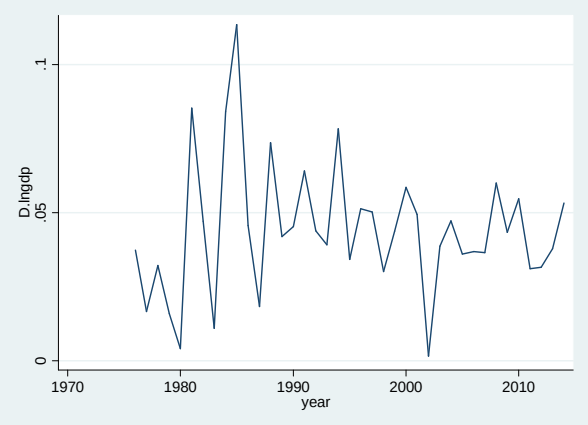
Appendix-6

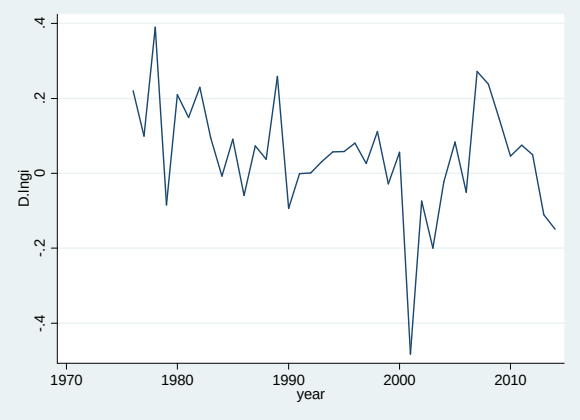
Time series plot of lnGDP lnGI lnRPI d.lngdp lngi lnpdi

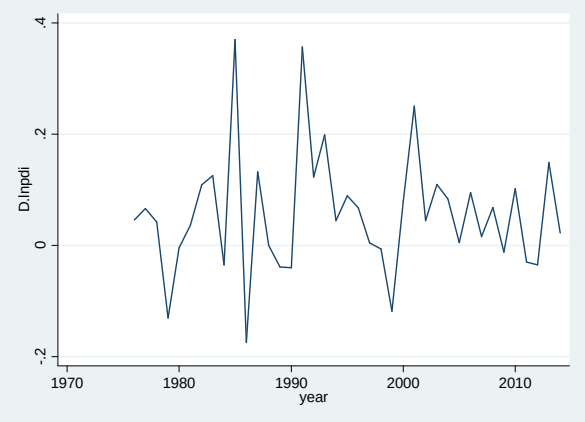









D.lngi
.4
.2
0
-.2
-.4
1970
1980
1990
2000
2010
year


D.lnpdi
.4
.2
0
-.2
1970
1980
1990
2000
2010
year

Appendix-7

ADF Test Results

Variables	From	test-statistic	P-value
LnGDP	Level	-1.657	0.7694
	First difference	-4.159	0.0052
LnGI	Level	-2.149	0.5183
	First difference	-2.688	0.2411
	Second difference	-3.441	0.0462
LnPDI	Level	-2.489	0.3332
	First difference	-4.053	0.0074

Appendix-8

zivot-Andrews Unit Root Test for dlnGDP, dlnGI and dlnPDI

```
Zivot-Andrews unit root test for  D.lngdp

Allowing for break in trend

Lag selection via TTest: lags of D.D.lngdp included = 2

Minimum t-statistic -5.034 at 1985  (obs 11)

Critical values: 1%: -4.93 5%: -4.42 10%: -4.11


Zivot-Andrews unit root test for  D.lngi

Allowing for break in trend

Lag selection via TTest: lags of D.D.lngi included = 1

Minimum t-statistic -2.787 at 1985  (obs 11)

Critical values: 1%: -4.93 5%: -4.42 10%: -4.11

.

Zivot-Andrews unit root test for  D.lnpdi

Allowing for break in trend

Lag selection via TTest: lags of D.D.lnpdi included = 0

Minimum t-statistic -7.704 at 1993  (obs 19)

Critical values: 1%: -4.93 5%: -4.42 10%: -4.11
```

Appendix- 9

Regression results of d.lnGDP d.lnGI d.lnPDI

```
. reg d.lngdp d.lngi d.lnpdi l.uhat1
```

Source	SS	df	MS		
Model	.002846111	3	.000948704	Number of obs	= 39
Residual	.016287836	35	.000465367	F(3, 35)	= 2.04
				Prob > F	= 0.1263
Total	.019133947	38	.000503525	R-squared	= 0.1487
				Adj R-squared	= 0.0758
				Root MSE	= .02157

D.lngdp	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lngi						
D1.	.0007537	.023384	0.03	0.974	-.0467183	.0482257
lnpdi						
D1.	.0889755	.0366586	2.43	0.021	.0145546	.1633964
uhat1						
L1.	-.1003322	.064325	-1.56	0.128	-.2309189	.0302545
_cons	.038844	.0042839	9.07	0.000	.0301472	.0475407