THE IMPACT OF HUMAN CAPITAL ON ECONOMIC GROWTH IN ETHIOPIA: EVIDENCE FROM TIME SERIES ANALYSIS

A THESIS SUBMITTED TO SCHOOL OF GRADUATE STUDIES OF JIMMA UNIVERSITY IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF DEGREE OF MASTER OF SCIENCE IN DEVELOPMENT ECONOMICS

BY

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JIMMA UNIVERSITY

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AUGUST, 2020
JIMMA, ETHIOPIA

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AUGUST, 2020
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DECLARATION

JIMMA UNIVERSITY

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A thesis Submitted to the School of Graduate Studies of Jimma University for the Partial Fulfillment of the Award of the Degree of Masters of Science in Development Economics.

I hereby declare that this thesis entitled "**The impact of human capital on economic growth in Ethiopia: Evidence from time series analysis**", is my original work and has not been presented for a degree in any other university, and all sources of material used for this thesis have been duly acknowledged list of references. Also, this work has been carried out under the guidance of Mr. Berhanu Getachew and Mr. Achalu Berecha.

By:

Mekoro Arega Gashe

Signature----------

Date ----------

APPROVAL OF BOARD OF EXAMINERS

JIMMA UNIVERSITY

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SCHOOL OF GRADUATE STUDIES

As a member of the Board of Examiners of the Master Thesis open defense examination, we testify that we have read and evaluated the thesis prepared by Mekoro Arega Gashe under the title "**The impact of human capital on economic growth in Ethiopia: Evidence from time series analysis**" and we recommend that this thesis be accepted as fulfilling the thesis requirements for the degree of Master of Science in Development Economics.

Approved By Board of Examiner

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Main advisor	signature	Date
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Co-Advisor	signature	Date
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Examiner (External)	signature	Date
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Examiner (Internal)	signature	Data

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"Who [am] I, O Lord GOD? And what [is] my house that thou hast brought me hitherto? "2nd Samuel 7:18. First and foremost, let me praise and honor the almighty God for the opportunity and capacity he gave unto me realize my objective.

I would like to express my deep gratitude and respect to my research advisor Mr. Berhanu Getachew (PhD candidate) and Mr. Achalu Berecha my co-advisor. For invaluable support, constructive comments for this research paper by reviewing each and every point comprehensively. Without their professional help and continual follow up, this thesis wouldn't have had its present shape. He deserves my special thanks. And I would also like to thank Jimma University, for providing a favorable environment to undertake this study.

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Mekoro Arega.

July, 2020

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ACRONYMS AND ABBREVIATIONS

ADF: Augmented Dickey Fuller test

AR: Autoregressive Order

CSA: Central Statistical Agency

DF: Dickey Fuller

ECT: Error Correction Term

EEA: Ethiopian Economic association

GTP: Growth and Transformation Plan

HSDP: Health Sector Development Plans

ILO: International Labor Organization

MOE: Ministry of Education

MOH: Ministry of Health

MOFED: Ministry of Finance and Economic Development

NBE: National Bank of Ethiopia

ODA: Official Development Assistance

TFP: Total Factor Productivity

TGE: Transitional Government of Ethiopia

UNDP: United Nation Decampment Program

VAR: Vector Autoregressive

VECM: Vector Error Correction Model

WB: World Bank

WDI: World Development Index

WDR: World Development Report

Abstract

The general objective of this study was to analyze the impact of human capital development on economic growth in Ethiopia using real GDP as a proxy for economic growth and govn't expenditure on education and on health as proxied human capital investment. In addition human capital stock variables such as: life expectancy, primary school enrolment and secondary school enrolment were used over the period 1974 -2018. Time series data was collected from NBE, MoFED, MoE and World Bank Data sets. The econometric models of Johnesan co integration, VECM and causality tests were applied to analysis short run and long run impact of Human capital on Economic growth by using statistical package Eview 10. The result shows that all variables are non-stationary at level (I (0)) and stationary at I (1). The result of the error correction model show that the model is adjusting at a relatively stable rate of 74.3% towards the long run equilibrium. Furthermore, the result shows that human capital proxied of (primary and secondary school enrolments) and active labor force have positive statistical significant long run and short run effect on economic growth in Ethiopia. The economic performance can be improved significantly when the human capital stock of primary and secondary school enrolment and active labor force of population improves and increase. Such findings are consistent with the endogenous growth theories which argue that an improvement in human capital (skilled workers) improves productivity. In addition, results reveal that education expenditure and life expectancy at birth have positive and statistically significant long run effect on economic growth. However, the expenditure on health, secondary school enrolment and official development assistance are statically significant and have unexpected negative impact on long run economic growth. Furthermore, the short run causality tests results reveals that public expenditure on education, primary school enrolment, secondary school enrolment and RGDP have unidirectional causal effects. Generally, human capital development or improvements have a large impact on human productivity which leads to improved national output per capita. Hence policy makers and/or the government give prioritize to create institutional capacity that increase school enrolment and strengthening the infrastructure or investment of educational and health institutions that produce quality of manpower to increase productivity.

KEY WORDS: *Causality, Economic growth, Education, Health, Ethiopia and Human capital Development*

CHAPTER ONE

1. INTRODUCTION

1.1. Background of Study

Human capital consists of the knowledge, skills, and health's that people accumulate over their lives, enabling them to realize their potential as productive members of society. A nation's ability to provide improving standards of living for its people depends crucially on its sustainable and long-run rate of economic growth as world development report (World Bank, 2019). It has large payoffs for individuals, societies, and countries' economies as a whole. Hence Human capital development is one of the necessary conditions for all kinds of growth- social, political, cultural, and economic aspects (Chitescu and Lixandru, 2016).

Human resources are used to achieve the economic growth. Countries develop their labor force, in terms of improving educational and health conditions. Thus, human capital investment is a means through which labor force or the population that is willing and able to work acquires skills and knowledge required for the transformation of the country and bringing about economic development (Chijioke and Amadi, 2019). The benefits of human capital development can also spill-over to other agents. At the firm level, the higher productivity of some employees, due to their higher education and experience, healthy may increase the performance of workers and the firm's profitability. Further, these spillovers are not limited to economic returns, education and health may make people better citizens and better parents, leading to greater social cohesion (Boarini, d'Ercole and Liu, 2012).

In the classical theory of economic growth, labor productivity is regarded as an exogenous factor which depends on the ratio between workforce and physical capital, plus other factors (technical progress), but the beneficial effect education on potential growth of productivity is not included in the model. The Neo-classical theory of economic growth developed in the early 1980s comes to correct this shortcoming of the classical theory emphasizing the importance of education and innovation, (elements of human capital) in long-term economic growth. In contrast to this, the theory of market value, shows that studies have highlighted the influence of intangible assets leading ultimately to economic growth overall national, regional or global, as the new growth theory (Tan, 2014).

Alternatives to these Neo-classical growth theories, the endogenous growth theories bring forward the idea that endogenous conditions of human capital like foreign trade policies, financial

development and public expenditures of a country can affect economic growth (Fine, 2000; Lucas, 1988; Musibau, Yusuf and Gold, 2019). The endogenous growth models developed by (Romer, 1990) and Lucas (1988) were giving emphasis on the endogenous growth theories that in the health care and education expenditures play an important role in the formation of human capital. In this respect, Health and education are not only means to accelerate economic growth but also recognized as the principal indicators of human capital development (Kesikoğlu and Öztürk, 2013).

Accumulation of human capital increases the productivity of workers and machines, equipment and other physical capital through innovation and adapting technology. General speaking, investment in education and health are believed to be the major components of human capital accumulation. Education plays a key role in the ability of a developing country to absorb modern technology and to develop the capacity for self-sustaining growth and development (Tamilina, 2012).

Health and education are two closely related proxy of human capital components that work together to make the individual more effective in production (Acemoglu, 2012). Improvement in health of workers increases productivity. In turn increase in productivity results in economic growth either through reducing work off days or through increasing production in work place (Yousefi and Movaghar, 2013). Health improvement influences mobility and labor force productivity, thereby enhancing the process and speeding up economic development. It is believed that such measures could improve the quality of life of their people and their efficiency as productive agents, thereby accelerating the general socio-economic development of their nation (Chijioke and Amadi, 2019). Thus, investing health and education can boost the economy.

In general, if done in compliance with efficiency, investments in education and health have effect on income of individual. Improved health and education help families escape some of the vicious circles of poverty in which they are trapped in. Thus both health and education can be seen as vital human capital components leading to growth and development (Yousefi and Movaghar, 2013). With higher income, people and governments can afford to spend more on education and health, and with greater health and education, higher productivity and incomes are possible (Acemoglu, 2010).

However, Sustained improvement in the Sub-Saharan Africa human development is found to be the lowest level in the world as the assessment made by UNDP (2013). The most of African countries continue to spend far less in education and health. In 2017, most of Africa country public expenditure on education is less than 6 percent of GDP. For example, 3.6 percent in Ghana, 5.2 percent in Kenya,

5.0 percent in Manutius, etc. In addition, Cameroon and Nigeria, Congo, Rep., Mali, and Ethiopia etc. spend less than 5 percent of GDP on health as world development report, 2019. The minimum per capita expenditure for essential health services recommended by the WHO Commission on Macroeconomics and Health for low-income countries is USD 38.4 while many African countries have not achieved that figure (World Health Organization, 2017).

In addition, Ethiopia is one of the developing African countries and exhibited low government spending and low private sector participation in healthcare financing and education sector comparing to other developing country. HDI's value for 2019 is 0.463 of one(1) which put the country in the low human development category positioning it at 173 out of 189 countries and territories according to the UNDP's Human Development index Report (Prakash and Garg, 2019; World Bank, 2019). This indicates Ethiopia has lower human capital investment and stocks than another country. Also, large economic variation with in a country. Therefore, this study will look at the impact of human capital formation on economic growth in Ethiopia considering both education and health aspects of human capital components in to consideration. Government Expenditure in education and health, school enrollment and life expectancy are taken as proxy variables for human capital developments.

1.2. Statement of Problem

Human capital development is one of the necessary conditions for all kinds of growth-social, political, cultural, and economic aspects. Human capital has large payoffs for individuals, societies, and countries (Chitescu and Lixandru, 2016). The concept that investment in human capital promotes economic growth actually dates back to the time of the Scottish economist Adam smith (1776) and the early classical economists who emphasized the importance of investing in human capital. Investments in human capital have become more important as the nature of work has evolved in response to rapid technological change, increase productivity and efficiency as world development report (World Bank, 2019).

Most schools of thought believe health and economic growth are intertwined. Health can strongly affect economic growth and economic growth can strongly affect health. Higher incomes promote better health through improved nutrition, better access to safe water and sanitation, and increased ability to purchase more and better quality health care. However, health may be not only a consequence but also a cause of high income (Bloom and Canning, 2008). Investments in health and education have direct effects on productivity and economic growth by producing healthy and educated Human Capital.

Many scholars, the theoretical and empirical studies including (Barro and Lee, 2010; 2013; 2017; Kazmi and Ali, 2017; Mankiw, Romer and Weil, 1992; Pelinescu, 2015) and others have shown that the importance of human capital in explaining differences in income growth across countries. Accordingly, increasing human capital with health aspects and education of the labor force appears to explain a substantial part of the growth of output in both developed and developing countries.

However, in Ethiopia the some of the study's results of human capital proxy variables were contradicted in short run and long run effect on economic growth. i.e., the results in short run and long run have not been consistent in different studies. E.g., According to Dinkneh and Yushi (2015) studies shown that public expenditure of health, primary and secondary school enrolment had positive statistically significant effect on economic growth both in long run and short run, but education expenditure has positive statistically significant effect on economic in long run but not in short run. Likewise Tertiary school enrolment and labor force were insignificant negative effect on economic growth both in the long run and in short run. Hence he used Johnson co integration techniques.

In contrast, Kidanemariam(2014) in the long run, the results shown that the public health expenditure and education human capital(secondary school enrolment) are the significant positive effects on economic growth, but government expenditure and official development assistance has significant negative effects. Similarly, Labor force and GCF have no significant effects on economic growth in long run. Conversely, In short run, health expenditure and official development assistance have insignificant negative impact on the economy growth. Education human capital, government expenditure and GCF are significant positive impact on economic growth in short run. Accordingly, in his study labor force is no significant impact on economic growth in SR and LR and in his study not included education expenditure and he used only secondary school enrolment as a proxy for the education human capital. He was applied ARDL model. furthermore, as study of woubet (2006) schooling has an insignificant impact on economic growth.

As in Kidanemariam, health expenditure has negative insignificant effect on economic growth in short run in contrast to Dinkneh. Also secondary school enrollment had positive significant effect in short run and long run while as Dinkneh, tertiary school enrollment has negative insignificant effects in long run and short run. In addition, Kidanemariam was take only school enrollment as proxy of education human capital but not included education expenditure on his study. Therefore, the results of these studies are mixed or contradicted. Thus, the impact of human capital in the economic growth cannot be resolved without appropriate methodology and appropriate measure of human capital.

Also in Ethiopia**,** investment of health services and education are Weak and limited coverage, especially in large portion of rural areas has inadequate health facility, and standardized education; it leaves insufficient financing available for investments in the other essential inputs for academic success. These challenges manifested in low education and health outcomes hurt the future productivity of workers and future competitiveness of economies. Hence, the gaps of this study the inadequate Expenditure on education and health to develop human capital and increase productivity. In addition, previous studies have been contradicted results between human capital proxy variables and economic growth in short run and long run effect. Here, in this paper, researcher concerned with human capital as a source of productivity or economic growth and incorporating other human capital proxy variables within the model. Applying the method of Johansen Co-integration approach, VECM and causality test.

1.3. Objectives of Study

1.3.1. General Objective of Study

The general objective of this study is to analyze the impact of human capital development on economic growth in Ethiopia using time series data over the period of 1974/15 to 2018/19.

1.3.2. Specific Objectives of study

The specific objectives of this study are:-

- ✓ To examine the short run as well as long run effects of human capital stocks such as school enrolment and life expectancy on economic growth in Ethiopia
- ✓ To determine the relationship between total Government expenditure on health and education and net official development assistance with economic growth in Ethiopia
- ✓ To identify the existence of causal relationships between human capital with economic growth in Ethiopia. If any, to investigate the direction of causality.
- ✓ To provide empirical evidences and guidance for future spending on the inadequacies in the Ethiopian health and education sectors

1.4. Hypotheses of the Study

Modern theory of economic growth argues that human capital, especially education and health has the principal role on achieving economic growth and development. Proponents of endogenous growth theory lay emphasis on human capital formation and regard it a factor that explains difference in growth performance of under developed and developed nations as Romer, 1992 cited by Tefera Y (2017). Then, this study tests the hypothesis:

Hypothesis 1

H1: human capital Stock variables have short run significance impact on economic growth

Hypothesis 2

H1: Human capital Stock variables have long run significance impact on economic growth

Hypothesis 3

H1: Government expenditure on health and education and net official development assistance have significant effect on economic growth. Similarly,

Hypothesis 4

H1: There is causality between human capital and economic growth.

In the empirical findings of this study, the researcher would be expected that there would be short run and long run significant relationship between human capital and economic growth and there is causality between human capital development proxy variables and economic growth has significant effect on economic growth of Ethiopia.

1.5. Significance of the Study

This study deals with the impact of human capital on economic growth in Ethiopia by taking various proxies variables of human capital. The theories and facts underlying the concept of human capital and its contribution to the national economy have been a growing subject area of interest for researchers. This study sought to contribute to the body of knowledge which exists now by providing empirical evidence specifically on impact of human capital development components including education and health aspects on economic growth in Ethiopia

Thus, the researcher believes that this study will contribute for different stakeholders such as for the researcher, governments, policy makers and other economic agents. In addition, understanding this, the study had the following significance.

- ✓ To improves the practical knowledge and skill of the researcher by making familiar with factual evidence and general information on the relationship between human capital and economic growth.
- ✓ Study will further support policy makers to compare financial expenditures on the stated sectors and the sectors contributions in the national economy of Ethiopia.
- ✓ To clarify the role of human capital on economic growth in the case of Ethiopia.
- ✓ It can also be used as a background for other researchers who are interested in doing research related with human capital.
- ✓ Generally, this study tried to provide comprehensive evidence on the Long Run and Short Run relationship between human capital development and economic growth of in Ethiopia by using yearly time series data.

1.6. Scope and Limitation of the Study

1.6.1. Scope of the Study

The geographical scope of the study is delimited to the political boundary of Ethiopia. It considers only the Human capital that affects economic growth in Ethiopia. In order to empirical analyze primary and secondary school enrollments and life expectancy is used as proxy human capital stock and governmental health and education expenditure used as proxy of human capital investment. On the other hand, the research did not include the impact of private expenditures on health and education. Because the most of time governments are provided basic health and education services r are provided by the government in Ethiopia. So, this study focused only on a public education and health sectors. The study would examine the long run as well as short run relationship between human capital development and economic growth in Ethiopia by using annual time sires data over 1974/5 to 2018/9 would be used.

1.6.2. Limitation of the Study

Looking at the variables in the model, the study would have selected different measurements for human capital stock as explained in different literatures. It is difficult that human capital itself independently contributes to individual development and national economic growth. The link between human capital and economic performance should be considered within a social and political context to precisely measure the human capital. However, the study fails to consider the non-monetary aspects of human capital such as, the social, political, cultural and other factors. It would have been consistent to the intention of the researcher to see the existing economic variations in the country at regional level as to whether they are attributed to differences in human capital developments. However, data access and availability limited the researcher's intention. A shortcoming of this study includes absence of disaggregated data over the period and variables. And the paper uses only governmental expenditures on education and health.

During the study time pandemic disease (COVID 19) was happened with in a country. This was challenges to accessibility of internet and it was affect the moral of researcher. However, different internet data sources would be used for various purposes and reference to download.

1.7. Organization of Paper

The whole paper is organized in to five chapters. The first chapter is dealing with introduction of the study that indicates I have thoroughly and critically evaluated the existing research in the area so as to identify my research gap, objective. Also it contains statement of the problem, objective of the study, research hypothesis, and significance of the study, scope and limitation of study and the organization of the paper itself. In the chapter two shows the critical review of the related literatures relevant to understand the topic of the study deeply. It contains theoretical, empirical findings and conceptual frame work of study was discussed. Chapter three contains the methodological aspect that shows the strength of the pair- wise relationship among the variables in our analysis and the study of which model is appropriate to our empirical model. This section includes: model speciation, estimation producer, data issues, estimation procedures and variable definition are discussed in detail. Chapter four deals about results and discussions including both the descriptive and result of empirical analysis and interpretation of the findings. Finally, chapter five provides an empirical investigation of the long run and short run impacts of the human capital on economic growth in Ethiopia. Then remarks and policy would be concluded. At the end, study followed by references and appendixes.

CHAPTRE TWO
2. LITERATURE REVIEW

2.1. Introduction of Literature

The chapter focuses on the theoretical and empirical literature reviews on the background of education and health; and presents the conceptual review on economic growth, and human capital providing evidence around the world and the study area; significance on the productivity of human capital which in turn has bearing on aggregate economic output. Moreover, the relationship between human development variables and economic growth are explained in the next sub-section as follows:

2.2. Theoretical Literature Review

2.2.1. Human Capital and Economic Growth Theories.

The process of economic growth and the sources of differences in economic performance across nations are some of the most interesting, important and challenging areas in modern social science. The analysis of the process of economic growth was a central feature of the work of the classical economists, as represented chiefly by Adam Smith, Thomas Malthus, David Ricardo, and Karl Marx were all concerned with the growth of the economy (I.e., the increase in the production of goods and services over time).

The interest of these economists in problems of economic growth was rooted in the concrete conditions of their time. Specifically, they were confronted with the fact of economic growth and social changes taking place in contemporary English society as well as in previous historical periods. According to a Smith (1776), the importance of 'invisible hand' (the force of supply/demand in a competitive market), specialization/division of labor, accumulation of physical capital (investment) and technological progress were the most determinants of economic growth in the long term and hence the prosperity of nations.

A wide range of studies have investigated the factors underlying economic growth. Using different conceptual and methodological viewpoints, these studies have placed emphasis on a different set of explanatory parameters and offered various insights to the sources of economic growth (Diebolt and Hippe, 2019).

The broad consensus highlighted in these studies is that a country's growth over a long period is basically determined by three factors, namely: (1) the efficient utilization of the existing stock of

resources, (2) the accumulation of productive resources such as human capital, and (3) technological progress (Dewan and Hussein, 2001, Ndambiri *et al.*, 2012). Moreover, research and development, economic policy and macroeconomic condition, openness to trade and institutional framework are among the most important determinants of economic growth. These broad categories can be further broken down into various determinants of economic growth. The influences considered here include human capital, physical capital, exports, Aid, government policies, inflation, external debt, government expenditure, financial systems and technological progress.

A variety of studies have addressed the issue of economic growth, mostly using either cross-country or panel data approach (Barro, 1997, 2003). While most of these studies utilize the standard neo-classical growth Model, More recent studies focus on endogenous growth models. There have been two periods of powerful work on growth theory, the first was in the 1950s and 1960s, and the second (30 years later) in 1980s and 1990s. In the first period, the neoclassical theory of growth was best known contribution by Robert Solow (1956).

2.2.2. The Keynesian Theory of Economic Growth

Unlike Smith's conception of saving (frugality) as an important prerequisite of growth, Keynesians approach gives emphasis to the demand aspect. According to the Keynesian theory of growth demand from consumer and state were the prerequisite for economic growth. This assumption means that changes in income, especially disposable income, is the prime influence on consumption expenditures. If the household sector has more income because of the economy is expanding, then they increase consumption expenditures. If the household sector has less income because of the economy is contracting and a large group of workers is unemployed, then they decrease consumption expenditures.

Following the publication of Keynes's *General Theory* in 1936, some economists sought to dynamize Keynes's static short-run theory in order to investigate the long-run dynamics of capitalist market economies. Roy Harrod (1939, 1948) and Evsey Domar (1946, 1947) were developing the growth model independently that relate an economy's rate of growth to its capital stock. However, the assumptions and results are, basically the same. While Keynes emphasized the impact of investment on aggregate demand, Harrod and Domar emphasized how investment spending also increased an economy's productive capacity (a supply-side effect).

The Harrod-Domar (H-D) model considers a closed economy in which one homogenous good *Y* is produced, where Y is gross output. This good may be either used as an investment good, *I*, or as a consumption good, *C*. The model suggests that the economic rate of growth depends on the level of savings, and the productivity of investment (i.e. in order to grow, economies must save and invest a certain portion of their GDP). The labor force is assumed to grow at a constant exogenous rate *n* and thus, $\frac{\dot{L}}{L}$ = n. Thus, an aggregate production function with fixed technological coefficient was given as:

$$Y_t = \min[\frac{Kt}{v}, \frac{Et}{u}] \text{ ----------(2.1)}$$

Where, Yt = total output (GDP) at a time t

Kt = physical capital stock at a time t

v = utilized capital-output ratio (constant, i.e. $\frac{K}{Y}$)

Et = effective labor force at a time t

u = employed effective labor-output ratio

Assuming a two-sector economy (households and firms), we can write the simple national income equation as:

$$Y_t = S_t + C_t \text{ ---------- (2.2)}$$

Where Yt = GDP, Ct = consumption and St = saving.

In the Harrod-Domar growth model, gross investment (It) is assumed to be equal to aggregate saving (St);

$$\text{That is } I_t = S_t \text{ ---------- (2.3)}$$

Subtitling [2.3] into [2.2] yields [2.4]

$$Y_t = C_t + I_t \text{----------} \text{ (2.4)}$$

The evolution of the capital stock over time is given by:

$$K_{t-1} = (1-\delta)K_t + I_t \text{ ----------(2.5)}$$

Where is δ the rate of depreciation of capital stock. By assuming that total saving (St) is some proportion (s) of GDP (Yt),

$S_t = sY_t$---------- (2.6)

We know that $V = \frac{K}{Y}$, from this K = vY and It = St =sYt, it follows that we can rewrite equation [2.5] as:

$vY_{t+1} = (1-\delta)\, vY_t + s\, Y_t$----------(2.7)

Dividing both sides by v, and subtracting Yt from both sides of equation [2.7] yields equation (2.8):

$Y_{t-1} - Y_t = (\frac{s}{v} - \delta)Y_t$ ----------(2.8)

Dividing both sides equation [2.8] by Yt yields that:

$\frac{\Delta Yt}{Y} = \frac{s}{v} - \delta, \quad g_y = \frac{s}{v} - \delta$ ---------- (2.9)

This simply states that the growth rate (g_y) of GDP is jointly determined by the savings ratio (s) divided by the capital–output ratio (v). The higher the savings ratio and the lower the capital–output ratio and depreciation rate, the faster will an economy grow (Brian Snowdon and Howard R. Vane, 2005).

2.2.3. Human Capital and Neoclassical Growth Theories

In the neo-classical growth model from the 1950s have no special attention was given to human capital. The Solow an exogenous growth theory that was developed at the height of the wave of newly independent countries can be considered the immediate predecessor of the new growth theories that emerged in the 1980s and 1990s. Basically, it was argued that the growth of physical capital had an effect on the growth of GDP while the unexplained residual, labeled Total Factor Productivity (TFP), explained economic growth in the long-run.

In addition, neoclassical growth theory argues that long-term economic growth is determined solely by the accumulation of factor inputs such as physical capital and labor. Solow (1956) Studies reveal a significant contribution from technical progress, which is defined as an exogenous factor. If there is no technological progress, then the effects of diminishing returns would eventually cause economic growth to cease. When we continue to provide people with more and more of the same capital goods without inventing new uses for the capital, then the extra capital goods become redundant and therefore the marginal product of capital will become negligible. This idea is captured formally by

assuming the marginal product of capital to be strictly decreasing in the stock of capital (Aghion and Howitt, 1998). In other words, assuming diminishing returns to scale, they said that as capital per worker increases, growth of the economy slows down until it reaches the steady state and the lower the initial level of income per capita the higher is the predicted growth rate (Weil, 2009). But the model cannot explain the existence of continuous economic progress (Zarra-Nazhad and Hosainpour, 2011).

2.2.4. The Solow Growth model and Economic Growth

Having disclosed general essence of neo-classical, it is interesting to review the works of Solow (1956) and Mankiw et al (1992), who are predominant scholars in their school.

Like classical, Solow (1956) developed growth model by modeling output as a function of capital and labor. He assumes that production take place using constant return to scale, where $\alpha+\beta=1$. However, each capital and labor is governed by diminishing marginal productivity. Moreover, Solow assumes that labor supply and technology are exogenously determined. Putting in mathematical form, supply of labor is given by $L(t)= L_oe^{nt}$ Loent, and technology is denoted by $A(t)= e^{gt}$ where labor and technology grow exogenously at a rate of n and g per time respectively. Solow by considering equilibrium of demand for labor and supply of labor, finally arrived at capital accumulation equation of $dk/dt= sF (k, L_oe^{nt})$.

Extending the model by including technology which are determined exogenously, capital accumulation equation is given by $dK/dt= se^{gt}k^{\alpha}(L_oe^{nt})^{\beta}=sK^{\alpha}Lo\beta e^{(n^{\beta}+g)t}$ **,** where $A(t)= eg^t$, is technology; α and β are the share of capital and labor in the nation's income (Solow, 1956).

Solow model put essential prediction, which deserves credit to mention some of them. i) The level of income of poor countries converges to rich ones irrespective of the initial difference in income. ii) The steady state level of income is merely a function of saving and populating growth. That is to say, the higher saving rate and the lower population growth, the higher will be the steady state level of income; and the reverse also true. iii) The steady state growth of per capita income has nothing to do with saving and population growth rates, rather it depends absolutely on technological growth. Nevertheless these predictions could not be taken as grant without justifying empirically (See for example, Solow, 1956 and Mankiw et al., 1995).

Mankiw et al. (1992) augmented Solow model by adding human capital in to the model. The model has also developed based on the assumption of decreasing return to scale of production function, where

$\alpha + \beta < 1$. This assumption contradicts Solow's constant return to scale. They have also assumed that one unit of resource is freely transform in to either one unit of physical capital or one unit of human capital. Moreover, they have assigned the same depreciation rate for all types of physical capital.

According to Solow model, the steady state level of per capita income is stated as

$$\ln[y(t)/L(t)] = \ln A(o) + gt + \alpha/(1-\alpha)\ln(s) - \alpha/(1-\alpha)\ln(n+g+\delta).$$

Where Y(t)/L(t) is output per labor, A(0) refers for technology, resource endowment, climate, institution and the like; g is advancement in knowledge, $n+g+\delta$ are growth of population (n) adjusted by technical progress (g) and depreciation rate (δ) (Mankiw et al.,1992).

Under augmented Solow model, the steady state level of per capital income is given by the equation,

$$\ln[y(t)/L(t)] = \ln A(o) + gt + (\alpha + \beta)/(1-\alpha-\beta)\ln((n+g+\delta) + a/(1-a-\beta)\ln(s_k) + \beta/(1-a-\beta)\ln(s_h)$$

Analytical comparison of the two models show that excluding human capital, the marginal effect of physical capital on per capita income is given by the coefficient of $a/(1-a)$ which in fact lower than including human capital which is given by $a/(1-a-\beta)$. Incorporating human capital in to the model, it makes the effect of physical capital on income stronger. To illustrate, it is not the existence of physical capital, but its efficient utilization of the resource that matters for growth. When higher levels of human capital are accumulated; machinery, equipment, building and the like capitals functions effectively and efficiently. Thus, the existence of human capital strengthened the effect of physical capital on per capita income than without including (Ibid).

2.2.5. Human Capital and Endogenous Growth Theories

In order to address the limitations of the neoclassical theory and answer the long-run determinants of economic growth, in the 1980s, endogenous growth models were developed. Lucas (1988) and Romer (1990), who are the famous proponents of this theory, include deliberately created technological changes as an explanatory variable in their growth model. For endogenous growth theorists, it is not only technology which determines the growth of a given nation, but there are other factors (such as human capital) that are not captured by the neoclassical growth model. Lucas (1988) considers human capital as a separate input in the production function formed predominantly by workers through education or on-the-job training. In the Lucas (1988) model, the rate at which human capital is being accumulated was seen as the critical determinant of productivity growth.

On the other hand Romer (1990)treats human capital as a factor affecting innovation that have a positive impact on the long-run rate of productivity growth, instead of treating human capital as a direct input to the production of goods. That means, for Romer endogenous growth is caused by accumulating technology and knowledge while for Lucas it is the non decreasing marginal returns of human capital that creates endogenous growth. Generally, they conclude that just having a large population is not sufficient to generate growth, rather stock of human capital and research and development are sources of economic growth. According to these models, the law of diminishing returns to scale may not be true since the returns on physical and human capital goods do not necessarily diminish through time. If the owner of the capital employs a skilled and healthy worker, the productivity of the capital and the technology will improve. Another justification to the possibility of increasing returns to scale is the spillover of knowledge across producers and external benefits from improvements in human capital (Wilson and Briscoe, 2004).

Similarly, in order to re-examines the Solow growth model and to explain the cross country per capita income variation, Mankiw et al. (1992) have formulated an augmented Solow model, in which human capital enters as a factor of production with those of physical capital and raw labor. They conclude that differences in human capital, saving and population growth determines cross-country differences in income per capita. That means accumulation of physical capital and population growth has greater impacts on income per capita when human capital is taken into account in the model. These scholars have used a Cobb Douglas production function to reexamine the Solow growth model.

The level of technology is determined within the system by the level of capital and labor. Taking in to account technology as a function of labor and capital, the production function for firm j can be written as $Yj= A (K, L)K_j^{1-\alpha} Lj^{\alpha}$. Once again A is the level of technology which is determined endogenously by spillover effect of knowledge. It is assumed that when there is investment in physical capital, there is technological progress due to spillover effect of knowledge where knowledge about technology transfers from firm to firm within system. In contrast, increase in the stock of labor in the economy discourages firms to innovate capital intensive technology and hence the level of technology diminished due to negative spillover effect. The equation tells that output of firm j is a function of K and L which are under its control and the level of technology which are determined locally. The level of technology in turn is the function of country wide stock of capital and labor (Romer, 1994).

In generally, the endogenous growth models played the central role of human capital in technological development and economic growth. According to these new growth theories the accumulation of human capital through education and on the job training fosters economic growth by improving labor productivity, promoting technological innovation and adaptation, and reducing fertility. Economic growth takes place due mainly to two factors: labor productivity growth and employment growth (Son, 2010).

2.2.6. The Return of Investing Education and Health on Economic Growth

Human capital is a broad concept which identifies human characteristics which can be developed and increase income. It is commonly taken to include peoples' knowledge and skills, acquired partly through education, and can also include their strength and vitality, which are dependent on their health and nutrition. Human capital theory focuses on health and education as inputs to economic production. This is the concept of human development which views health and education as intrinsically valuable outcomes to be placed alongside economic production as measures of human welfare. In understanding the role of human capital as an input into development it is necessary to consider the possible links between human capital, other forms of capital, income and growth (Appleton and Teal, 1998).

Investment in education and health promotes growth in national income of the country. Education and health are basic objectives of development; they are important ends in themselves. Health is central to well-being, and education is essential for a satisfying and rewarding life; both are fundamental to the broader notion of expanded human capabilities that lie at the heart of the meaning of development. At the same time, education plays a key role in the ability of a developing country to absorb modern technology and to develop the capacity for self-sustaining growth and development. Moreover, health is a prerequisite for increases in productivity, and successful education relies on adequate health as well. Thus, both health and education can also be seen as vital components of growth and development as inputs to the aggregate production function. Their dual role as both inputs and outputs gives health and education their central importance in economic development (Jones and Romer, 2010).

Human capital theory suggests that individuals and society derive economic benefits from investments in people. Education is often referred to as the prime human capital component but many authors including Boarini et al. (2012) and Eggoh, Houeninvo, and Sossou (2015) have argued that health expenditure is also a part of human capital investment. In this regard, modern theory of economic growth argues that human capital, especially one that accommodates education and health

has the principal role on achieving economic growth and development (Gyimah-Brempong and Wilson, 2005). Therefore, education and health expenditure increase the healthy and educated labor force can be created and the return or productivity also increased.

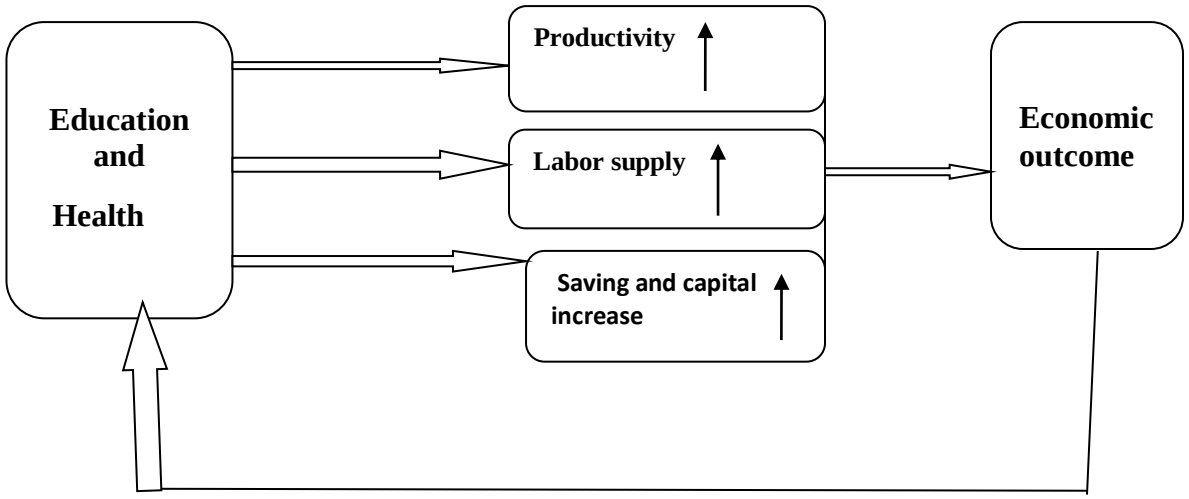
The analysis of investments in health and education is unified in the human capital approach. Human capital is the term economists often use for education, health, and other human capacities that can raise productivity when increased. An analogy is made to conventional investments in physical capital after an initial investment is made, a stream of higher future income can be generated from both expansion of education and improvements in health. As a result, a rate of return can be deduced and compared with returns to other investments (Kesikoğlu and Öztürk, 2013). This is done by estimating the present discounted value of the increased income stream made possible by these investments and then comparing it with their direct and indirect costs. Of course, health and education also contribute directly to wellbeing. For example, education increases empowerment and autonomy in major matters in life, such as capacity for civic engagement, making decisions concerning one's own health care, and freedom to choose one's own spouse over arranged marriage. But the basic human capital approach focuses on their indirect ability to increase wellbeing (Todaro and Smith, 2012).

Education and Health as Joint Investments sector for Development. Health and education are closely related in economic development. On one hand, greater health capital may improve the return to investments in education, in part because health is an important factor in school attendance and in the formal learning process. On the other hand, greater education capital may improve the return to investments in health, because many health programs rely on basic skills often learned at school, including personal hygiene and sanitation, not to mention basic literacy, education is also needed for the formation and training of health proficiency personnel. Finally, an improvement in productive efficiency from investments in education raises the return on a lifesaving investment in health (Todaro & Smith, 2012).Improvement in health of masses increases their productive capacity and leads to quantitative improvement in human capital. Therefore, expenditure on health care important in building and maintaining a productive labor force as well as in improving the levels of the people and quality of the society under the health programs are expanding medical knowledge (Kedir and Abdulnasir, 2018).

Human capital (health and education) investment generates significant social returns as well. People are more productive when they are healthier. The benefits of human capital transcend private returns,

extending to others and across generations. These individual returns to human capital add up to large benefits for economies countries become richer as more human capital accumulates. As a result, between 10 and 30 percent of per capita gross domestic product (GDP) differences is attributable to cross-country differences in human capital. This percentage could be even higher when considering the quality of education or the interactions between workers with different skills. Therefore, subsequent public investments in education and health are more likely to benefit people who start out better off. Government actions to support investment in human capital go well beyond spending on health, education, and social protection programs (World Bank, 2019).

Figure 2.1: The Relationship between Education and Health with the Economy outputs



Returns to human capital investment depend on the success of policies in promoting the growth of physical capital. There is evidence from micro studies that the income returns to education reflect the effects of education in raising productivity. These effects have been observed for both industry and agriculture. Fewer researches have been done on the productivity effects of health and nutrition in Africa. The limited evidence is consistent with conclusions from other developing countries that these effects may be substantial. The role of human capital in Africa's economic development is complex. Inadequate investment in education and health are clearly not the only cause of Africa's economic difficulties. However, the poor health and education of Africa's workers is one factor explaining low income and economic growth(Akinrinade and Barling, 2013).

2.2.7. Challenges in Improving Healthcare and Economic Growth in Africa

Healthcare is a public good that confers benefits directly to individuals and is also a human right to which all are entitled. Consequently, African member states have placed healthcare financing as one of the central tenets to improve the wellbeing of their populations. However, while a small number of African governments have increased the proportion of total public expenditure allocated to health, overall healthcare financing remains a major constraint to effective health service delivery undermining outcomes. Overall, health spending in Africa remains largely inadequate to meet the growing healthcare financing needs and the rising healthcare demands, creating a huge financing gap. The slowdowns in economic growth and high public indebtedness across the continent have restricted the fiscal space for the public financing of health. Total spending on healthcare in Africa remained within a narrow band of 5 to 6 per cent of GDP over the period 2000 to 2015, while at the same time in per capita terms it almost doubled from $150 to $292. Scarce public resources and unpredictable donor aid have resulted in the private out-of-pocket expenditure becoming the single largest component of total health expenditure, pushing many people into abject poverty. Health needs and the availability of funds for healthcare differ significantly across countries, and there is no consensus on how much countries should spend on the health sector. In 2001, member States of the African Union committed to allocate at least 15 per cent of their annual budgets to healthcare, commonly referred to as the Abuja target, but few countries have achieved this target (United Nations Economic Commission for Africa,2019.

2.2.8. Economic Growth and Human Capital in Ethiopia

2.2.8.1. Education and Health Policy in Ethiopia

Sustained economic growth will be achieved by high human capital such as education and health, sufficient infrastructures leading to high marginal productivity of capital, high saving rates, and a stable population. Growth performance is still dependent on a fragile economic sector and on exogenous conditions. Not only this but also, over a long period the economy has performed below expectations, given initial conditions (John et al., 2004).

2.2.8.2. Education Policy in Ethiopia

Education policy becomes very important to increase educated labor force. While each country's needs and conditions are different, a general recommendation arising from this study is that education policy must be closely tied with labor and economic policy. The educational system must not exist in a

vacuum; rather, decisions on priorities, curriculum, and budget allocation need to be made in line with medium and long term development plans. Likewise, if a country needs to improve governance and institutions, then standardized subjects cannot be eliminated from the curriculum. Likewise, development institutions will need to improve education sector strategies and policy (Acemoglu, 2010; Son, 2010).

Ancient Ethiopian Orthodox church a great impact on the development of education, but there was full curriculum consisted of religious teachings, prose, poetry and poems as well as documentation in Geez and Amharic. It is emphasized that education has, meaning only when in its cultural context and very little in contrast to the emerging socio economic transformations (Teshome, 2006).

In modern Ethiopian political economic history, Developments of modern education can be discussed in the three phases. The first phase is during the imperial period (1930 to 1974). At the beginning of the twentieth century, the education system's failure to meet the needs of people involved in statecraft, diplomacy, commerce, and industry led to the introduction of government sponsored secular education. Hence the more planned and coordinated expansion of education has been done after 1941, the primary objective of education had been to produce trained manpower that could run the emergent state bureaucracy (Teshome, 2006). After 1941 the series of concrete educational policies were introduced for the promotion of education in the country. From 1942 until 1955, the Ethiopian Government was engaged in the expansion of the education system. The high expenditure on education in relation to total expenditure, as well as the rapid growth of student enrolment showed the commitment of the Ethiopian government to the expansion of education.

The second phase is during the Derge (1974 to 1991) after the overthrow of imperial rule, the provisional military government dismantled the feudal socioeconomic structure through a series of reforms. The structure and organization of educational activities were changed alongside the objectives of the socialist government. The Government's goals for education are (1) education for production, (2) education for scientific consciousness, and (3) education for political consciousness (Tewodros, 2014).

The military regime worked toward a more even distribution of schools by concentrating its efforts on small towns and rural areas. With technical assistance from the Ministry of Education, individual communities performed all primary school construction. In large part because of such community

involvement, the number of primary schools expanded or increased significantly in all regions (Tekeste, 1996).

The last phase is during EPRDF (1991 up to present) the new strategy presupposes the overall lack of coordination between education, training, research and development efforts in the country. The New Education and Training Policy also addressed the issues of technical Vocational training. Thus, it is stipulated in the document that Parallel to general education, diversified technical and vocational training will be provided for those who leave school from any level of education for the development of middle level manpower. Investment is thought to be simply more schools, and places for more children in school. These are necessary conditions but insufficient alone to bring about needed development gains. More is needed, including increasing curriculum relevancy, training teachers to use the most effective pedagogy, improving the way schools are organized and managed, and involving parents and the larger community in supporting schools and ensuring quality education(Tosheme, 2006 and Wubet, 2006).

Still the majority of Ethiopia's economically active population did not attain even the primary level education. Especially the proportion of economically active population who attained Tertiary level has remained below one percent until the year 2000 (Kidanemariam, 2014).

2.2.8.3. Health Policy in Ethiopia

In the WHO's definition, a health system is "all the activities whose primary purpose is to promote, restore, or maintain health. Health systems include the components of public health departments, hospitals and clinics, and offices of doctors and paramedics. Outside this formal system is an informal network used by many poorer citizens, which includes traditional healers, who may use somewhat effective herbal remedies, or other methods that provide some medical benefits, but who also may employ techniques for which there is no evidence of effectiveness beyond the placebo effect. It has long been understood that some developing countries' health systems were far more effective than others in achieving health goals (Todaro and Smith, 2012). In Ethiopia following the change of government in 1991, the new Government of Ethiopia put in place many political and socio-economic transformation measures. Among these, it developed a first national health policy, which was followed by the formulation of four consecutive phases of comprehensive Health Sector Development Plans (HSDPs), starting from 1996/97. The policy and the first HSDP were based on critical reviews of prevailing national health problems and a broader awareness of newly emerging health problems in the

country. At the core of the health policy are democratization and decentralization of the health care system; developing preventive, promote and curative components of health care; assurance of accessibility of health care for all parts of the population; and encouraging private and NGO participation in the health sector.

The Federal Ministry of Health has built an impressive framework for improving the health for all, including maternal and neonatal health. There are also strategies on free service for key maternal and child health services (Health Care Financing Strategy), the training and deployment of new workforce of female. The Ministry has also established the MDG Performance Package Fund and given priority to maternal health, which is expected to facilitate mobilizing additional funding opportunities (HSDP, 2014).

The main cause of many of Ethiopia's health problems is the relative isolation of large segments of the population from the modern sector. Additionally, widespread illiteracy prevents the dissemination of information on modern health practices. A shortage of trained personnel and insufficient funding also hampers the equitable distribution of health services. Moreover, most health institutions were concentrated in urban centers prior to 1974 and were concerned with curative rather than preventive medicine (HSDP, 2011).

The current Government therefore accords health a prominent place in its order of priorities and is committed to the attainment of these goals utilizing all accessible internal and external resources. In particular the Government fully appreciates the decisive role of popular participation and the development of self-reliance in these endeavors. The Government believes that health policy cannot be considered in isolation from policies addressing population dynamics, food availability, acceptable living conditions and other requisites essential for health improvement and shall therefore develop effective inter sectarian for a comprehensive betterment of life. So health development shall be seen not only in humanitarian terms but as an essential component of the package of social and economic development (Alebachew et al., 2015).

2.2.9. Effects of Human Capital Migration on Economic Growth

One of the most complex phenomena that define globalization is the migration of labor force. Being based on the need of personal fulfillment or on the simple desire to survive, the phenomenon has major consequences for the countries involved in this process. Globalization gives the opportunity to accumulate human capital in that regions or countries where it already is abundant and well

rewarded in developed countries (Dinkelman and Mariotti, 2016).

Brains drain is the emigration of highly educated and skilled professionals and technicians from the developing countries to the developed world. This is particularly true in the case of scientists, engineers, academics, and physicians, many thousands of whom have been trained in home country institutions at considerable social cost only to gain the benefits from and contribute to the further economic growth of the already rich countries. The international brain drain has in fact influenced the style and approach of educational systems in the developing world. The brain drain, broadly construed, has diverted the attention of the scientists, physicians, architects, engineers, and academics that remain in their homeland from important local problems and goals (Maxim and Popescu, 2014).

The high skilled workers can perform more tasks, including the low skilled ones, so they do not necessarily need to migrate. But because they invested a large number of resources to specialize in doing specific tasks, they will look for a job corresponding to their education, with a good salary. In poor countries, the increase in the number of high skilled emigrants became a serious problem because those who migrate represent a growing share in the total population (Schiff and Docquier, 2016).

International migration in the Ethiopian context had shown dramatic increase starting from the late 1970's, which was the result of the political instability and revolution at that time (Alemayehu et al., 2011). Gradually, out migration which was predominated by the urban elite for political reason in the previous periods, started to take economic dimension and became the aspiration of most urban people (Acharya and Leon-Gonzalez, 2018).

The outflow of human capital resources from developing to developed countries appear to be somehow beneficial to the world economy today. This is due to the fact that developing countries are earning substantial amount of foreign exchange through migrant remittances whereas the advanced and semi-industrialized are enjoying higher surplus value as a result of employing cheap labor from these developing countries.

Conceptually, two main schools of thought can be identified with regard to the broad impact of foreign remittances on developing economies. These are remittance-optimistic developmental and the remittance-pessimistic migrant syndrome schools of thought (Ahortor and Adenutsi ,2009).

The ideology of remittance-optimistic developmental school is that international remittances have the potential of enhancing the development process via positively contributing to the elimination of

production and investment constraints through direct financing of critical developmental projects, raising the average household incomes, lessening balance of payment problems, facilitating debt servicing and narrowing the trade gap of developing countries. From the developed nations' point of view, the emergence of remittances on the global scale has further encouraged international migration to advanced countries resulting in increasing large scale production due to cheap labor from developing economies. This reduces average cost of production in industrialized countries. Understanding the underlying motivations behind remitting is necessary for investigating the economic impact of remittances.

Remittances have been found to have an income stabilizing effect at the macroeconomic level (World Bank 2019), and at the household level. Remittance-receiving households in Ethiopia used their cash reserves and thus avoided having to sell their livestock to cope with drought (Mohapatra et. al., 2009). Furthermore, migration has been observed to increase health knowledge in addition to the direct effect on wealth, which has led to lower rates of infant mortality and higher birth weights in Mexico (Hildebrandt and McKenzie, 2005).

In particular, additional income from remittances can relax budget or credit constraints, allowing for investment in goods and services such as education. The effect of remittances on household to invest on education, income from remittances may increase investment. For instance, households must pay many different types of fees to send their children to school; these fees often take the form of uniforms, books, building fees, etc. Thus, the financing of primary and secondary schooling can be non-slight, especially for poorer households (Hines et al., 2018).

2.3. Empirical Literature Review

A number of studies have been done by economists and researchers to examine how human capital accumulation affects a country's economic growth, by applying different techniques and methodologies. The contribution of human capital accumulation on economic growth is ambiguous magnitude of proxy variables. Also, various researchers have used different proxies for measure human capital and their conclusions are controversial about the relationship between human capital and economic growth in the world. Some studies suggested that human capital development has a larger impact on economic growth and others suggested the reverse.

As empirical study of Eggoh et al. (2015) the relationship between human capital (measured by education and health related variables) and economic growth of African countries over the period from 1996 to 2010. Using traditional cross-section and dynamic panel techniques, we found that education and health expenditures have a negative impact on economic growth for a sample of African countries due to their inefficiency, corruption, bureaucracy and underinvestment. However, the inefficiency of public spending is higher in education than health sector and the health indicators contribute more economic growth than the education variables.

Jaiyeoba (2015) carried out an empirical investigation on the relationship between investment in education, health and economic growth in Nigeria, using time series data from 1982 to 2011. He employed trend analysis, the Johansen co-integration and ordinary least square technique. Empirical findings however indicate that there is a long-run relationship between government expenditure on education, health and economic growth. The variables: health expenditure, secondary and tertiary enrolment rate and gross fixed capital formation appear with the expected positive signs and are statistically significant (except primary enrolment rate). The findings of this work have strong implications on education and health policies and considering that they are of great debate in the country. Therefore, this study recommends that in order to accelerate growth and liberate Nigerians from the vicious cycle of poverty, the government should put in place policies geared towards massive investment in the education and health.

Lawanson (2015) investigated the relevance of educational and health components of human capital to economic growth, using a panel data from sixteen West African countries over the period 1980 to 2013. He employed Diff-GMM dynamic panel technique. The empirical findings indicate that coefficients of both education and health have positive statistically significant effects on GDP per capita. The paper affirms the strong relevance of human capital to economic growth of West Africa. He recommended that increased resources and policy initiatives to motivate and enhance access to both health and education by the population should be pursued by policy makers.

Hadir and Lahrech (2015) examined the relationship between human capital development and economic growth in Morocco using annual data from 1973 to 2011. The ordinary least square regression method was adopted using total government expenditure on health and education, the enrolment data of tertiary, secondary and primary schools as proxy for human capital. The study revealed a positive relationship between total government expenditure on education, total government

expenditure on health, primary school enrollment, secondary school enrollment and tertiary school enrolment in long run. They therefore recommended that the effort of Government on increasing primary school enrolment through the free compulsory universal basic education should be sustained and the government should invest more and more in Health. Thus improvements in health may increase output not only through labor productivity, but also through the accumulation of capital.

The causality between government expenditure on education and economic growth in Malaysian economy was studied by Hussin, Muhammad and Razak (2012) using time series data from 1970 to 2010 and applying Vector Auto Regression (VAR) technique. They found out that economic growth co-integrated with fixed capital formation, labour, labour force participation and government expenditure on education. On education causing growth, the study proved that human capital such as education plays an important role in influencing growth. The research demonstrated that government expenditure on education, work force participation and capital to a greater extent influence long run economic growth.

Mankiw et al. (1992) investigated the link between education and economic growth in industrialized and less industrialized countries. They examined variations in school enrolment rates, using a single cross-section of both the industrialized and the less developed countries. Both studies concluded that schooling has a significantly positive impact on the rate of growth of real GDP. Similarly, Mallick, Das, and Pradhan (2016) also investigated the impact of government educational expenditures on economic growth. Their findings showed a strong positive impact on economic growth.

Wilson and Briscoe (2004) examined the links between education and training in a country and its macroeconomic growth. According to the result-increased investment in education is shown to lead to higher productivity and earnings for the individual and similarly, such investment results in significant social rates of return. The returns on investment in vocational training are more difficult to demonstrate. It is concluded that, the impact of investment in education and training on national economic growth is positive and significant effects.

According to Odit, Dookhan, and Fauzel (2010) focused on the impact of investment in education on economic growth in Mauritius. We used the Cobb-Douglas production function with constant returns to scale where human capital is treated as an independent factor of production in the human capital augmented growth model by bringing evidence or data from for the period 1990 to 2006. The results revealed that human capital growth and physical capital in the long run to were a positive and

significant impact on the growth of output or economic growth. Besides, human capital is seen to facilitate the adoption and implementation of new technologies, which are continuously invented at exogenous rate.

According to Anbela et al. (2014) identified as human capital is one of the main determinants of economic growth and plays an important role in the technological progress of countries. Based on econometric panel data estimations involving a set of OCDE countries over 1960-2011, we found that the interaction between human capital and structural change towards high knowledge intensive industries affects the economic growth. However, the sign of this effect depends on the type of country and length of the period of analysis. Specifically, in the long term and in developed countries, the impact of the interaction between human capital and structural change is positive. In the case of less developed countries, and considering a shorter run, the effect of human capital via specialization in high-tech and knowledge intensive activities emerged as negative.

Imran et al. (2012) also this examined the role of human capital formation in economic growth in Pakistan by using the secondary data for the period of 1972/73 to 2010/11. The results implied that school enrollment (proxy for human capital), health and physical capital are important to boost the economic growth in Pakistan. Human capital, fixed capital and employed labor force affect the GDP and result in unidirectional and non-unidirectional causality. we concluded that education enrollment index, gross fixed capital formation and Gini coefficient have positive and significant impact on gross domestic product, while head count ratio and infant mortality rate, CPI inflation and investment growth rate have negative and significant impact on gross domestic product.

Altiner and Toktas (2017) the relationship between of human capital and economic growth for selected 32 developing countries is investigated by panel data analysis method using data from the period 2000-2014.The variables primary school enrollment, secondary school enrollment and tertiary school enrollment were used as the indicators of the human capital. According to the results, it has been seen that the increase in the labor force negatively affects economic growth but positively affects the increase in physical capital and human capital. It has also been found that physical capital is more effective than human capital on economic growth. The effect of secondary and tertiary school enrollment rate on economic growth is positive and statistically significant. But, effect of primary school enrollment rate on economic growth is statistically insignificant.

Arabi and Abdalla (2013) investigate the impact of human capital on economic growth in Sudan for the period 1982-2009 by using a simultaneous equation model that links human capital i.e., school attainment; and investment in education and health to economic growth, total productivity, foreign direct investment, and human development index. Based on three-stage least squares technique, the empirical results presented that quality of the education has a determinant role in the economic growth; health quality factor has a positive impact on economic growth as expected and total factor productivity which mainly represents the state of technology has adverse effect on economic growth and human development.

Gisore et al. (2014) investigated the effect of government expenditure on economic growth in East Africa over period of 1980 to 2010. The study focused on disaggregated expenditure and using balanced panel fixed effect model. The findings showed that expenditures on health and defense to be positive and statistically significant effect on growth. In contrast, education and agriculture expenditure were insignificant. This study suggests that for East Africa, the policy of increasing spending on health and defense budget to promote economic growth will be appropriate, but fewer funds should be channeled towards other sectors.

According to Kazmi et al. (2017) investigated Impact of Human capital on Economic Growth over the period of 1992 to 2014 for Pakistan. Variables Real GDP, Capital used for the production in economy, Number of labour used in the production and school enrolments, life expectancy, health, knowledge, and skills were collectively known as human capital and employed the Johansen co-integration technique in order to find short run and long run association between human capital and economic growth. The results show that there is a long time association between human capital and economic growth, therefore investment in human capital has positive effect on the economic growth.

According to Mehrara and Musai (2013) investigates the causal relationship between gross domestic investment and GDP for the Middle East and North Africa countries estimating panel unit root tests, co-integration and Granger Causality analysis for the period 1970 to 2010 by using variables of real gross domestic investment and real GDP per capital. The results showed that there is strong causality from economic growth to investment in these countries. In addition, the results indicate that there is a long run and short run significant relationship between investment and GDP. Therefore, the findings support the higher economic growth that leads to higher investment.

According to Anyanwu, Adam, Obi, and Yelwa (2015) **e**xamines the impact of human capital

development on economic growth in Nigeria Considering over the period of 1981-2010, we adopting the endogenous modeling approach cast with in the auto regressive distributed lag (ARDL) framework was adopted. Variables used in the model where gross domestic product, Gross capital formation, government total expenditure on education, government total expenditure on health, labour force, primary school enrolment, secondary school enrolment, tertiary enrolment. Findings shown that in long run, estimated model revealed that government expenditure on education and health, labor force, primary and tertiary enrollments had positive but insignificant effect on economic growth. The impact of government gross capital formation and secondary enrolment on economic growth found to be statistically insignificant and negative effects. It is only tertiary enrolment at lag one that has significant impact on economic growth in the long run. Further evidence indicated that equilibrium is fully restored for any distortion in the short-run. Therefore, the government to invest more in human capital development process and endeavors prioritize the health and education sectors budgeting considering their growth driving potentials in Nigeria.

Pelinescu (2015) the impact of human capital on economic growth period 2000-2012 by applying a panel methodology and using GDP per capita as dependent variables, education expenditure in GDP, number of employees with secondary education, exports of goods and services and the number of patents were considered as human capital indicators as independent variables. The results showed that a positive and statistically significant relationship between GDP per capita and innovative capacity of human capital (evidenced by the number of patents) and qualification of employees (secondary education) as economic theory. However, the negative relationship between education expenditure in GDP and GDP per capita, a possible explanation being the heterogeneity of countries considered.

According to Urgaia (2018) the growth rates of human capital resources and the physical capital stock have long run effects on the growth rate of gross national income per capita in a panel of nine East African countries over the period of 1980 to 2015. The long-term transmission mechanism of the human capital growth contributes hugely to the development of physical capital stock through gross national income. The economic growth has also a positive role in accumulating human capital resources.

Acharya and Leon-Gonzalez (2018) examined the impact of Remittances, Human Capital on Economic Growth using panel data (1975-2014) for 18countries in Asia and Sub-Saharan Africa that are similar in size and development level. The estimation results show that remittances increase growth

significantly, especially through investments in human capital. The results also reveals that remittances have a significant and positive long-run effect on human capital formation regardless of the sub-samples considered but the effect on physical capital accumulation is significant only among middle income and Asian countries. Therefore, findings suggest that channeling the remittances towards investments in physical capital and adoption of new knowledge, skills and technology is crucial for high economic growth in low-income countries.

Victoria (2015) examined the impact of human capital on economic growth in Nigeria using education and health expenditure, primary school enrollment, secondary school enrollment and tertiary school enrollment as proxy for human capital investment and accumulation; and the findings the study indicate that public expenditure on health, secondary and tertiary enrollment rate have significant positive effect on economic growth. However, government expenditure on education and primary enrolment rate has not.

Dinkelman and Mariotti (2016) the Long Run Effects of Labor Migration on Human Capital Formation in Communities of Origin. We estimate the net effects of migration from Malawi to South African mines using a difference-in-differences strategy. We provide new evidence of one channel through which circular labor migration has long run effects on origin communities by raising completed human capital of the next generation. The main results showed that the long run effects of labor migration shocks on education. Therefore, evidence suggests that there is to have positive, and importantly, long lasting impacts on human capital formation in communities of origin.

Hines and Simpson (2019) investigate the relationship between international migration, remittances and human capital investment in Kenya. They used household level data from the 2009 Kenya Migration Household Survey to test a positive and significant relationship between the amount of international remittances a household receives and the amount of expenditures allocated to education (for all levels of education). We found that a positive relationship between education expenditures and remittances. Migrant households who receive remittances from abroad tend to spend more on education-related expenditures. Therefore, this is good for investment in education can have significant, positive effects on long-run GDP growth, especially in developing countries

Olarinde (2017) Migration, Human capital formation and economic growth in Nigeria covering the period 1980 to 2011.An exogenous growth model captured the effects of migration, human capital formation, and public spending on education, remittances and access to education on economic growth.

Long run relationship among the variables was established employing the Johansen co-integration technique. The Results showed that human capital formation would be positively related with migration since people would build more skills if they could receive higher returns for them on a global market. Human capital also has a direct relationship with public spending on education, access to education and savings. Public spending on education had a statistically significant impact on human capital formation, positive and relevant in magnitude. Access to education had a positive and significant impact on human capital formation In addition; this growth was through the human capital formation channel, which had a positive and significant impact on economic growth. There was also a positive but not significant relationship between remittances and output in the growth analysis. Access to education had a positive but marginal and not significant relationship on economic growth. Finally, Generalized Method of Moments and Two Stage Least Squares estimations were applied and the results were consistent in direction of impact between migration and human capital formation. Further the results affirmed that migration and human capital formation positively affected output per worker in Nigeria.

Chijioke and Amadi (2019) examined the impact of Human Capital Investment as a Catalyst for Sustainable Economic Development in Nigeria from 1986 to 2017. The ordinary least square (OLS) method was used in analyzing data. The findings were a positive relationship between government expenditure on education, Government expenditure on health, gross capital formation and real gross domestic product. The t-test and f-test result also showed that; government expenditure on education, Government expenditure on health and Gross capital formation had a significant impact on real gross domestic product.

Fadila et.al. (2019) Examined the effect of human capital development on economic growth of ECOWAS member states for the period from 1980-2016 applying the Pedroni residual co-integration approach to test for the long-run relationship among the variables. The variables were used expenditures on education, expenditures on health, school enrollment as proxy of human capital and the economic growth was proxied by GDP. The findings showed that there is positive and significant relationship between GDP and government expenditure on education, expenditure on health and school enrollment in the ECOWAS counties. The study also revealed that the increase in human capital development (resulting from increasing investment in education and health) would be enhances economic growth and development. Therefore human capital development has an effect on economic growth in the

Bane (2018) examined the impact of flow and stock human capital on economic growth in low and middle-income African countries over the period 1985–2015 by using the dynamic panel GMM estimation technique. The results revealed that investments in healthcare services were positively related to GDP both in low and middle-income countries in Africa. According to the estimated coefficient, investments in health human capital have stronger effects on GDP growth in African countries as compared to investments in education human capital. In general, investments in education and health human capital are positively related to GDP growth in African countries. GDP had strong positive and significance effects on education expenditure. However, Stock of education human capital had no influence on economic growth in both low and middle-income countries probably due to measurement errors in the education human capital employed.

In Ethiopia, some researcher tried to investigate the relationship between human capital formation, international remittance and economic growth by using various proxy variables. However, founding results were inconsistent. (i.e., Findings results showed similar variables for different researcher's results) for this reason the literature of human capital, remittance on economic growth has not consistent results. For instance, the returns to health in rural Ethiopian agriculture are more than double of the returns to inputs like fertilizer (Rena, Kefela, & Ghirmai, 2007).On the other hand, Having more skilled labor increases the potential for participating in highly productive activities and earning higher wages.

According to Teshome (2006) the impact of various components of government spending (investment, consumption and human capital expenditures) on the growth of real GDP in Ethiopia for the period 1960/61-2003/04 used Johanson Maximum Likelihood Estimation procedure. The results found that only expenditure on human capital have long-run significant and positive impact. Another government investment spending displays a negative and insignificant impact on growth of real GDP, which reveals the inefficiency and poor quality nature of public investment. In the short run, all components of government expenditure have not significant meaning in explaining economic growth. This finding is reinforced by Siraj (2012)who found a positive and significant relationship between capital spending on human capital and economic growth from year 1975 to year 2010. But both of them didn't show the separate impact of the health and education sector's spending on economic growth.

According to Tewodros (2014) examine the relationships between human capital and economic growth in Ethiopia (using real GDP per capita, as a proxy for economic growth and health index and education index as proxy of human capital) from year 1971 to 2011 analyzed by causality and co-integration methods. The findings were significant impact of human capital on economic growth by confirming direct positive relationship between economic growth and measures of human capital education and health. The results also were stable long-run relationship between economic growth and measures of human capital (health and education index). In Short run results reveals existence of unidirectional causality runs from economic growth to health provision, but there is no short run causality from education to economic growth. Therefore, findings of this research concerning the long run positive impact of the education and health human capital are consistent with the endogenous growth theories

According to Dinkeneh and Yushi (2015) to analyze the impact of human capital on economic growth from 1980 up to 2013 in Ethiopia by employing Johansen's Co-integration technique. Human capital stock is proxied by primary, secondary and tertiary school enrolment and Human capital investment is proxied by expenditure on education and health. Their study showed that public expenditure on health and education, primary and secondary school enrolment have positive statistically significant effect on economic growth both in long run and short run. In addition, physical capital has positive whilst inflation has negative effect on economic growth. However, tertiary school enrolment has insignificant effect on economic growth both in long run and short run. Based on their findings increasing primary and secondary school enrolment is recommended. In addition, substantial amount of government expenditure should be allocated towards health and education sectors to further increase contribution of the sectors to economic growth.

According to Kidanemariam (2014) determined the long run and short run impact of human capital on economic growth in Ethiopia over period of 1975 up to 2011, the study has used the ARDL Approach to co-integration. The main finding showed that in the long run, health human capital (proxied by the ratio of public health expenditure to GDP) and education human capital (proxied by secondary school enrolment) are the main contributors to real GDP per capita rise. In other words, the result reveals that the economic performance can be improved significantly when the ratio of public expenditure on health services to GDP increases and when secondary school enrolment improves. However, government expenditure, official development assistance and recurrent drought have a

negative impact on the economy. In the short run, the estimated coefficients showed that education is the main contributor to real GDP per capita change followed by gross capital formation (one period lagged value) and government expenditure (one period lagged value). In addition, unlike its long run significant impact, health has no significant short run effect on the economy. Even its one period lag has a significant negative impact on the economy.

According to Tewodros (2015) analyzed the determinants of economic growth in Ethiopia during the period year 1974 to 2013. The Autoregressive Distributed Lag (ARDL) Approach to Co integration and Error Correction Model were applied in order to investigate the long run and short run relationship between the real GDP and its determinants. The finding of the Bounds test showed that there is a stable long run relationship between real GDP, Physical capital, human capital, export, aid, external debt and inflation. The empirical results reveal that both physical capital and human capital are found to have positive impact on economic growth while debt affects economic growth negatively and statically significant at 1 percent.

According to Wube (2008) Human capital plays an important role on improving the productivity of the Ethiopia. According to the study, human capital has a positive influence on facilitating the adaption of new technologies. The findings show that human capital is statistically significant and positively correlated with productivity. Thus, a policy that focuses on busting human capital is more likely to have greater payoff in terms of productivity gains. However, labor and physical capitals have negative impact on productivity; this is probably due to the omission of the quality of physical capital which is unexpected.

According to woubet (2006) also investigated the impact of human capital on economic growth in Ethiopia over the period 1971 up to 2005 using an error-correction methodology. Evidence shows that the average level of human capital variable in the form of schooling has an insignificant impact on the level of output. Simply providing more schooling may yield little or nothing in the way of economic growth in the absence of other elements such as the appropriate market, legal and governmental institutions and suitable policy environment in other sectors of the economy to support a functioning modern economy. In this direction the study also questions the economic policy directions, which could have been perverting the contribution to economic growth that would have been made from an expansion in educational investment.

According to Kedir and Abdulnasir (2018) study used yearly Healthcare expenditure and GDP data of Ethiopia during the period 1995 to 2014. Augmented Dickey–Fuller and Johansen co-integration tests were carried out to check stationary and the long-run equilibrium relationship between the variables. The results confirm that there was a significant long-run relationship between the variables. In addition, the results of this study showed that increasing GDP has a significant and positive impact on health care expenditure. Therefore, suggest that Healthcare expenditure and GDP have a long-term co-integration and that health expenditures were a necessity in Ethiopia.

Mulugeta (2017) investigated the impact of government expenditure on economic growth in Ethiopia covering the period 1981 to 2014. Applied Johansen co-integration approach, the study findings that real government spending on human capital formation, real private investment and real openness had a significant and positive association with the long-run growth of real per capital income while, real government consumption had a significant but negative association with long-run economic growth. The study also found that the coefficient on real government physical investment was not statistically significant in the long run. On the other hand, the result revealed that in the short run, all components of government expenditure were not significantly associated with growth of real per capita income.

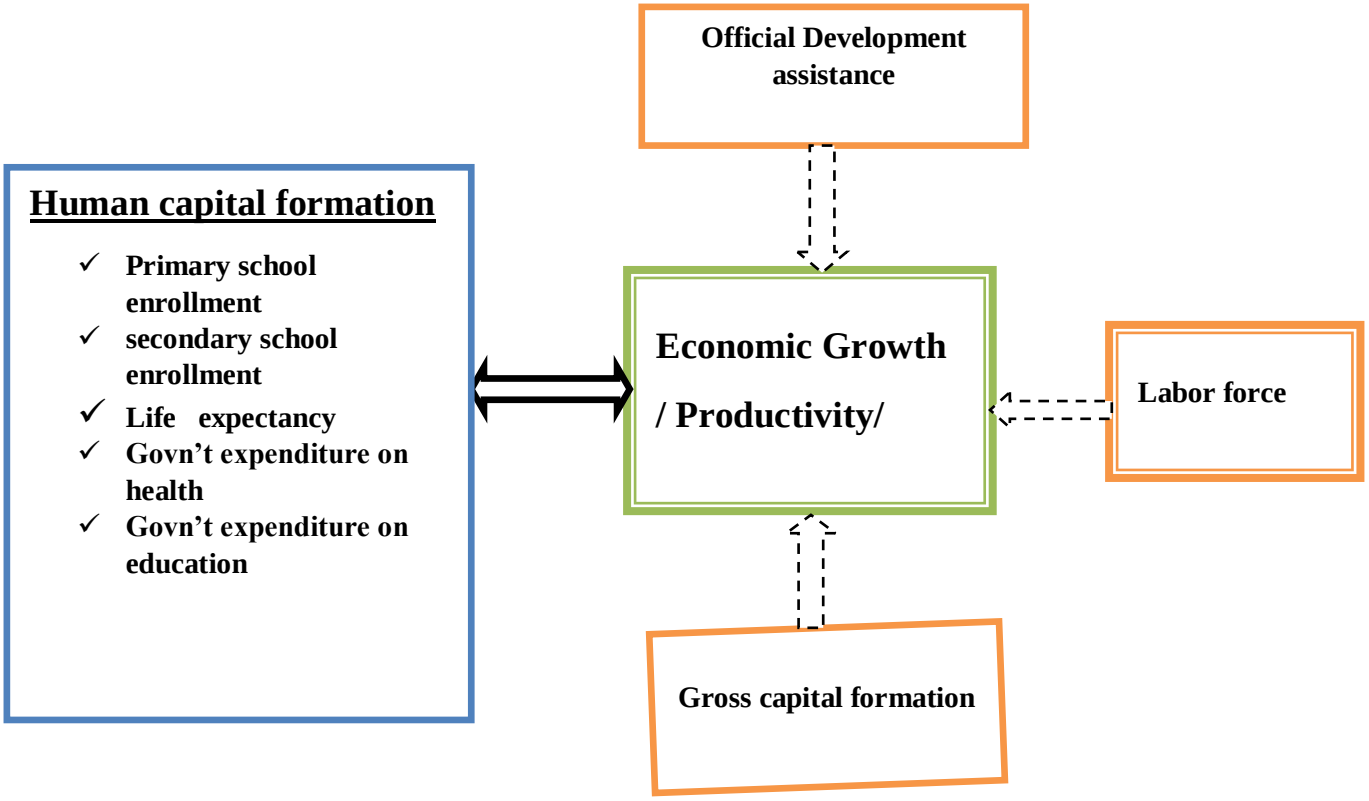
The study conducted by Biruk,2017 the relationship between infrastructure development and economic growth is investigated for Ethiopia during the period 1974/75 to 2014/15 applied ARDL; bounds tests, and ECM. The result shows that education expenditure and real GDP had positive and significant relationships in the long run. In addition, health expenditure had positive relationship to real GDP, but it's not statistically significant. As a matter of fact, health affects economic growth directly through labor productivity and the economic burden of illnesses.

According to Tassew and Nandeeswar (2016) the impact of remittances on economic growth in Ethiopia over the period 1981 to 2012. ARDL model is used for time series estimation and Real GDP, Remittance, Physical capital formation, Secondary school enrolment and total government expenditure variables are employed. An empirical result shows that there is the long run fixed capital formation; secondary school enrollment and total government expenditure have a positive and significant impact on economic growth, whereas remittances have a significant and negative effect on GDP in the long run.

2.4. Conceptual Frameworks

The study conducts based on the conceptual framework which draws from the above theoretical and empirical literature reviews. This research focuses on studying the human capital formation that are critical impact on economic growth in Ethiopia. From the literature review mention above the study develops the following schematic representation of the conceptual framework/model for this study which shows the relationship among the some macroeconomic variables and economic growth.

Figure 2.2: Conceptual Framework of the study



Source: Derived from empirical and theoretical literature (2020)

The double arrow from the above diagram shows that the existence of bi-causal relationship between economic growth and human capital proxy variables of education and health expenditures. This means that each variable of human capital measured affect economic growth and vise verse. i.e., causality or affect each other's. And life expectancy effect on human capital formation and economic growth. On one hand, the growth or development of human capital proxy variables affect by increase or decrease economic growth and the growth of one's economy contribute positively or negatively to other variables on the other hand.

CHAPTER THREE

3. METHODOLOGY OF STUDY

3.1. Introduction

In the preceding chapter the theoretical and empirical literatures about the impact of human capital development are presented and discussed. The main objective of this paper is to analyze the impact of human capital development on economic growth in Ethiopia. The quantitative analysis is employed for all variable proxies of human capital entered in to the model. The data is expected to use a time series data from years 1974 to 2018. To this end, model specification, theoretical framework and estimation techniques for econometric investigation are briefly discussed in this chapter.

3.2. Data Types and Sources

The study has used annual time series data from 1974 to 2018 years to achieve objective to analyze the impact of human capital development on economic growth in Ethiopia. The data for this study is a quantitative data which is based on some measurement of characteristics of dependent variable and independent variables. All the variables, in this study are expressed in quantitative terms. such variables are:- real GDP as proxy of economic growth, gov'nt expenditure on health, gov'nt expenditure on education, life expectancy at birth, primary and secondary school enrollment as proxies of human capital, labor force measured total population age 15-64 that are active working age group, Gross capital formation and official development assistance.

The secondary data could be collected from different organizations such as real GDP, gross capital formation and net Official Development Assistance from National bank of Ethiopia, government expenditure on Health and Education from Ministry of Finance and Economic Development, School enrolment and Labor force from World Development Indicator (WDI) and Ministry of education in the respective periods.

3.3. Research Design

To achieve the objective of this study, explanatory or causal research design was adopted. Besides, this the study have been used quantitative research approach to examine the impact of human capital on economic growth in Ethiopia from the period 1974 to 2018.

3.4. Methods of Data Analysis

In this study both descriptive and econometric methods of data analysis were employed. To analyze the impact of human capital on economic growth of Ethiopia during the study period, we would be used tools of descriptive statistical such as tables and trend of graphs to show trend of government expenditure on health and education and RGDP have consistently increased or not. On the other hand, the econometric analysis such as Time series testing, estimation and interpretation of results based on econometric outputs were employed. This analysis mainly examines short and long run relationship and causality between human capital and economic growth. To analyze the data, the statistical package of Eview10 would be applied.

3.5. Econometric Model Specification

To analysis the impact of human capital development on economic growth in Ethiopia the endogenous growth (augmented Solow growth) model would be applied in this study. The augmented Solow production function specifies that output is a function of labor, human capital, capital stock and productivity (Mankiw et al., 1992).It is represented in a Cobb-Douglas production function with constant returns to scale. Hence, human capital augmented Solow model using the standard Cobb-Douglas production function specified as follows:

$$Y_t = AK_t^{\alpha} H_t^{\beta} L_t^{1-\alpha-\beta} \quad \text{---------- (3.1)}$$

Where,

Y_tRepresents Output level or economic growth at time t, A is the level of technology which is not accounted by the growth in factors of production. K_t,H_tt andL_t are physical Stock Capital at time t, Level of Human Capital at time t and Labor force measured by number total population of active workers age at time t respectively; α, β and $(1-\alpha-\beta)$ are elasticity of physical capital with respect to output , elasticity of human capital with respect to output and elasticity labor force respectively.

Theoretically, a positive correlation is expected between growths in output on the one hand and increases in capital stock, human capital and labor force on the other.

Based on theoretical framework developed by Mankiw et al., (1992) the following Econometrical model is specified:

$$Y_t = AK_t^{\alpha} H_t^{\beta} L_t^{1-\alpha-\beta} e^{U_t} \quad \text{---------- (3.2)}$$

When transformed into a log-linear to linearized and to show elasticity of the variables form (Gujarati, 2009); the growth function of equation becomes,

$LnYt = \alpha_0 + \alpha LnKt + \beta LnHt + \Theta LnLt + Ut$ ---------- (3.3)

Where, $\Theta = 1 - \alpha - \beta$ and $\alpha_0 = LnA$, e = Base of natural logarithm

The augmented Solow human capital growth model is modified to take an additional (external) variable in addition to gross variable and labor force. These external variables are proxy of human capital such as govn't expenditure on education, govn't expenditure on health, official development assistance, life expectancy at birth, primary school enrollment, secondary school enrollment and dummy of policy change.

The new expanded model is stated as follows:

LnRGDPt= (LnGCFt, LnLbFt, LnGovn'tEduExpt, LnGovn'tHealExpt,PSCEROLRt,

SESCEROLt,LnLifeExpt, LnODAt, D)---------- (3.4)

$LnRGDPt = \alpha_0 + \beta_1 LnGCFt + \beta_2 LnLbFt + \beta_3 LnGovn'tEduEXPt + \beta_4 LnGovn'tHealExpt + \beta_5 LnPSCEROLt + \beta_6 LnSESCEROLt + \beta_7 LnLifeExpt. + \beta_8 LnODAt + \beta_9 D + Ut$ ----------(3.5)

Where:

$\boldsymbol{LnRGDP_t}$= Natural logarithm of real GDP at time t.

$\boldsymbol{LnLbF_t}$= Natural logarithm of Labor force measured total number of population age 15-64 to total population workers at time t.

$\boldsymbol{LnGCF_t}$ = Natural logarithm of gross capital formation at time t.

$\boldsymbol{LnGovn'tEducExp_t}$ =Natural logarithm of govn't education expenditure at time t.

$\boldsymbol{LnGovn'tHealExp_t}$=Natural logarithm of govn't health expenditure at time t.

$\boldsymbol{PSCEROL_t}$= Primary school enrollment proxy of human capital stock at time t.

$\boldsymbol{SESCEROL_t}$= Secondary school enrollment proxy of human capital stock at time t

$\boldsymbol{LnLifeExp_t}$ = natural logarithm of life expectancy with birth at time t.

$\boldsymbol{LnNODA_t}$ = Natural logarithm of net official development assistance at time t.

D = are dummy variables for policy change and

Ut = Stochastic random error term at time t

β 's ($\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_8$ *and* β_9)are the output parameters with reference to a particular input.

In this study real GDP per capita used as a proxy for economic growth. The study also used proxy human capital by total government expenditure on education, total government expenditure on health,

primary and secondary school enrolment, life expectancy and net official development assistant based on theoretical and empirical literature.

3.5. Estimation Procedure

This study engages in a series of six-step procedure in order to determine the long run and short run relationship between human capital development and economic growth in Ethiopia. These procedures are the stationarity test for variables, Johansen co-integration rank of estimation, the VECM for short run adjustment to the long run, short run causality test for the sum of the differences of the explanatory variables, autocorrelation and residual normality tests. Finally, causality could be test by employing the granger causality tests.

3.5.1. Unit Root Test

Most of the economic time series variables are non-stationary and the use of non-stationary time series leads to spurious regression, which cannot be used for precise decision. A variable is said to be stationary if it's mean, variance and auto-covariance remains the same no matter at what point we measure them. A number of tests are available in the literature to check the existence of the unit root problem both in the level of the variables as well as in their first difference, i.e. to determine the order of integration. The Dickey Fuller (DF) test is applicable if error terms (Ut) are uncorrelated. In case the error terms (Ut) are correlated, DF test is useless (Stock and Watson, 1988).

The study follows Augmented Dickey Fuller (ADF) test which takes care of this problem by augmenting the equation(s) of DF test by adding the lagged values of the dependent variables (Gujrati, 2009).

The testing procedure for the ADF equation can be stated as:

$\Delta Z_t = \gamma Z_{t-1} + \boldsymbol{\lambda}_t \sum_{t=1}^{\rho} \Delta Z_{t-i} + \mathbf{e}_t$---------- (3.6) without trend and intercept

$\Delta Z_t = a_0 + \gamma Z_{t-1} + \boldsymbol{\lambda}_t \sum_{t=1}^{\rho} \Delta Z_{t-i} + \mathbf{e}_t$---------- (3.7) Intercept only

$\Delta Z_t = a_0 + a_1 + \gamma Z_{t-1} + \boldsymbol{\lambda}_t \sum_{t=1}^{\rho} \Delta Z_{t-i} + \mathbf{e}_t$---------- (3.8) with trend and intercept

Where Z_t is a time series variables under consideration in this model at time t, t is a time trend variable; Δ denotes the first difference operator; **et** is the error term; **p** is the optimal lag length of each variable chosen such that first-differenced terms make **et** a white noise.

The hypothesis is:-

Null hypothesis, H0: a variable is non stationary or unit root

Alternative hypothesis, H1: a variable is stationary or no unit root

That means: H_0: $\gamma = 0$; H_1: $\gamma \neq 0$

$\Rightarrow$ If the null hypothesis is rejected Z_t is stationary. For the estimated parameters of lagged variable in the equation, we accept the null hypothesis if the calculated test statistic in absolute value is less than the critical value.

If the t value or t-statistic is more negative than the critical values, the null hypothesis (H_0) is rejected and the conclusion is that the series (Zt) is stationary. Conversely, if the t-statistic is less negative than the critical values, the null hypothesis is accepted and the conclusion is that the series is non-stationary. If dependent and independent variables will be fail the stationary test, the data generating process of these variables are non-stationary. These tests are performed on both level form and first differences of both variables. In a situation where all the variables are stationary at I (0), the OLS method is use in the estimation. Implications of the unit root test result on the estimation procedures are; if all variables in the equation are found to be non-stationary at level form I (0) but stationary at first difference I (1), then co-integration test is conducted to find the existence of a long-run equilibrium relationship (Harris, 1995).

3.5.2. Optimal Lag Selection

The estimation of the long run co- integration and ECM requires the determination of the appropriate lag length because the co integration result may be sensitive to the number of lags included in the model. Thus, prior to co integration testing and estimation of the ECM, we need to determine the appropriate lag length, which is determined using the well-known model selection criteria, the Akaike Information Criteria (AIC), the Final Prediction Error (FPE), the Hannan-Quinn Information Criteria (HQ), and the Schwarz (Bayesian) Information Criteria (SBIC). Usually, the model with the smallest HC, AIC or SBIC values row number were chosen.

3.5.3. Johansen Co- integration Test

Co-integration is a statistical property that describes long-run relationship of economic time series. Johansen (1988) proposed an approach to investigate long-run relationship among non-stationary variables. This study uses Johansen and Juselius (1990) co-integration approach for exploring long-run relationship between economic growth and human capital development. To analyze the

relationship between RGDP and explanatory variables, the study uses vector error correction models (VEC). The reason for these methodologies was as follows: first, this allows the possibility for both RGDP and human capital to be endogenous, as suggested by endogenous growth models. Second VEC models were useful for testing causality. Tests for co-integration were carried out by using the Johansen's testing procedure which involves the estimation of a vector error-correction model (VECM) in order to obtain the likelihood ratios (Johansen, 1988).

To test the number of co integrating relationships among variables, Johansen co integrating test is considered. To determine the number of co integrating vectors two test statistics called the maximum Eigen value (λ max) and trace statistics (λ trace) are computed. The trace test tests the null hypothesis of r co integrating vectors against the alternative hypothesis of k co integrating vectors, where k is the number of endogenous variables, for r =0,1,2…, k-1. The maximum Eigen-value test, on the other hand, tests the null hypothesis of r co integrating vectors against the alternative hypothesis of r+1 co integrating vectors. In both test statistics, the null hypothesis is rejected if the statistics value is greater than the critical value.

Vector auto regression (VAR) is an econometric model used to capture the evolution and the interdependencies between multiple time series, generalizing the univariate AR Models. All the variables in a VAR are treated symmetrically by including for each variable an equation explaining its evolution based on its own lags and the lags of all the other variables in the model.

To describe this procedure, consider the following vector auto-regression (VAR) of order p:

$$Yt = \mu + \beta 1Yt-1 + \beta 2Yt-2 + - - - + \beta pYt-p + \varepsilon t \quad \text{----------} \quad (3.9)$$

The above VAR can be written alternatively as:

$$\Delta Yt = \Pi Yt\text{-}1 + \sum_{i=1}^{p-1} \Gamma i \Delta Yt\text{-}_i + \varepsilon_t \quad \text{----------} \quad (3.10)$$

$$\Pi = \sum_{i=1}^{p-1} \beta j - Ik \,, \Gamma = -\sum_{j=i+1}^{p-1} \beta j$$

Where, *Yt* = (kx1) vector of variables that is used in the study. i.e., RGDP and others independent variables, ε*t* is the independent and identically distributed n-dimensional residual vector with mean zero and variance equal to matrix $\sum \varepsilon$, Π = (αβ') is the number of independent co-integrating vectors, where the elements of α are the adjustment parameters in the error-correction model, and β contains the co integrating vectors and μ is a vector of constants.

Johansen's procedure relies on the rank of Π and its characteristics roots:

i. If rank (Π) = 0, the matrix is null (no co-integration) and equations in vector Yt are common VAR in first differences.
ii. If Π has full rank (Π = k), the vector process is stationary and the equations in yt are modeled in levels I(0).
iii. If rank (Π) = 1, there is evidence of a single co-integrating vector.

Johansen drives two test statistics to test co-integrating rank:

- **Trace test statistics** = $\mathbf{t_{race(r)=}} - \boldsymbol{T} \sum_{i=k+1}^{k} \mathbf{ln}(\mathbf{1} - \boldsymbol{\lambda}\mathbf{i})$ **, and**
- **Maximum Eigen value test statistics** = $\mathbf{t_{race(r,r+1)=}} - \boldsymbol{T} \sum_{i=k+1}^{k} \mathbf{ln}(\mathbf{1} - \boldsymbol{\lambda}\mathbf{i} + \mathbf{1})$

Where, $\lambda_{r+1,\lambda n}$ are the (k - r) smallest estimated Eigen values. In both tests, λ represents the estimated values of the characteristic roots obtained from the estimated Π matrix, and T is the number of observations. The trace test attempts to determine the number of co-integrating vectors between the variables by testing the null hypothesis that r = 0 against the alternative that r > 0 or r ≤ 1 (r equals the number of co-integrating vectors). The maximum Eigen value tests the null hypothesis that the number of co-integrating vectors is equal to r against the alternative of r+1 co-integrating vectors. If the value of the likelihood ratio is greater than the critical values, the null hypothesis of zero co-integrating vectors is rejected in favor of the alternatives (Howard, 2002)

A **Vector Error Correction Model** has co-integration relations built into the model; it restricts the long-run behavior of the endogenous variables that converge to their co integrating relationships while allowing for short-run adjustment dynamics. According to Engle and Granger (1987)equilibrium relationships found with simple VAR may be causal behavior, or simply a reduced form relationship among similarly trending variables. To test for co-integration we use standard Johansen (1991) rank tests. If co-integration is detected from the rank tests, then using a VEC is appropriate for examining the causal relationships between GDP and human capital proxy's.

Johansen's full information maximum likelihood (FIML) approach is used for testing the co-integration (Johansen, 1988). The likelihood ratio test constructed for detecting the presence of a single co-integrating vector is trace test statistic. If co-integration is established then error correction specification is used to test for Granger causality (Engle & Granger, 1987).

3.5.4. Vector Error Correction Model

The Vector Error correction Model applies to series that are I(1) and co-integrated (Engle and Granger, 1987). In such case, VECM should be estimated to account for the variable deviations from equilibrium, a mechanism that brings the economies back to equilibrium. The ECM is used to estimate the significance of the error term in the co integrating vector(s) to see how quickly the series adjust to their long-run equilibrium condition. To correct for disequilibrium in the co-integrating vector(s), the residuals from the equilibrium regressions should be used to estimate the VECM (Engle & Granger, 1987). Causality in systems (co-integrated systems) can be established if and only if lagged error correction term (ECTt-1) that takes into account long-run dynamics and sum of the coefficients of the lagged variables that takes into account short run dynamics both are significant.

The following VECMs can be described as follows:

$$\Delta Zt = \alpha_0 + \Pi Z_{t-1} + \Gamma_1 \Delta Zt\text{-}_1 + \text{-----} + \Gamma_p \Delta Zt\text{-}_i + \varepsilon_t \text{----------} \quad (3.11)$$

$$\Delta Zt = \alpha_0 + \Pi Z_{t-1} + \sum_{i=1}^{p} \Delta \ \Gamma_i \Delta Z\ t\text{-}_i + \varepsilon_t \text{----------} \quad (3.12)$$

Where, ΔZt represents the first differences of the variables $\Gamma_i = \sum_{j=i+1}^{p} \beta i$ is (nxn) coefficient matrix in the error correction term (which contains short-run parameters); and $\prod = \sum_{j=1}^{p} \beta i - 1$is (nxn) matrix of long-run responses, which contains information about the long-run relationships.

The Error correction Model (ECM) used to estimate the significance of the error term in the co integrating vector(s) to see how quickly the series adjust to their long-run equilibrium condition. To correct for disequilibrium in the co-integrating vector(s), the residuals from the equilibrium regressions should be used to estimate the ECM. For the above growth model (eq(5)) the ECM is estimated as follows.

$$\begin{aligned}\mathbf{\Delta lnRGDPt=}\ \alpha_0 + & \sum_{i=0}^{p} \boldsymbol{\beta_0} \Delta \text{lnRGDP}_{t\text{-}I} + \sum_{j=0}^{p} \boldsymbol{\beta_2} \Delta \text{LnGCF}_{t\text{-}I} + \sum_{q=0}^{p} \boldsymbol{\beta_3} \Delta \text{LnLbF}_{t\text{-}1} + \\ & \sum_{i=0}^{p} \boldsymbol{\beta_4} \boldsymbol{\Delta} \text{LnGovn'tHealExp}_{t\text{-}i} + \sum_{i=0}^{p} \boldsymbol{\beta_5} \boldsymbol{\Delta} \text{LnGovn'tEduExp}_{t\text{-}i} \\ & + \sum_{i=0}^{p} \boldsymbol{\beta_6} \Delta \text{PSCEROL}_{t\text{-}i} + \sum_{i=0}^{p} \boldsymbol{\beta_7} \Delta \text{SESCEROL}_{t\text{-}i} \\ & + \sum_{i=0}^{p} \boldsymbol{\beta_8} \Delta \text{LnLifeExp.}_{ti} + \sum_{i=0}^{p} \boldsymbol{\beta_9} \Delta \text{LnNODA}_{t\text{-}I} + \boldsymbol{\beta_{10}} D - \boldsymbol{\lambda} \text{ECT}_{t\text{-}1} + \varepsilon_t \text{----------} \\ & \text{----------} \quad (3.13)\end{aligned}$$

Where Δ is the first difference of the variables, ECT_{t-1} is the Error Correction Term (ECT) representing lagged residual from the co integrating relationships (from the residuals of the long run equation). The ECT represents the disturbance from the equilibrium relationship in co-integrated series; λ is speed of adjustment parameter which confirms the existence of short run relationship among the variables and is also a further evidence for long run co integration and; the coefficients of lagged value of the first difference of variables are short run adjustment parameters. Therefore, an error-correction model combines the short run dynamics with the long run properties of the data and thus provides a convenient tool for investigating short run as well as long run causal patterns.

3.5.5. Granger Causality Test

In this study the causality test would be employed. The Granger causality test is applied to investigate the direction of causality between the variables. This concept involves the effect of past values of one or more of the variables on the current value of the other.

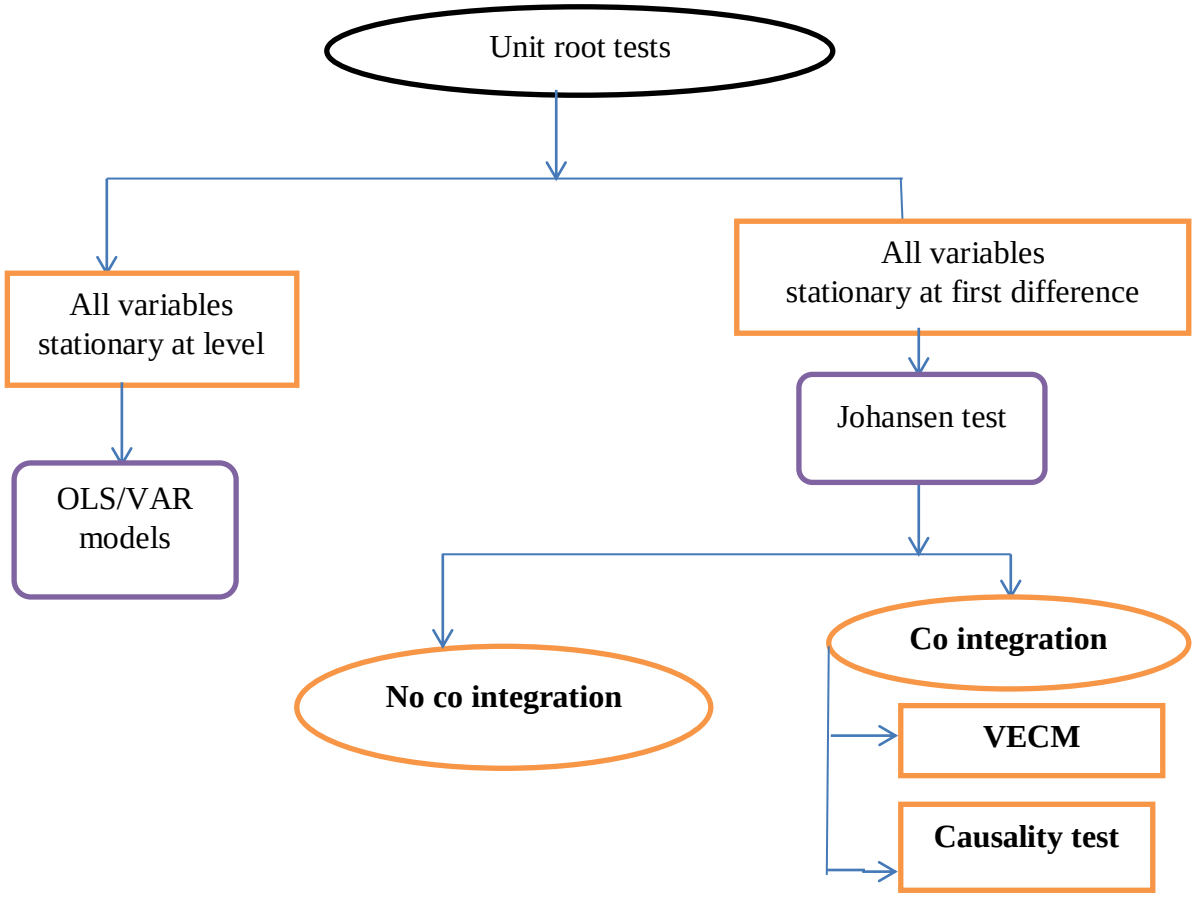
According to Granger, causality can be further subdivided into long-run and short-run causality. This requires the use of error correction models, depending on the approach for determining causality. Long-run causality is determined by the error correction term, whereby if it is significant, then it indicates evidence of long run causality from the explanatory variable to the dependent variable. Short-run causality is determined as before, with a test on the joint significance of the lagged explanatory variables, using an F-test or Wald test (Risso, Barquet and Brida, 2010)

3.6. Diagnostic Tests

Diagnostic tests tell us about the robustness of estimated coefficients. After estimating the long run and short run model, normality test, serial correlation test, heteroscedasticity test and cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) test for stability of the model is undertaken to check the robustness of the model. The stability diagnostics examine whether the parameters of the estimated model are stable across various sub-samples of the data (Pesaran and Shin, 2001).

Generally,

Method selection for time series data. OLS: Ordinary least squares; VAR: Vector autoregressive; ECM: Error correction models.



Source: author computation, 2020

3.7. Concepts of Human Capital and Its Measurements

Human capital development represents the productive capacity of the people. Just like land or machinery, workers are an essential requirement for production. As such, human capital denotes the skill of the labor force, how well and efficiently workers can transform raw materials and capital and use technology into goods and services. These skills such as literacy, proficiency, cognitive, and analytical skills can be learned and improved through education; thus, any discussion of human capital has to touch upon education (Son, 2010).

Human capital plays a critical role in economic growth and poverty reduction. From a macroeconomic perspective, the accumulation of human capital improves labor productivity; facilitates technological

innovations; increases returns to capital; and makes growth more sustainable, which, in turn, supports poverty reduction. Thus, human capital is regarded at the macro level as a key factor of production in the economy extensive production function. From a microeconomic perspective, education increases the probability of being employed in the labor market and improves earnings capacity. Thus, at the micro level, education considered as the proxy of human capital that contributes to an individual's labor productivity and earnings while being an important component of firm production (Millan et al., 2014).

Human capital is only one factor in accounting for differences in growth rates across countries. While low starting levels of human capital may have hindered Africa's economic growth, its poor performance cannot be attributed to a lack of subsequent investment in human capital. A more important proximate cause is the low level of investment in physical capital. Low rates of investment in physical capital have implications for the rates of return on human capital, particularly education and health. Government investment in the health and education sectors is likely to be economically productive and indeed is likely to bring more direct benefits to the people than many other forms of government expenditure. Government investment in both education and health may be particularly important as there are indirect benefits of such investments which individuals may not allow for in their investment decisions. Social rates of return may substantially exceed private rates (Appleton and Teal, 1998).

The main reason of income differences in the countries to countries are differences in the factors of production, such as the quantities of physical and human capital, differences in the efficiency with which economies use their factors of production. Human capital is one factor in accounting for differences in growth rates across countries. While low starting levels of human capital may have hindered Africa's economic growth, its poor performance cannot be attributed to a lack of subsequent investment in human capital. That is, a worker in a poor country may be poor because he or she lacks tools and skills or because the tools and skills has not being put to their best use (Mankiw et al.,1992).

Although the conceptual definition of human capital is clear, its measurement is difficult because it is practically impossible to observe individual skill, and even harder to design a metric that is comparable across individuals and countries. Thus, many economists use different measurement to proxy human capital, such as the average number of years of education attainment (school enrollment), years of schooling, literacy rate, health and education aspects(expenditure), were used as measurements of

human capita and important measure of well-being, but it does not measure quantitative the educational attainment or skill level of the workforce(Barro,1991; Barro and Lee, 2010;2013; Mankiw et al., 1992; Pelinescu, 2015).

3.8. Description of Study Variables and their Expectation

Real GDP (Y):- is a macroeconomic measure of the size of an economy adjusted for price changes. It is defined as the market value of all final goods and services produced in a geographical region, usually a country. Therefore, real GDP is used to capture the overall economic performance. In this case, real GDP in millions of birr used as a measurement for economic growth. Since most economists argue that economic growth can be measured as growth in real GDP, it includes in the model as main dependent variable in order to measure economic growth. In order to avoid the inconsistency associated with different base year price while computing real GDP, this study will be used the real GDP (Dynan and Sheiner, 2018).

Gross capital formation (GCF):-is defined as Physical capital accumulation (formerly gross investment) in a country. However, getting such a readymade time series data in Ethiopia is difficult. Therefore in this study, gross investment would be used as proxy of this variable and have been expected a positive impact on economic growth **(**Ehite,2015**).**

Labor Force of active working age (LAB):- It comprised people who are economically active. That is people who supply labor for the production of goods and services during a specified period (in case of Ethiopia between the ages of 15 to 64). It includes both the employed and unemployed. The neoclassical economists believe that to raise the trend rate of growth a higher level of productivity of labor and capital are needed. This is because only a sustained rise in capital stock increases the growth rate only temporarily. However, the marginal product of additional units of capital may decline and thus an economy moves back to a long-term growth path **(**Riley, 2012**).** So a higher level of labor is needed to bring a large and sustained increase in economic growth. It could be the engine of growth for labor intensive economies like Ethiopia. But if it couldn't be used efficiently, so based on this active labor force is expected to have positive impact on economic growth.

Governmental Education Expenditure (Gov'ntEduExp):- is money spent in formal schooling, on-the job-training and off-the-job training. Giving more emphasis to education is raising the productivity of workers by providing useful knowledge and skills **(**WB, 2015**).**

Governmental Health expenditure (Gov'ntHealExp):- Health status affect the human capital level of individuals and thereby the growth of a given country. Health capital can affect economic growth through the channels of productive efficiency, life expectancy, learning capacity, creativity, etc. Healthier workers will become strong, energetic, creative, attentive so forth that makes them more effective in the production process with any given combination of skills, physical capital and technological knowledge **(**WB, 2015 and Shim J.K. et al., 1995**).** Therefore, Rise in expenditure on health leads rise in economic growth.

School enrolment (SCR):- shows the number of student who registered in primary and secondary school at a yearly study time. Various theoretical and empirical literatures shows school enrolment increase productive, further leads economic growth. In this study expect the positive and significance impact of school enrolment on economic growth **(**WB, 2019**).**

Life expectancy at a birth (LifeExp)**:-** is as the average number of years that anew born could expect to live if he or she were to pass through life subject to age specific the mortality rates of a given period **(**WB, 2019**).**

Official Development Assistance (ODA):- is defined as inflows from external assistances. As we know, Ethiopia is one of the poor countries in the world, as result Ethiopia is getting from external assistance in the form of aid. To see its effect on the economic growth this variable is chose as one explanatory variable as one part of human capital development and expected to have positive contribution to the socioeconomic status of the recipient country (Siraj, 2012; World Bank, 2018)

All of the variables discussed above are given in natural logarithm forms except primary and secondary school enrolment because it collected in terms of percentage. The log-linear form of specification enables the researcher to interpret the coefficient of the dependent variables directly as elasticity with respect to the independent variables.

Dummy Variable (D): - Changes in economic policies can influence the performance of the economy through investment on human capital and infrastructure, improvement in political and legal institutions and so on (Easterly, 1993). Therefore, policy change dummy (D) was added in to the model. The dummy for changes in economic policies take zero for the period 1974/75-1991/92 and one otherwise.

Table 3.1: Summary of Variables Measurements, Sources and their expected sign

Variable	Measurement	Source	Expected effects
RGDP	In millions of birr	NBE	
GCF	In millions of birr	NBE	Positive
Labor Force	Active labor force (total population at age 15 -64)	WDI Data set	Positive
Gov'nt expenditure on health	In millions of birr	MoFED	Positive
Gov'ntexpenditure on education	In millions of birr	MoFED	Positive
Primary school enrolment	School enrollment rate, primary (% gross)	MoE and WDI	Positive
Secondary schooll enrolment	School enrollment rate, secondary (% gross)	MoE and WDI	Positive
LifeExpectancy at birth.	Life expectancy at birth	WDI	Positive
Net Official Development Assistance	In million birr	WDI	Positive

Source: Derived from empirical and theoretical literature, 2020

CHAPTER FOUR
4. RESULTS AND DISCUSSION

4.1. Introduction analysis and interpretation

This chapter contains both the descriptive and econometrics analysis. Under the descriptive statistics the trends and overall performances of the variables on economic growth are presented in a line graph and tables. The econometric analysis begins by testing the necessary tests such as stationary tests, diagnostic tests and granger causality test. After passed the necessary tests both the long run and short run models are estimated using Johansen co integration and Vector Error Correction Model respectively. After estimation has been made the interpretation and discussion are continued based on the model results.

4.1.1. Descriptive Analysis

In this study annual time series data covering the period from 1974/5 to 2018/9 is used. The variables under consideration are real gross domestic product, Labor force of active working aged population, Net Official Development Assistance. In addition, total government expenditure on education, government expenditure on health, primary school enrolment, secondary school enrolment and life expectancy at birth were considered as a proxy variable of human capital development. Real Gross Domestic Products as proxy economic growth of dependent variable, whereas, the other variables are determinant factors of economic growth. They are all expressed in logarithm form for the sake of econometric analysis but not descriptive analysis.

Table 4.1: Descriptive Statistics of the Economic Variables in millions of ETB from 1974 to 2018

Measurement	RGDP	GCF	Health Exp	Edu Exp	Net ODA
Mean	472,363.4	114,713.8	14,585.10	13,549.17	20,380.96
Median	167,917.5	42,820.90	577.5277	1,452.516S	6,467.790
Max.	1,874,689	663,218.4	47,771.47	98,388.54	96,754.86
Min.	97,651.09	141,16.01	46.32100	148.9490	707.8986
Std. Dev.	505,770.0	176,758.8	71,036.55	25,857.90	27,780.30
Source	NBE	NBE	MoFED	MoFED	WDI

Source: Author's calculation using Eview 10

Table 4.1 depicted the description of variables used in the estimation. They are all expressed in millions of local currency (Ethiopian Birr). The RGDP averages 472,363.4 million ETB and varies from minimum 97,651.09 to maximum 1,874,689.0 million ETB with a standard deviation of 505,770.0 million. Similarly, the mean of the gross capital formation is 114, 713.8 million ETB. It varies from its minimum value 141, 16.01 in a million to 663,218.4 in a million ETB with standard deviation of 176,758.8 million birr. Likewise, Education expenditure averages 13,549.17 million ETB and ranges from 148.949 to 98,388.54 million ETB. Health expenditure, with a mean of 14,585.10 million ETB, also varies from a minimum of 46.321 to a maximum of 47,771.47 million ETB. Finally, the mean of the Net official development assistant is 20,380.96 million ETB. It varies from its minimum value 707.8986 million to 96,754.86 million ETB with standard deviation of 27,780.30 million birr.

4.1.2. Trends of real GDP in Ethiopia from 1974/5 to 2018/9

The Ethiopian economic growth has shown various changes in different political regimes. The changes in government structure created a problem of inconsistency in implementing the policies by previous regimes including external and internal wars as well as natural disaster like famine and drought had a depressing effect on the history of economic growth of the country.

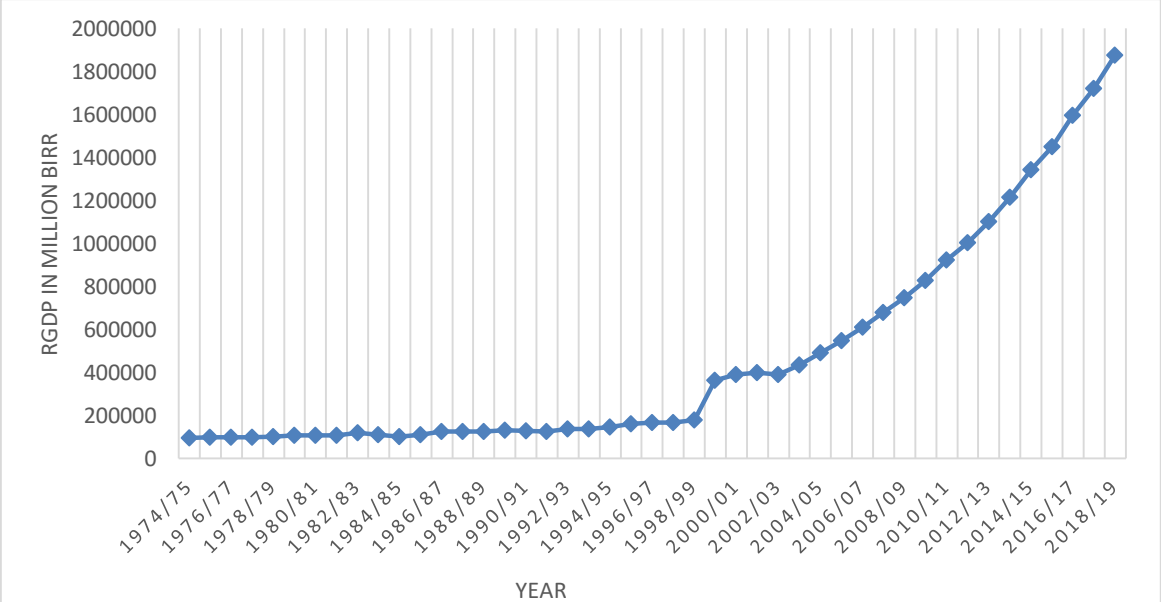


FIGURE 4.1: TRENDS OF REAL GDP IN ETHIOPIA BY BIRR FROM 1974 TO 2018/9

Source: own calculation based on NBE and MOFED data

According to the above figure 4.1, the real GDP of Ethiopia was 97,651.09 in a million birr in 1974 and it reaches 1,874,689 in a million of birr in 2018. In recent time the figure of real GDP is increasing fast because government giving more emphasis on investment on human capital development than earlier time. i.e., government more invests on education and health in current time. Health condition of people relatively improves and education coverage was increased. For this reason, real gross domestic product increase fast. Specially, as graph indicate the fast economic growth starting in Ethiopia from year 2,000.

4.1.3. Trends in the share of Governmental Expenditure on Health and Education in Ethiopia

The government of Ethiopia is committed to achieving education for all, and has an education policy that is committed to improving access to quality basic education for all children and adults, with particular emphasis on female's participation. Indeed, the education sector in Ethiopia has experienced remarkable expansion in recent years through the growth of both formal and informal schools for primary and secondary education, as well as through alternative ways to education such as basic education centers and non-formal and adult education. In addition, the government of Ethiopia spent ETB 31,829.24 in a million on public health in 2017/18, an increase from ETB 46.321 in a million in 1974/75. As the data of MoFED (2018) indicate that government of Ethiopia has consistently increased its educational and health sector expenditure from year 1974/75 to 2018/19. As depicted in Figure 4.2 both the total government expenditure on health and education and overall total govn't expenditure shows an increasing trend in line to this RGDP also increased.

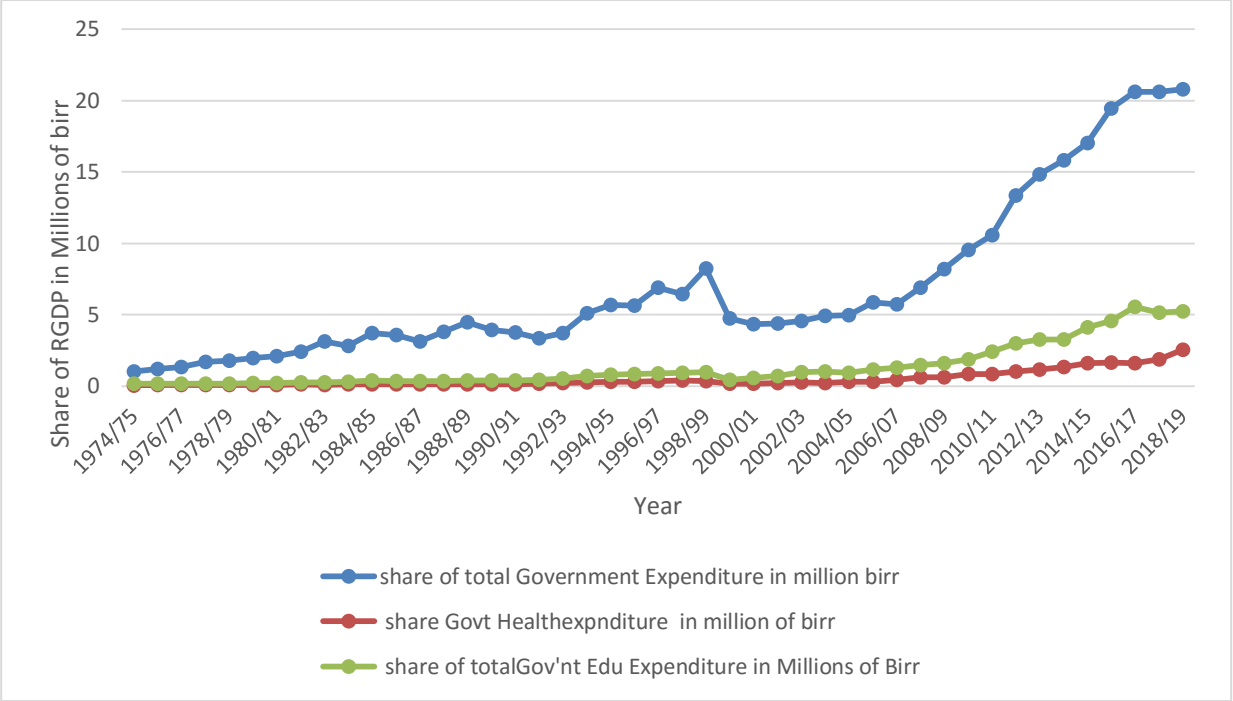


Figure 4.2: Share RGDP on Public expenditure on education, health and total in a years of 1974 to 2018/9

Source: own calculation based on MOFED (2020) data

4.2. **Econometric Estimation Results and Interpretation**

4.2.1. Unit Root Tests

In this study the augmented Dickey-Fuller (ADF) test is used to detect unit roots and the order of integration of the variables. This test was undertaken to check the order of integration of the variables. The test was done for two alternative specifications. First it is tested with intercept but no trend, and then it is tested with constant and trend and the Augmented Dickey Fuller (ADF) test result is given in table 4.2.

Table 4.2: ADF Unit Root Test Results at Levels and first difference

at Level			at 1st difference		
Variables	**Specification**	**Test statistic**	**Variables**	**Specification**	**Test statistic**
LnRGDP	Intercepts	1.363246	**ΔLnRGDP**	Intercept	-5.845017***
	Trend and intercept	-1.772487		Trend and intercept	-6.275791***
LnGCF	Intercept	1.065360	**ΔLnGCF**	Intercept	-7.677932***
	Trend and intercept	-1.590885		Trend and intercept	-8.168274***
LNLbF	Intercept	1.007309	**ΔLNLBF**	Intercept	-7.596097***
	Trend and intercept	2.376872		Trend and intercept	-7.626964***
LnHelExp	Intercept	2.894263	**ΔLnHelExp**	Intercept	-4.245197***
	Trend and intercept	0.222711		Trend and intercept	-5.343270***
LnEduExp	Intercept	2.833944	**ΔLnEduExp**	Intercept	-3.969683***
	Trend and intercept	1.586756		Trend and intercept	-5.863532***
PscErol	Intercept	-0.352398	**ΔLnPrmScEnr**	Intercept	-3.729414***
	Trend and intercept	-1.809972		Trend and intercept	-3.698359**
LnSeScErol	Intercept	-1.785697	**ΔLnSecScEnr**	Intercept	-2.986476**
	Trend and intercept	-3.507701		Trend and intercept	-5.587804***
LnLifeExP	Intercept	-1.457172	**ΔLnLifexpe**	Intercept	-4.532095***
	Trend and intercept	-2.050375		Trend and intercept	-4.332360***
LnNODA	Intercept	0.464621	**ΔLnNODA**	Intercept	-4.199583***
	Trend and intercept	-2.345331		Trend and intercept	-4.277089***
Testcritical values:	**Intercept**	**Trend and intercept**		**Intercept**	**Trend and intercept**
1% level	-3.588509	-4.180911		-3.592462	-4.186481
5% level	-2.929734	-3.515523		-2.931404	-3.518090

Source: own estimation using Eviews version 10.

Note: The rejection of the null hypothesis is based on MacKinnon (1996) critical values. Akaike information criterion (AIC) is used to determine the lag length while testing the stationarity of the variables. The *** and ** sign indicates the rejection of the null hypothesis of non-stationary at 1%, and 5% significant level respectively.

The null hypothesis in these tests claims that the series under investigation has unit root. On the other hand, the alternative hypothesis claims that the series is stationary. The ADF test statistics as depicted in table 4.2 illustrates that all variables are non-stationary or unit root problem in their levels for both type of specifications at 1% and 5% level of significance. That is, it is not possible to reject the null hypothesis of unit root. On the other hand, in their first differences, all of the variables are stationary at the conventional 1% and 5% level of significance. These results indicate that, with intercept and trend, the variables are integrated of order one I (1). This shows that the mean value and variances are constant. Such results of stationarity test would allow us to apply the Johansen approach of co-integration. This is one of the main justifications for using the VEC Model.

4.2.2. Optimal Lag Length Selection Results

Johansen co-integration analysis is very sensitive to the number of lags included in the model. This necessitates the determination of an optimal lag order prior to the test of co integration. The more lags we include, the more initial values we lose or it results loss of degree of freedom. If we include too few lags, the size of the test will be incorrect (Gujarati, 2009). Therefore, selection of optimal lag length helps to avoid loss of initial values. Stationarity of the results confirmed that all variables were integrated I(1), before identifying the number of co-integrating vectors, we first applied VAR test in order to determine optimal lag length. As shown in the table 4.3 the optimal lag order is determined with the sequential modified Likelihood Ratio test statistics (LR), the Final Prediction Error (FPE), the Akaiki Information Criterion (AIC), the Schwarz Information Criterion (SIC), and the Hannan-Quinn Information Criterion (HQ). The table 4.3 shows that the most of criteria suggest a lag length of three at 5% level of significance and three lag lengths is used in this study.

Endogenous variables: LNRGDP, LNGCF, LNLbF, LNGov'tHealExp, LNGovtEduExp, PSCEROL, SECSEROL, LNLifeExpt, LNNODA

Exogenous variables: C, Sample: 1974 2018, Included observations: 42

Table 4.3: Optimal Lag order Selection Results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	60.65427	NA	4.24e-14	-2.412108	-1.998377	-2.260459
1	425.5693	538.6841	1.60e-19	-15.02711	-10.47607*	-13.35897
2	529.1998	103.6305	3.18e-19	-15.19999	-6.511643	-12.01537
3	**777.2178**	**129.914***	**6.62e-21***	**-22.24847***	**-9.422810**	**-17.54736***

Source: own estimation using Eviews version 10; *indicates lag order selected by the criterion at5%

4.2.3. Johansen Co - integration Test and Analysis

In the presence of co integration, the valuable long-run relationship can be preserved since estimation would not be spurious, so long as the variables are integrated by the same order and are co integrated. The study tests for the existence of a long run relationship among the variables. The Johansen cointegration test for the variables indicates the presence of co- integration and also the presence of one co-integration as the variables are integrated of order one. The null hypothesis that there is no co integrating vector in the system is rejected, but the null that there exists at most one co-integrating vector of order one is not rejected at 5% level of significance. These findings establish the existence of an underlying long-run equilibrium relationship between the dependent variable, LnRGDP and the independent variables.

Series:LNRGDP,LNGCF,LNLbF,LNGov'tHealExp,LNGov'tEduExp,PSCEROL, SECSERO, LNLifeExpt, LNNODA

Table 4.4: Johansen Co-integration Test Result

Null hypothesis	Alternative hypothesis	Eigen value	Co-integration trace Statistic	5% Critical value	Prob.**	Hypothesized No. of CE(s)
Trace test (λ trace)						
$r \leq 0$	$r > 0$	0.811001	227.8888	197.3709	0.0006	None ***
$r \leq 1$	$r > 1$	0.690243	156.2504	159.5297	0.0743	At most 1*
$r \leq 2$	$r > 2$	0.521673	105.8557	125.6154	0.4172	At most 2
$r \leq 3$	$r > 3$	0.392679	74.14493	95.75366	0.5752	At most 3
$r \leq 4$	$r > 4$	0.348896	69.81889	71.22831	0.5806	At most 4
$r \leq 5$	$r > 5$	0.348896	47.85613	52.70094	0.5184	At most 5
$r \leq 6$	$r > 6$	0.271067	29.79707	34.25023	0.4882	At most 6
$r \leq 7$	$r > 7$	0.259568	15.49471	20.65478	0.3795	At most 7
$r \leq 8$	$r > 8$	0.160577	3.841466	7.732372	0.4945	At most 8
Max eigen test (λ max)						
r = 0	r = 1	0.811001	71.63849	58.43354	0.0016	None **
r = 1	r = 2	0.690243	50.39465	52.36261	0.0785	At most 1 *
r = 2	r = 3	0.521673	31.71078	46.23142	0.6761	At most 2
r = 3	r = 4	0.392679	21.44399	40.07757	0.9353	At most 3
r = 4	r = 5	0.348896	18.45071	33.87687	0.8539	At most 4
r = 5	r = 6	0.271067	13.59545	27.58434	0.8495	At most 5
r = 6	r = 7	0.259568	12.92241	21.13162	0.4594	At most 6
r = 7	r = 8	0.160577	7.526729	14.26460	0.4288	At most 7

Source: own estimation using Eviews version 10; *Note: ** and * denotes* rejection of null hypothesis at 5% level and 10% level of significance respectively.

The Johansen's co-integration Eigen value is presented in table 4.4, and determine the number of co-integrating vector. The null hypothesis is that there is no co-integrating vector: H0: $r \leq 0$; against its alternative hypothesis, r>0, Ho is rejected by both the λ max and the λ trace statistics at 5% level of significance. From the maximum Eigen value test results, for Ho: r = 0, the reported trace statistic is 227.8888 which is greater than the 5% critical value of 197.3709, thus suggesting that the null hypothesis is rejected. But, for Ho: $r \leq 1, \leq 2, \ldots, \leq 8$, the reported trace statistics are less than the critical value at 5% significance level. Thus both λ trace and maximum Eigen value (λ max) conclude that there is one co integrating vector among the variables. These findings establish the existence of an underlying one long-run equilibrium relationship between the dependent variable and the independent variable.

4.2.4. Long Run Analysis

The main objective of this paper is to analysis the impact of human capital development on economic growth in Ethiopia for the period 1974 - 2018. To this end, data on variables that are believed to be more relevant in explaining economic growth in Ethiopia have been employed. These include gross capital formation, active labor force age of population, government health expenditure, government education expenditure, primary school enrollment, secondary school enrolment, life expectance and net official development assistance. The regression result for the long run model is given below.

Equation need to come bellow the results table:

LnRGDP = -22.83259 - 0.345897LnGCF +3.930827LnLF - 0.290677LnHealExp+ 0.446044LnEDduExp + 0.016622PSCERoL - 0.017101SESCEROL + 5.741163LnLifeExp - 0.124166 LnNODA + 0.070347 D

Table 4.5: Results showing Long - Run estimation of LnGDP
Dependent Variable: LNGDP

Variables	Coefficient	Std. Error	t-Statistic	Prob.
LNGCF	-0.345897***	0.053586	-6.454962	0.0000
LNLAF	3.930827***	0.963579	4.079403	0.0003
LNGOVTHEALTHEXP	-0.290677***	0.046404	-6.264025	0.0000
LNGOVTEDUEXP	0.446044***	0.064662	6.898075	0.0000
PRSCHERL	0.016622***	0.001625	10.22996	0.0000
SECSCERL	-0.017101***	0.004246	-4.027833	0.0003
LNLIFEEXPE	5.741163***	0.642945	8.929473	0.0000
LNNODA	-0.124166***	0.045863	-2.707320	0.0105
dummy change Policy	0.070347	0.064582	1.089272	0.2837
C	-22.83259***	3.500609	-6.522463	0.0000
R-squared	0.982775	Mean dependent var		12.57136
Adjusted R-squared	0.978216	S.D. dependent var		1.006176
S.E. of regression	0.148507	Sum squared resid		0.749845
Long-run variance	0.003247			

Source: *own estimation using Eviews version 10; *** and ** show significance at 1% and 5% level of significance respectively.*

As table 4.5 Indicates R-squared (R^2) is 0.982775signifying that 98.3% of the variation in ln real GDP in the long run is explained by explanatory variables such as Ln of Gross Capital Formation, Ln of Labor Force, Ln of Gov't Health Expenditure, Ln of Gov't Education Expenditure, Primary School Enrolment, Secondary School Enrolment, Ln of Life Expectancy and Ln of Net Official Development Assistance. As it is shown in long run results, the some of the variables coefficients have as expected hypothesized signs while gross capital formation, government expenditure on health, secondary school enrolment and net official development assistance have unexpected signs. In addition, all the variables have statistical significant at 1% and 5% level of significant in long run.

Since the growth model is specified in a log- linear form, the coefficient of the independent variables can be interpreted as elasticity with respect to real GDP.

Total government expenditure on Education

Human capital is approximated using total government expenditure on Education has a long run impact on the Ethiopian economy growth and statistically significant at 1 percent significance level. The findings of this study concerning the long run positive impact of the education expenditure on Ethiopian economic growth are consistent with the endogenous growth theories developed by Lucas (1988), Romer (1990). The result as it can be seen from the table 4.5 is both significant and robust. One percent increase education expenditure is expected to raise the level of real GDP by 44.67%. According to theoretical literature, education is basic objective of development. Education is essential for a satisfying and rewarding life; it is fundamental to the broader notion of expanded human capabilities that lie at the heart of the meaning of development. At the same time, education plays a key role in the ability of a developing country to absorb modern technology and to develop the capacity for self-sustaining growth and development. Moreover, health is a prerequisite for increases in productivity, and successful education relies on adequate health as well. Thus education can also be seen as vital components of growth and development as inputs to the aggregate production function. Their dual role as inputs and outputs gives education their central importance in economic development (Todaro, 2012). This is in line with the results found by (Teshome 2006; Dinkneh and Yushi,2015; Tewodros,2014; Hadir and Lahrech, 2015; Biruk,2017; Kazmi et al., 2017; Fadila et al.,2019; Chijioke and Amadi, 2019). On the other hand this result is in contradiction with previous findings of negative or insignificant effects of education expenditure on economic growth like (Eggoh, Houeninvob and Sossoub, 2015 and Gisore et al., 2014) who found that education expenditure and human development indicator have insignificant effect on economic growth in Africa. Thus, government investment on education sector in Ethiopia helps in economic growth in the long-run.

Public expenditure on health

The result of the long run model show public expenditure on health has negative statistically significant effect on long run economic growth. It indicates, real Gross Domestic Product declines by 29,06 percent as health expenditure decline by 1% at 5% level of significance, keeping other variables constant. The Significant result is consistent with the output of studies conducted by Gisore et al. (201it4); Eggoh, Houeninvob and Sossoub (2015), Kidanemariam (2015), Dinkene(2015) and Fadila et

al.(2019). This consistency results may be indicate it is most important and significant to support country economy when adequately allocate and follow applying usage of budget by any concerning body. But, it is uneven with the output of study is negative; it may be allocation, availability and/or problem of budget use and corruption.

Primary school enrollment

In addition, the coefficients of primary school enrollment have positive relationships and statistical significant at 1% percent of level significance in long run. This variable is one of proxy human capitals. From the above long run equation economic growth with respect to primary school enrollment is highly elastic with a one unit increase of primary school enrollment leading to a by 1.7 percent increase in economic growth or real GDP when the other things considers at constant . This supports the government investments on education human capital formation means of producing educated and skilled labor force. On the other hand the argument of endogenous growth theories of additional effects of human capital over the static effect on the level of output that explains sustainable economic growth. This result supported or in the line of positive and significant effect of primary school enrolment on economic growth as study of Hadir and Lahrech, 2015 and Dinkneh and Yushi, 2015. But this findings contradiction with previous study like Jaiyeoba,2015 who found negative and insignificant effect of primary school enrolment on economic growth. So, as result of study government investment on primary school is crucial to post our economy in a long run. Because can produce/create skill full and educated man power to increase productivity.

Secondary school enrolment

Furthermore, Secondary school enrolment of human capital stock has also negative statistical significant effect on economic growth at one percent level of significance in long run. The investment on secondary education in developing countries provides not much support to economic development because a coefficient study result is negative. Unexpected negative effects may be Ethiopia is less industrialized country and this level education is no supported with laboratory, practical and limitation in education quality. For more industrialized countries, secondary and above education enrollment can play a key role in economic growth (International Institute for Applied Systems Analysis, 2008). Furthermore, the fast increase in enrolment in school in Ethiopia is important but may not be sufficient to ensure that students have harvested sufficient knowledge and skills that will enable them to create productive job and employment because secondary school in the country is claimed less quality

education. This significant results in a line as study results of (Kidanemariam, 2014; Dinkneh, 2015; Jaiyeoba, 2015; Hadir and Lahrech, 2015; Tassew and Nandeeswar, 2016 and Fadila et al., 2019). Furthermore, other factors such as countries' macroeconomic structure, the given function of education in national poverty reduction strategy giving education calculam independence and their responsiveness to local needs can also have influence and limit education benefits (Montanini, 2013).

Life expectancy at Birth

Life expectancy has positive statistical significant impact on economic growth at 1% level of significance with in a long run. One percent increase of life expectancy of people, the real gross domestic product increased by 5.74 percent. Healthy people live long and numbers of population are increased and death rate would be decreased. Within many population, may have many active working age grouped labor force increased. Then the productivity would be increased. This result supported by previous study findings like Kazmi et al., 2017 who found positive and significant effect of Life expectancy at birth on economic growth.

Gross Capital Formation

The gross capital formation is unexpected negative sign and significant effect on the real GDP in the long run. Output of study shows that, one percent increase of gross capital formation decrease 34.6 percent of real gross domestic product. The result is unexpected or inconsistent with the neoclassical growth model of the Solow - Swan (1956) and endogenous growth model. In their model they assumed higher investments and saving rates leads to more accumulated capital per worker. However, this finding is inconsistent with prior expectation and contradicts with economic growth theories. In my opinion, it may be problem of corruption; probability of omission of the quality of physical capital; inefficient and under investment; but it is difficult to justify the exact reason behind such unexpected result using this research. Even the result is negative it was significant effects on economic growth. Hence, further detailed research should be done to identify the reason behind such result. This result finding in line with (wube, 2008).

Active Labor Force

The population of active labor force aged and is positive statistical significant effects on economic growth at 1% level of significant in long run. This is in line with expectation. As we observed from the above table model results other things remains constant as labor force increases by one percent real

GDP has increased by 39.3 percent other things at remain constant. This implies that labor force has important role in the growth of Ethiopian economy. Like that of human capital, the result shows that population active labor force strongly affects economic. This shows how high population of labor force growth in Ethiopia activates economic advancement in the long run. So, skill full and healthy labor force can easily adopt technology to increase product and largely contribute the country economy in any work places. The findings of this research are consistent with the endogenous growth theories (mainly advocated and developed by Lucas (1988); Romer (1990); Mankiw, Romer and Weil (1992) which argue that improvement in human capital (skilled and healthy workers) leads to productivity enhancement that boost output. Also the results in line with the other studies like Barro (1997), Anyanwu et al. (2015) while this result finding is also inconsistent results to Wube (2008); Kidanemariam (2015); Dinkeneh (2015); Altiner and Toktas (2017).

Net Official Development Assistant

The study expected the long run effect of net official development assistant to be positive considering the effects of investing on a human capital and other investments. But the result shows that its effect is unexpected negative sign. But as attempted to explain the findings concerning the relationship between Net official development assistant and economic growth was negative and significant effect on economic growth at 1% of level of significance with in long run. One reason behind the negative effect of development assistant on the Ethiopian economy might be that the period covered is too short to experience the negative effect of debt servicing on economic growth. Official development assistant in this paper includes grants, external debt and aid. From this finding a one percent increases of official development assistant real gross domestic product decreased by 12.4% when other things remain constant. This shows that even if the effect of development assistant on the long run growth negative, it has a very weak effect on economic growth. The result is also in line with Tewodros (2015), kidanemarian(2014) and Mulugeta (2017) had investigated that external debt had a negative significant impact in the long run on economic growth in Ethiopia due to debt overhang and crowding effect.

4.2.5.The Vector Error Correction Model Estimation Results

The coefficients of difference of the variables represent the coefficients of short run dynamics whereas the coefficient of lagged error correction term ECM (-1) captures the speed of adjustment towards the long run equilibrium relationship. i.e., ECM is used to tie short run behavior to its long-run dynamics. The table 4.6 indicates that human capital proxy variables such as primary school enrollments and secondary school enrolments at its difference are statistically significant in determining real GDP in the short run at 5% level of significance. Also, active labor force and dummy of policy changes have positive significant effects on economic growth in a short run. But, gross capital formation, public education expenditure, public health expenditure, life expectancy at birth and official development assistants have an insignificant impact on economic growth in the short run. The result shows that the coefficient of the error-term for the estimated growth equation is statistically significant and negative as expected. Thus, it will rightly act to correct any deviations from long-run equilibrium. Specifically, if actual equilibrium value is too high, the error correction term will reduce it while if it is too low, the error correction term will raise it. In other words it shows the convergence of the model toward the long run equilibrium in case of any disturbance occurs in the short run. The coefficient (-0.7434387) shows that 74.3 percentage points adjustments takes place each year towards long run equilibrium; or about 74.3% of the disequilibrium is adjusted in the first period, hence, full adjustment would require a period of about three years.

Table 4.6: Results Showing the Short run dynamics Estimation:

Variables	Coefficient	Std. Error	t-Statistic	Prob.
C	0.0117699	0.0633148	0.19	0.853
DlnRGDPt-1	0.4606638	0.2898744	1.59	0.112
DlnGCFt-1	0.0838671	0.1456302	0.58	0.565
DlnLF t-1	26.76997 **	11.82638	2.26	0.024
DlnHealthEXPt-1	0.0014309	0 .2305709	0.01	0.995
DlnGOVTEDUEXPt-1	-0.1902941	0.3425092	-0.56	0.578
DPRSCHERLt-1	1.142645 **	0.4879458	2.34	0.019
DSECSCERLt-1	0.8547845**	0 .3867671	2.21	0.027
DlnLifeexpet-1	38.02518	26.49113	1.44	0.151
DlnNODAt-1	0.0337698	0 .1091353	0.31	0.757
Policy change dammy(D)	0.5808233*	0.3330441	1.74	0.081
ECTt-1	-0.7434387 **	0.3709864	-2.00	0.045

R-squared	0.449227	Mean dependent var	0.069881
Adjusted R-squared	0.026441	S.D. dependent var	0.116191
S.E. of regression	0.117717	Akaike info criterion	-1.135307
Sum squared resid	0.304862	Schwarz criterion	-0.307846
Log likelihood	43.84145	Hannan-Quinn criter.	-0.832010
F-statistic	0.944412		
Prob(F-statistic)	0.546406	Durbin-Watson stat	1.972035

Source: own estimation using Eviews version 10; Note: ** and * shows significance level at 5% level of significance respectively.

Guideline: when the error correction term is significant (0.05) and the sign of coefficient is negative there is long run equilibrium or loosely speaking causality running from the explanatory variables to the dependent variable in this case to Real GDP. Hence the model is judged to have a short run adjustment to the long run equilibrium running from the independent variables to real GDP.

4.2.6. Short Run Analysis

The model estimates that the short run dynamics which is mainly driven by lagged real GDP, total government expenditure on education and health, primary and secondary school enrollment, life expectancy, Gross capital formation, net official development assistant, and active labor force age population . The short run coefficient of individual variables should be examined to determine the relative contribution of each component of explanatory variables to economic growth in Ethiopia.

After the acceptance of long run coefficients of the growth equation the short run Error correction Model is estimated. The coefficient of one-period lagged error-correction term (lagECM) measures the speed of adjustment to the co-integration relationship. It is as expected to be negative, statistically significant, and has an absolute value smaller than one, indicating the gradual convergence of the system toward long run equilibrium values (Engle and Granger,1987). Based on the result, the R^2 for the ECM is 44.9% which means that 44.9% the variation in first lagged value of real gross domestic product in the short run is explained by the difference of logarithm of all explanatory variables. The magnitude of the error correction coefficient, estimated at -0.743 is significant and has the correct negative sign. This shows that there is a very high speed of adjustment to equilibrium. The significant error correction term (i.e. 74.3%) further confirms the existence of stable long run relationships. More over the Durbin-Watson statistics (1.972035) is greater than that of R^2 (0.449227). The implication is that the rate at which adjustment is made towards long run equilibrium annually 44.9%.

As shown in table 4.6 the estimated short-run model reveals that human capital proxy variables such as primary and secondary school enrollments have a positive statistically significant effect on economic growth in the short run. The estimated short-run model reveals that human capital variable the coefficient of first lagged of primary school enrolment that proxies of human capital was positive and significant impact on economic growth in short run. As result reveals that one unit of primary school enrolment increased, the real gross product is raised by 1.143 amounts when other things constant. This result findings similar to previous or earlier study like Dinkneh and Yushi (2015).

- Similarly, the coefficient of first lagged of secondary school enrolment were positive statistical significant effect on economic growth. That implies one present increase in secondary school enrolment leading to a raise in economic growth on average by 85.5 percent in the short run when other things remain constant. School enrolments have support to adopt new technology for manufacturing and service sector and benefit for education among people to produce more quality

production in short run. This may be due to the fact that Ethiopia economic growth based on school enrolment by producing educated man power. And the sign is expected but different growth theories emphasize that the impact of such human capital is observed in long run rather than in short run. Also, the result was similar consistent with the finding of Dinkneh and Yushi (2015) who found positive impact of human capital development on economic growth in Ethiopia increasing school enrolment for education.

- In addition, the co-efficient of the first lagged value of labor force was positive significant effects on economic growth at 5% level of significant in short run. This indicates, in the short run, active labor force in the current period is sensitive to what it was in the previous period to support continuous economic growth.
- However, the coefficient of first lagged value of human capital proxy variables of health expenditure and life expectancy have positive insignificant impact on economic growth in short run. But, human capital measured by education expenditure is negative insignificant to economic growth in short run. Because this all are investment for future productivity, but for current it is economic cost.
- Whereas official development assistant are negative and statically insignificance impact on economic growth which is opposite result to long run result at 5% level of significance. However, the long run contribution of the development assistant to the overall economic growth is turned to be negative and significant. Similarly, the results of short term dynamics reveals that gross capital formation has positive insignificant effect on economic growth in the short run economic growth in Ethiopia.
- Policy change in Ethiopia has positive significant effect on real Gross Domestic Product in the short run. Probably a change of policy can affect or change our economy by 58.08 percent in short run. This indicates government structural change can produce proper policy develop to increase or post the country economy.
- Finally, the study result shows that human capital proxy variables primary and secondary school enrolment are positive significant impact on economic growth in short run. And active labor force is positive significant effect on economic growth in short run. On the other hand in short run, government education expenditure, government health expenditure and life expectancy have insignificant impact on economic growth in Ethiopia.

4.2.7. Granger Causality Test Results

A granger causality test is made to identify the direction of causality between the dependent variable (real GDP) and independent variables such as human capital (proxy by education expenditure, health expenditure, primary and secondary school enrolment). In order to test the causality pair wise granger causality test was employed. The concept of causality involves the effect of past values of one or more of the variables on the current value of the other. In a causality test as first proposed by Granger (1969), we consider the null hypothesis that Ln of real Gross Domestic Product does not granger cause Ln of Gov't Health Expectancy, Ln of Gov't Education Expenditure, Ln of Primary and secondary School Enrolment, Ln and vice versa. These tests confirm the application of a single dynamic model rather than a simultaneous equation model. It helps to test whether economic growth has got an impact on the human capital level in the country and vice versa. Our result shows that human capital which is proxy by Ln of Primary School Enrolment and Ln of Secondary School Enrolment are causal relation with LnRGDP that is at 1% and 5% level of significances respectively. But, Ln of RGDP is the cause only for Ln of Gov't Education Expenditure at 10% level of significances. This shows that human capital is the cause for economic growth and there is feedback effect of economic growth on the level of human capital formation means of government education expenditure. Causality may be positive or negative cause. From the above result, education expenditure and primary school enrollments are the cause for the improvement of economic growth, while Secondary school enrolment is the cause for reduction of economic growth.

Table 4.7: Pair wise Granger Causality F-Statistics

Null Hypothesis:	F-statistic	Prob.
LnHEALTHEXP does not Granger Cause LNRGDP	2.35306	0.1088
LnRGDP does not Granger Cause LNHEALTHEXP	1.17316	0.3203
LnGOVTEDUEXP does not Granger Cause LNRGDP	2.58857	0.0883*
LnRGDP does not Granger Cause LNGOVTEDUEXP	1.07644	0.3510
LnPRSCHERL does not Granger Cause LNRGDP	1.43408	0.2509
LnRGDP does not Granger Cause LNPRSCHERL	6.67230	0.0033***
LnSECSCERL does not Granger Cause LNRGDP	0.05689	0.9448
LnRGDP does not Granger Cause LNSECSCERL	3.71993	0.0335**

Source: our calculation using eview version 10.

Note: ***significant at 1 percent level, **significant at 5 percent level, and *significant at 10 percent level are probabilities of accepting the null hypotheses of no causality.

There is universal consensus that the Granger causality test does not indicate real causality among variables. However, it suggests a preliminary approach to the possible relationships among the Variables. Table 4.7 presents the Granger causality test results for each pair of variables of the model. According to the result, government expenditure on education and economic growth shows unidirectional causality at 10percent level of significance. Also, economic growth and primary and secondary school enrollment shows unidirectional causality at 0.5 percent level of significance. Therefore, the evidence coming from the Granger-causality test demonstrates the idea that human capital had an impact on economic growth in Ethiopia.

4.3. Diagnostic Tests and Model Stability

Tests of serial autocorrelation, hetroskedasticity and normality tests on the residuals of the vector error correction models are conducted with the help of Lagrange-multiplier test, Breusch-Pagan test, RMSE tests and Jarque Bera test respectively. Finaly, the model stability test is conducted using CUSUM test and CUSUM of squares test. These tests are used to confirm the basic assumptions regarding the residual and the validity of the results in this study.

4.3.1. Serial Autocorrelation Test

The serial correlation test can be done using the Lagrange multiplier (LM) test for autocorrelation presented in appendix 1(A) shows that our lag selection criteria dictated us to choose lag 3. At each lags, the p value is greater than 5% level of significant. The decision in this case is to not reject H0 (there is no autocorrelation). Hence we accept the null hypothesis. Again in all the lags above the p value is insignificant. As such we no autocorrelation problem and we can judge that the model is free from autocorrelation problem.

4.3.2. Heteroskedasticity Test

The estimated residuals did not provide significant heteroskedasticity effect in the error term (see appendix 1(B) for Breush-pagan heteroskedasticity test).

4.3.3. Normality Test

H0: the residuals are normally distributed; Alternative H1: the residuals are not normally distributed

The result presented in appendix 1(C) shows that the normality distribution of the residuals, the Jarque Bera test is used. As can be seen from the test result, residual distribution of all variables for all models shows that the distribution is normal. Results for the variables shows that the p value for over all variables is not greater than 5% and hence we can say that the model is free from the a problem of normality distribution of the residual (error) terms.

4.3.4. Model Stability Test

Finally, the stability of the model test is conducted using CUSUM test and CUSUM of squares test. This option plots the cumulative sum together with the 5% critical lines. The test finds parameter instability if the cumulative sum goes outside the area between the two critical lines. As with the CUSUM test, CUSUM of squares test shows movement outside the critical lines as suggestive of parameter or variance instability. Accordingly the results presented in appendix 1(D) show that the model and parameters of the model are stable since cumulative sum and cumulative sum of square lie between two critical lines.

CHAPTER FIVE

5. SUMMARY, CONCLUSIONS AND POLICY IMPLICATION

The previous chapter presented the result and analysis of the study. This chapter provides the conclusions and recommendations in line with the findings of the study. The chapter is structured to two sections. The first section deals with the summary, second section presents conclusion whereas the third section presents some recommendation and suggested as a solution to problem which is identified in the study.

5.1. SUMMARY OF STUDY

The main objective of the study was to analyze the impact of human capital development on economic growth in Ethiopia using a time series data running from 1974 to 2018. Both neoclassical and modern growth theories have placed emphasis that human capital is the main engine of economic growth. Thus, to determine the impact of human capital proxy variables such as public expenditure on education, public expenditure on health, primary school enrollment, secondary school enrollment and life expectancy on economic growth by applying Johansen co-integration approach, the vector error correction model and granger causality tests were employed to grasp the nature of time series data. The stationery of the variables are tested using ADF tests and all variables are non-stationary at level and they become stationary at their first difference; i.e., they are integrated of order one, (I ~I (1)). The Johansson co-integration result revealed the existence of only one co-integrating equation in the long run. The result of the descriptive analysis revealed that the trend of Ethiopian human capital proxy of government expenditure on health and education with RGDP shows an increasing path on average during study period.

The empirical results of this paper showed that in the short run, the coefficient of error correction term is -0.743 suggesting about 74.3 percent annual adjustment towards long run equilibrium. This is another proof for the existence of a stable long run relationship among the variables. Study results showed that in the human capitals proxied by (primary school enrolment and secondary school enrolment) and active labor force are the positive significant effect to rise real GDP in short run and long run but secondary school enrolment is not positive effect in short run economic growth. In other word, holding other things constant, a one percent change in human capital proxied by primary school enrolment brought in short run 1.147 and in long run 16.6 percent change in real GDP at 5% level of significant. Next a one percent increase in secondary school enrolment has resulted in short run in 0.855 and in long run 0.0171 unit decline the real GDP. Also, human capital proxy of government

expenditure on education and life expectancy at birth are positive significant effect on economic growth in long run. As result indicates, a one percent increase in life expectancy has 5.74 unit increase on real GDP in long run at 5% level of significant. In addition, the result reveals that gross capital formation, government health expenditure and net official development assistant have negative significant effect on economic growth in long run.

A causality test result shows that human capital development which is measured by primary school enrollment and secondary school enrolments are causal relationship with real GDP at 1%, 5%, level of significances respectively. But, real GDP is the cause only for public expenditure on education human capital formation at 10% level of significances. This shows that human capital is the cause for economic growth.

Finally, the result reveals that economic performance can be improved significantly when the education expenditure on human capital, primary school enrolment enrollment and life expectancy increases. Likewise, two variables such as gross capital formation and net official development assistant are shown to have negative statistically significant impact on economic growth in long run but not short run. On the other hand, labor force has positive statistical significant effect on economic growth in short run and long run.

5.2. **CONCLUSSION**

The human capital proxy variables such as government expenditure on education, life expenditure at birth, primary school enrollments are a positive long run effects or relationships on economic growth in Ethiopia. Thus, human capital developments have positive and significant long run impacts on economic growth in Ethiopia. In this study significant impact of human capital proxy variables are sound and consistent with the theoretical prediction of the neoclassical growth model and the endogenous growth model which argue that improvement in human capital (skilled workers) leads to productivity improvement that enhances output. Furthermore, the finding of this research concerning the long run positive impact of human capital is consistent with the in line of study Mankiw, Romer and Weil (1992), Barro and Salai-Martin (1995). So, the development of human capital is important accelerator of economic growth in Ethiopia.

However, human capitals proxied by government expenditure on health and secondary school enrollment have negative significant impact on the economy growth in long run. In Ethiopia, public health expenditure may not have sufficient health facility materials or investment on health to

sustainable and improve human health. Also secondary education has limitation on necessary education materials, quality and laboratory to produce skilled human capital. For this reason coefficient of public health expenditure and secondary school enrollments have unexpected negative result even statistically significant impact on economic growth. Simply providing more schooling may yield little or nothing in the way of economic growth in the absence of other elements such as the appropriate market, legal and governmental institutions and suitable policy environment in other sectors of the economy to support a functioning modern economy. School enrolment by itself is not a sufficient engine of growth. This may be adjusted by improving quality, increasing accessibility to all local area, fulfilling necessary materials and follow upping efficiency. Moreover, the results of the study have important implications particularly for policy makers that for achieving rapid economic growth, it is indispensable to give much emphasis to human capital development.

Human capital proxy of primary school enrollment and secondary school enrolments are unidirectional causal relationship with real GDP. And real GDP is the causes for public expenditure on education. This shows that human capital is the cause for economic growth by producing educated man power to increase productivity. Qualified education have support to adopt new technology for manufacturing and service sector and benefit for education among people to produce more quality of production. Hence giving emphasis to educate society and improving the quality of any type of education system most important direction to economic growth in Ethiopia.

In generally, high level of human capital development has most important macroeconomic variables to mobilize the utilization of resources wisely and adopt new technology. Also, there has been a multiplier effect that has led to economic growth in Ethiopia. As a result, a high sense of optimism has emerged concerning the benefits of increased continuous development of human skills, abilities and health facility. This eventually spilled over into socio-economic and development, as many analysts and policy makers now believe that human capital development can offer great gains to developing countries economy like Ethiopia.

5.3. **Recommendation and Policy Implications**

Based on these findings and the resulting conclusions, the following policy recommendations or suggestions can be drawn for achieving considerable and sustained economic growth.

- In order to improve economic growth, public expenditure on education needs to be better prioritized and more resources should be devoted to educate the citizens of the country. So, Government suggested to give more emphasis on its spending on education especially in rural areas because majority of the population lives there.
- We have shown that economic conditions and health status of most of developing countries are unfavorable. Our empirical evidence also reveals that improving the existing bad health facilities can smooth economic growth. To this end, concerned bodies suggested to increase the accumulation of health capital stock. This is possible by investing on health. Therefore, policy makers, government and non-governmental organizations who strive to promote growth and development suggested that investing on health and accumulate this form of capital. In addition, government take better action to audit and follow up how governmental expense used in expected sectors; increase accessibility of health care center facility.
- The results suggest that government and any concerned body should be given greater attention to human capital stocks development by introduce policies innovation promote and supporting education with practical and technology to support economic growth. Besides that, government suggested provide more opportunity job to balance with increasing enrollment rate to achieve high income economy and productive in order to adjust the negative impact of secondary school enrolment. Also, Government addressing the issue of relevance, quality and facilities of secondary education; the institutional workings of the labor market and employment conditions and the economy would essentially to contribute economic growth. In addition, after completion of secondary school, the institution guide and direct the way of how to join or create job opportunity of that society. Then, they can productive any type of work area and the country can raise economy.
- Generally, In order to achieve economic growth, policy makers and / or the government should strive to create institutional capacity that increase school enrolment and improve basic health service. That means, the policy makers and the government should center on securing more resources and structures that are essential and appropriate for better school enrolment and improved basic health service provision. In addition, the government should also continue its leadership role in creating enabling environment that encourage better investment in education and health sector.

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APPENDICES

Diagnostic Tests

1. (A) Autocorrelation test for residuals

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.268428	Prob. F(2,20)	0.3029
Obs*R-squared	4.727721	Prob. Chi-Square(2)	0.0941

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 04/27/20 Time: 12:53
Sample: 1977 2018
Included observations: 42
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.000809	0.070670	-0.011447	0.9910
C(2)	0.071061	0.421374	0.168641	0.8678
C(3)	0.363964	0.313563	1.160738	0.2594
C(4)	-0.034614	0.138087	-0.250666	0.8046
C(5)	-0.043014	0.121609	-0.353708	0.7273
C(6)	3.984330	14.08429	0.282892	0.7802
C(7)	-4.557193	9.933133	-0.458787	0.6513
C(8)	0.017507	0.180457	0.097015	0.9237
C(9)	0.008273	0.226457	0.036531	0.9712
C(10)	0.052395	0.382854	0.136853	0.8925
C(11)	-0.120698	0.323021	-0.373652	0.7126
C(12)	0.116847	0.312428	0.373995	0.7123
C(13)	-0.098414	0.390873	-0.251779	0.8038
C(14)	0.002208	0.121120	0.018230	0.9856
C(15)	0.008627	0.131688	0.065508	0.9484
C(16)	0.009607	0.153290	0.062673	0.9506
C(17)	0.054717	0.159174	0.343757	0.7346
C(18)	-0.019430	0.214349	-0.090646	0.9287
C(19)	-0.128987	0.195903	-0.658422	0.5178
C(20)	-0.021221	0.051664	-0.410759	0.6856
RESID(-1)	-0.031351	0.493273	-0.063557	0.9500
RESID(-2)	-0.698735	0.439042	-1.591498	0.1272

R-squared	0.112565	Mean dependent var	2.55E-16
Adjusted R-squared	0.819242	S.D. dependent var	0.086230
S.E. of regression	0.116307	Akaike info criterion	-1.159489
Sum squared resid	0.270545	Schwarz criterion	-0.249281
Log likelihood	46.34927	Hannan-Quinn criter.	-0.825862
F-statistic	0.120803	Durbin-Watson stat	1.904075
Prob(F-statistic)	0.999995		

1(B) **Test for Heteroskedasticity**

Heteroskedasticity Test: Breusch-Pagan-Godfrey

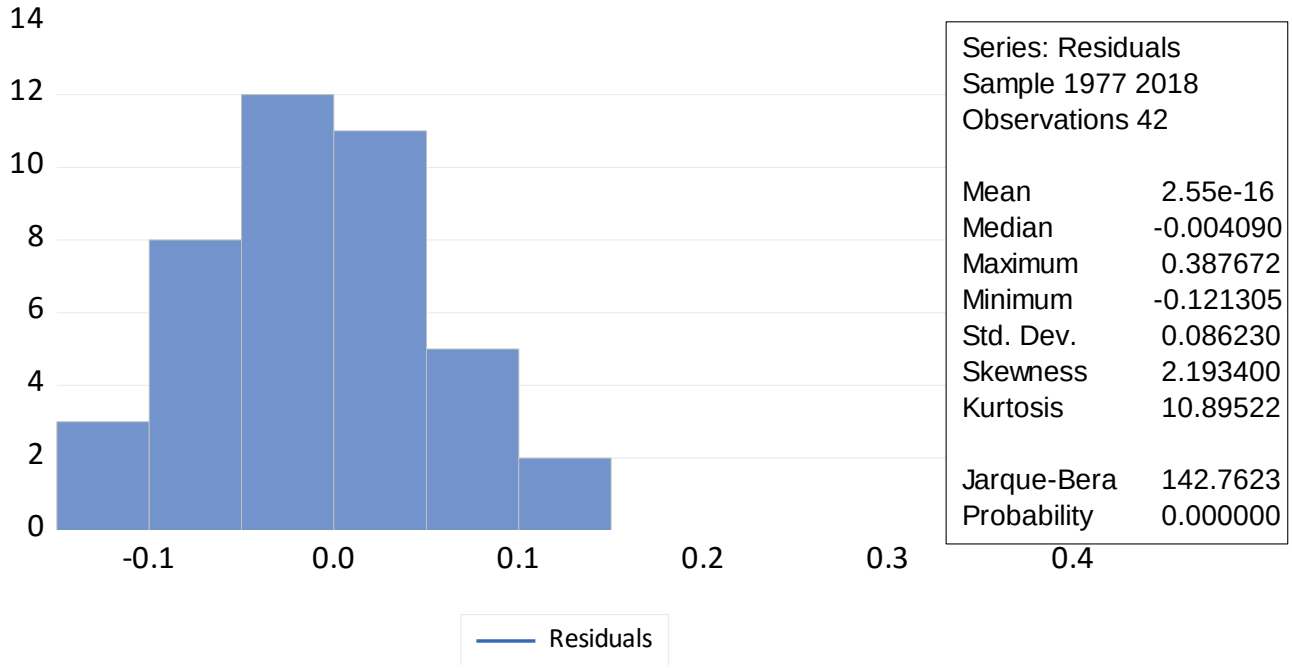
F-statistic	0.831706	Prob. F(27,14)	0.6714
Obs*R-squared	25.87100	Prob. Chi-Square(27)	0.5258
Scaled explained SS	35.12006	Prob. Chi-Square(27)	0.1359

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 04/27/20 Time: 12:57
Sample: 1977 2018
Included observations: 42

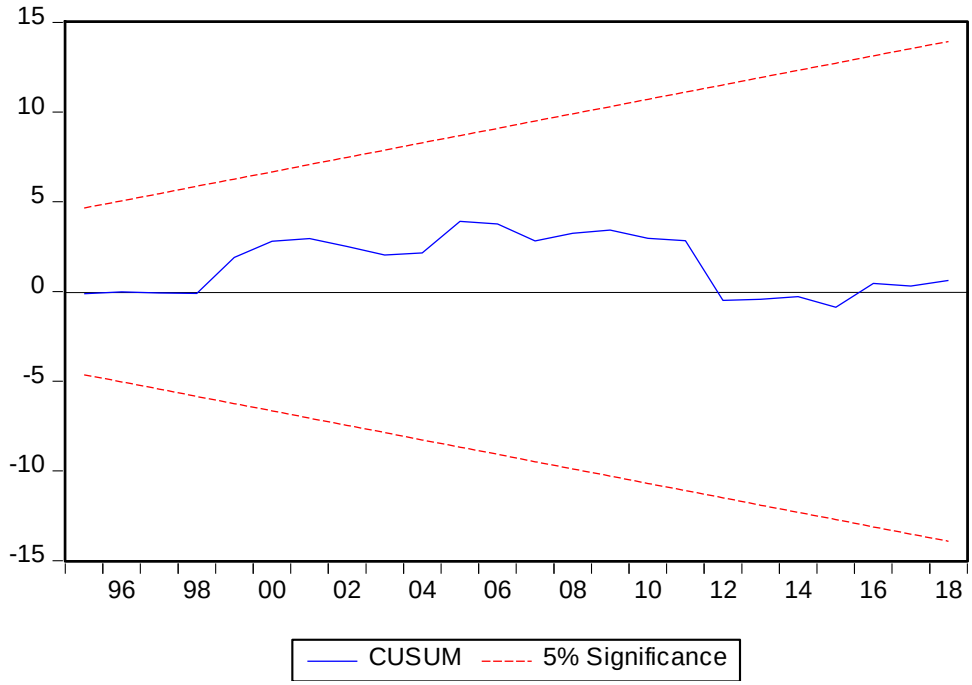
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.445350	4.662076	-0.953513	0.3565
LNRGDP(-1)	-0.000202	0.049531	-0.004085	0.9968
LNGCF(-1)	-0.029895	0.049313	-0.606220	0.5541
LNLF(-1)	-1.241363	2.577588	-0.481599	0.6375
LNHEALTHEXP(-1)	0.043461	0.050830	0.855024	0.4069
LNGOVTEDUEXP(-1)	0.170688	0.094642	1.803511	0.0929
LNPRSCHERL(-1)	0.180311	0.082802	2.177605	0.0470
LNSECSCERL(-1)	-s0.057197	0.033282	-1.718548	0.1077
LNNODA(-1)	-0.015946	0.032027	-0.497891	0.6263
LNLIFEEXPE(-1)	-0.020554	0.045465	-0.452090	0.6581
LNRGDP(-2)	-0.200508	0.081490	-2.460526	0.0275
LNRGDP(-3)	0.067637	0.069242	0.976833	0.3452
LNGCF(-2)	0.012774	0.031357	0.407392	0.6899
LNGCF(-3)	0.033289	0.037250	0.893651	0.3866
LNLF(-2)	2.214042	3.196424	0.692662	0.4999
LNLF(-3)	0.437467	2.275020	0.192292	0.8503
LNHEALTHEXP(-2)	-0.094815	0.058794	-1.612659	0.1291
LNHEALTHEXP(-3)	0.093103	0.050531	1.842510	0.0867
LNGOVTEDUEXP(-2)	-0.129340	0.096035	-1.346800	0.1994
LNGOVTEDUEXP(-3)	-0.008239	0.082429	-0.099958	0.9218
LNPRSCHERL(-2)	-0.294476	0.125035	-2.355147	0.0336
LNPRSCHERL(-3)	0.241505	0.099587	2.425074	0.0294
LNSECSCERL(-2)	0.003951	0.034407	0.114830	0.9102
LNSECSCERL(-3)	-0.048667	0.033271	-1.462761	0.1656
LNNODA(-2)	-0.036132	0.027576	-1.310279	0.2112
LNNODA(-3)	0.050572	0.042848	1.180252	0.2576
LNLIFEEXPE(-2)	-0.017960	0.048033	-0.373906	0.7141
LNLIFEEXPE(-3)	-0.038116	0.048339	-0.788507	0.4435

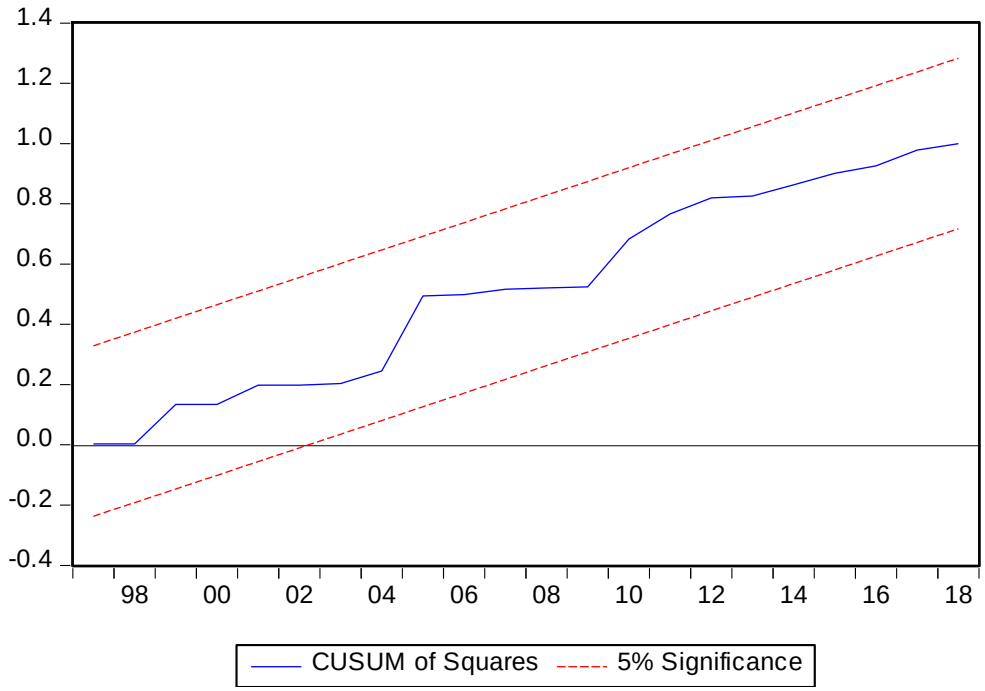
R-squared	0.615976	Mean dependent var	0.007259
Adjusted R-squared	0.124641	S.D. dependent var	0.023110
S.E. of regression	0.024508	Akaike info criterion	-4.344919
Sum squared resid	0.008409	Schwarz criterion	-3.186473
Log likelihood	119.2433	Hannan-Quinn criter.	-3.920303
F-statistic	0.831706	Durbin-Watson stat	2.466760
Prob(F-statistic)	0.671398		

1.**(C) Normality test**



D) Model stability test




1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
98
00
02
04
06
08
10
12
14
16
18
CUSUM of Squares
5% Significance