THE IMPACT OF HUMAN CAPITAL DEVELOPMENT ON ECONOMIC GROWTH IN ETHIOPIA

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APPROVAL SHEET

This is to certify that the thesis written by Henok Mengistu, entitled : *"The impact of human capital development on economic growth in Ethiopia"* and submitted in partial fulfilment of the requirement for the Degree of Master of Science (Development Economics) complies with the regulations of the university and meets the accepted standards with respect to originality and quality.

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DECLARATIONS

To confirm that the thesis titled: *The impact of human capital development on economic growth in Ethiopia* Submitted in partial fulfilment of the criteria for the Degree of Master of Science (Developmental Economics) degree complies with University rules and satisfies recognized standard for originality and quality.

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LIST OF ACRONYMS AND ABBREVATIONS

AIC	Akaike Information Criteria
ARDL	Autoregressive Distributed Lag
ECM	Error Correction Model
ECT	Error Correction Term
GDPPC	Gross Domestic Product Per Capita
GNP	Gross National Product
RGDP	Real Gross National Product
HDI	Human Development Index
NGO	None Government Organization
MoF	Minister of Finance
MoH	Ministry of Health
MoE	Ministry of Education
NBE	National Bank of Ethiopia
UNDP	United Nations Development Programs
WB	World Bank
WDI	World Development Indicator
WHO	World Health Organization

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ABSTRACT

Human capital is one requirement for achieving continuous economic growth. This study examines the relationship between economic growth and human capital development in the Ethiopian scenario from 1991 to 2021. In the meantime, the study analyses the effects on economic growth by dividing human capital into education and health human capital. Additionally, the study applies the Error Correction Model (ECM) and Autoregressive Distributed Lag (ARDL) techniques of co-integration to examine the immediate and long-term effects of human capital development. The outcome indicates the education human capital components namely school enrolment exhibit positive and statistically significant effect on economic growth in both the long run and short run. However, official development assistance and government expenditure on health exhibit negative and statistically significant effect on economic growth of Ethiopia in the long run. In short run, the coefficient of error correction term is -0.86 suggesting about 86 percent of the varation in real GDP is corrected within a year from its equilibrium level. The estimated coefficients of the short-run model indicate that school enrolment(education) is the main contributor to real GDP change followed by official development assistance (one period lagged value) and government expenditure on health But, unlike its long run significant impact, significant short run impact on the economy. Besides, the findings imply that the government and any other relevant entity should pay more attention to the development of human capital stocks by introducing policies that encourage innovation, support education, and provide practical and technological tools to support economic growth.

Keywords: Economic Growth, Human Capital, Ethiopia, ARDL,

CHAPTER ONE

1. INTRODUCTION

1.1 Background of the Study

Economic growth is a slow and steady process that continues over time, and this slow and steady process contributes to higher levels of output, income, and employment. The concept of investing in human resources and the role of human resources in economic growth is not a new concept, and a new economic growth hypothesis has been created to emphasize the significance of human capital in long-term economic growth. Modern economic growth has been driven by technological advancement, which encompasses both existing physical and human resources. This accounted for the majority of the observed historically higher per capita domestic product growth. (Tefera, 2017).

In theory, the knowledge, experience, and abilities of employees are referred to as human capital. But these mainly depend on the educational conditions and health status of each country. Human capital development is a key factor in achieving sustained growth in GDP per capita. Moreover, investing in human capital in the form of health protection, good nutrition, and quality education is a powerful weapon to eradicate pervasive poverty and inequality and break intergenerational cycles of poverty (Reem et al., 2021).

According to Fadilla et al. (2019), Investing in human capital through education and health in developed and a developing country has attracted the attention of many economists, researchers, and policymakers. While the main variables of human capital development focus on investment in education and the health sector, education makes an important contribution to the development of the research sector and increases economic growth through the efficiency and productivity of people. Generate new knowledge and stimulation that influence growth. Additionally, it could result in increased creativity and new technological developments and innovations. On the other hand, health reflects a total condition of wellbeing, whether physical or mental. (Todaro, 2011)

This African country has launched several campaigns to educate a skilled and competent population by developing and implementing very different education and health policies. While tensions and degrees of success may vary from administration to administration, African countries have poured significant resources and efforts into the education and health sectors in hopes of boosting productivity and thus economic processes (IBDR-IDA, 2019). Therefore, studying the relationship between economic growth, human capital (resources devoted to this sector), and economic processes is also of great interest to policymakers. Therefore, the main objective of this study is to analyze the impact of human capital development on Ethiopia's economic growth.

Ethiopia is the second-most populous country in Africa after Nigeria and remains the fastest-growing economy in the region. However, Ethiopia is also one of the poorest countries in 2020, with a GNI per capita of US$960 and a Human Development Index (HDI) score of 0.38. This is lower than the average for sub-Saharan Africa (UNDP 2020), where even the most developed countries have far fewer long and secure lives, knowledge, and a decent standard of living. Ethiopia's goals are to achieve, by 2025, lower middle-income status. Over the past 15 years, the Ethiopian economy has been the fastest-growing in the world, growing at an average annual growth rate of 9.5% (World Bank 2020).

With rapid economic growth and the expansion of services, Ethiopia has made great progress in improving its human capital. Ethiopia has made remarkable progress in education; it tripled primary net enrollment between 2000 and 2016 and is now at 100%. Ethiopia, where children and young people make up 48% of the population, can lift itself out of poverty by ensuring that children have access to quality education. Most children attend school, but many do not complete their education. 85% go on to her 5th grade and 54% to her 8th grade. 63% of her lower primary school students are not achieving the basic learning outcomes needed for further educational advancement (more than 50%). Gross pre-primary school enrollment has increased from 9% in 2010 to 46%, but access is limited to children in urban and wealthier areas. About 2.6 million primary school children are out of school, of whom 43% are boys and 57% are girls. Only 25% of secondary-age children go on to secondary school. Barriers to education include traditional gender norms, heavy labor (especially for girls), and long commute times. Many out-of-school children come from pastoralists, internally displaced persons, or refugee communities (MoE,

2018). in this nation, the biggest health issues still predominate. Preventable epidemics and malnutrition. Nevertheless, the health sector has made significant progress in the prevention and control of major infectious diseases (HIV, tuberculosis, and malaria). For HIV, more than 7.2 million people were tested, of whom 33,988 (0.47%) were newly identified as HIV-positive through the implementation of various innovative HIV testing strategies (MoH, 2021).

The performance report also shows that Ethiopia has made good progress in meeting goals 2 and 3 of the HIV Target 95-95-95. His EFY for the first 95 performances of 2013 was 81%, 95% for the second 95 performances, and 95% for the third 95 performances. The incidence of tuberculosis has steadily declined over the years, reaching 140 per 100,000 people in 2020. In terms of tuberculosis case detection and treatment, tuberculosis treatment coverage was 76% in 2013, an increase of 5 percentage points from the previous year. The outcomes of bacteriologically confirmed TB cases were 95% who successfully completed treatment. For malaria, 23 malaria cases were reported per 1,000 at-risk populations, five fewer than last year. Mortality from malaria also decreased during the year. (MoH, 2021). However, Ethiopia's morbidity and mortality rates remain high, and health conditions remain relatively poor.

In fact, investment in education and health is the backbone of any country that can measure the contribution of human capital to economic growth. Human capital makes a clear contribution to accelerating economic growth by providing a productive workforce.

1.2 Statement of the Problem

The contribution of human capital to Ethiopia's economic growth is still developing. Ethiopia's Human Development Index (HDI) score for 2021 is almost 0.5, indicating a low level of development. The country has seen no change in HDI since 2019. However, since 2000, a significant increase has been recorded. Ethiopia scored 0.29 for this year, meaning the country was behind in human development (Saifadin, 2022). The number of countries classified was low throughout the period. According to the latest HDI data released by the United Nations Development Program (UNDP), Ethiopia ranked 175th out of 191 countries surveyed in 2021/22. Ethiopia continues to be classified as a Least Developed Country (LDC) in terms of human capital. The country is traditionally one of the least educated countries in the world, with the majority of the population having little access to schooling (UNDP, 2022).

Given Ethiopia's low Human Development Index, investment in education and health services is inadequate and has little coverage, particularly in many areas of Ethiopia, where rural populations suffer from inadequate health facilities and a lack of education. The standardization of education has led to a shortage of funds, making the inputs critical to academic success available for investment. In other regions as well. These challenges manifest themselves in poor educational and health outcomes, impacting future worker productivity and future economic competitiveness.

Various studies conducted on Ethiopia's economic growth and human capital developments have been empirically examined, with varying frequencies but mixed results. Woubet (2006) examined the average levels of human capital and found that they do not appear to have a large effect on economic growth, which is inconsistent with economic theory of the importance of human capital. School enrollment as a proxy for human capital Tefera (2017) also investigated whether expenditure and total investment in health and education were positive and statistically significant. However, a high enrollment rate is statistically significant and negatively affects economic growth in the long and short term, leading to similar outcomes. Woubet (2006) and only uses the education aspect as a proxy for human capital. Kidanemariam (2014) analyzed the impact of human capital development on economic growth. Estimated long-term models show that human capital in the form of education (representing secondary school enrollment) is the major contributor to economic growth, as is human capital in health. This finding is supported by Tofik (2012), Asigidewu (2021), Shemsiden (2018), and Misganu et al. (2021), which confirm this. The influence of human capital development on Ethiopia’s economic growth was thus empirically examined in this study using both education and health indicators separately. A weighted average school enrollment rate is used as an indicator of human capital in education. Giving equal weight to each educational level or evaluating the impacts independently, as is done in most studies, is misleading because human capital accumulates knowledge from basic to higher levels (Aghion et al., 1994), and government expenditure on health is a proxy for human capital. With the exception of Kidanemariam and Asigdewu, previous studies sought to use the same analytical method (Johnson's cointegration method). It was possible to determine the relationship between human capital and economic growth. Although this technique is one of the most widely used techniques for time series analysis, the results can be unreliable when the sample size is small (Kidanemariam, 2014). Therefore, in this study, the impact of human capital

development on economic growth was demonstrated with reliable empirical data using the ARDL. As such, this study fills a gap by providing a full conceptual review of the impact of human capital development on economic growth in Ethiopia.

1.3 Objectives of the study

The general objective of the study is to analyze the impact of human capital development on economic growth in Ethiopia.

The Specific objective of the study includes:

- To discuss the trends of education, health, and economic growth in Ethiopia over time.
- To empirically identify the effects of human capital development on Ethiopia's economy over the long and short terms.
- To identify whether human capital and economic growth are causally related in Ethiopia.

1.4 Research Question

- What are the trends of education, health and economic growth in Ethiopia?
- Is there a long-term and short-term relationship between Ethiopia's economic growth and the growth of its human capital?
- To analyze the causal connection between Ethiopia's economic success and the development of human capital?

1.5 Hypothesis of the study

The most crucial factor in achieving economic growth and development, according to modern economic growth theory, is human capital, especially in the areas of education and health. Human capital formation is emphasized by proponents of endogenous growth theory as a component that explains disparities in growth rates between emerging and industrialized countries (Romer, 1992; Becker, 1962). Who hold the view that one may invest in human capital through investments in education, health, and training, which will enhance output and support economic growth. Human capital is seen as being similar to physical capital. The following hypothesis will be tested:

H0: $\beta i = 0$ (i.e. Ethiopia's economic growth is not significantly influenced by human capital.)

H1: $\beta i \neq 0$ (i.e. Economic growth and at least one proxy factor for human capital are related.) and

H0: Human capital and economic growth are not related.
H1: Economic growth and at least one human capital proxy component are related.
We anticipate a strong correlation between Ethiopia's human capital and economic growth, as well as a causal relationship between the two, in the study's empirical results.

1.6 Significance of the study

In theoretical and empirical research, the significance of human capital accumulation as a driver of economic growth and development has been generally acknowledged, and no country has ever achieved sustained economic progress without making substantial investments in human capital. This study examines the impact of human capital development on economic growth in Ethiopia from 1991 to 2021. In line with that, It is expected to be beneficial for a variety of stakeholders, including researchers, policymakers, the government, and other economic agents. Additionally, by familiarizing researchers with factual evidence and general information on the relationship between human capital and economic growth, this study enhances their practical knowledge and skills.

1.7 Scope and Limitation of the study

A hard task that takes a lot of effort and knowledge is conducting research on the connection between human capital development and economic growth in Africa. Due to these constraints, the study requires national-level research (in Ethiopia) to examine the relationship between the development of human capital and its economy from the fiscal years 1991 through 2021. Researchers typically face difficulties with data availability and consistency. The use of a proxy variable also posed a drawback for this investigation. It is possible that this results from a lack of global consensus over the metrics to be utilized to gauge the growth of human capital.

1.8 Organization of the Thesis

The study is divided into five chapters. The introduction is explained in the first section. The second part a review of relevant theoretical and empirical literature is presented in the following chapter. In Chapter 3, we present model specification, data sources and types, and estimation

techniques. Chapter four discusses the estimation of results and presents the findings of the study. In the last chapter, the study's policy implications and conclusion are discussed.

CHAPTER TWO

2. LITERATURE REVIEW

2.1. Definition of key Terms

Human capital emphasizes a person's knowledge, competitiveness, and internal qualities that help them build their own personal, social, and economic welfare (Harbison, 1962). The ability of the populace to produce Workers are a crucial component of industry, just like land or equipment. As a result, human capital refers to the labor force's expertise, specifically how effectively and efficiently people can convert capital and raw materials into commodities and services. Any discussion of human capital must include education since these abilities can be gained and developed through education, including reading, math, cognitive abilities, and analytical abilities. (Son, 2010). Economic expansion and the eradication of poverty depend heavily on human capital.

Human Development Index (HDI): The Human Development Index (HDI) is one method for gauging the progress of human development, according to the Human Development Report (2020). Since 1990, it has been utilized to determine a nation's success in advancing its people. Even though not all aspects of development can be measured, the most fundamental aspects of human development, which are thought to reflect the population's core abilities, can. Chances of surviving are determined by life expectancy at birth; knowledge is assessed using the average number of years spent in school and the literacy rate of the population aged 15 and over; and a decent life is evaluated using purchasing power parity-based spending per capita.

Human capital development refers to the process of acquiring and increasing the number of individuals with the skills, education, and experience essential to the socioeconomic development of a country. It also refers to investment in people and their development as creative and productive resources (OECD, 2001)".

Gross domestic product (GDP) is the sum of all final outputs of goods and services produced in a country or territory by its economy, irrespective of the division of domestic and foreign claims (Todaro, 2011).

Economic growth: ’the growth in standards of living that occur over a substantial period of time’’ (Charles 2014, p.588)

2.2. Models of Economic Growth and Human Capital Development

2.1.1 The Exogenous Theory

Neoclassical growth theory makes an effort to figure out the factors that contribute to long-term economic growth by accumulating factor inputs like labor and physical capital. Studies have shown that technological advancement or external influences have a significant impact. Among the first to show this were Solow (1957) and Swan (1956). The neoclassical model is based on an aggregate production function that exhibits the return to a constant size of labor and replicable capital. Y = F(K,L) In his modification of the model that was mentioned earlier, Solow (1975) made the assumption that the aggregate production function has a productivity (or technology) parameter A that reflects the status of technological knowledge at the time. Y = F (KL).

The Solow-Swan model's failure to take technological advancement into account is a clear drawback. Although the fraction is determined exogenously in the model, it does not explain how technical advancements contribute to economic growth. According to Slow (1957), the reason for technological advancement is that it occurs beyond the constraints of the economic system and is based on knowledge generated by public scientific research (such as research conducted in public research laboratories).

2.1.2 The Endogenous Theory

The Frankel model makes the premise that technological advancement is endogenous to the economy (connected to changes in K&L). The model argues that when knowledge-creating activity balances out return reductions, output grows proportionally to capital. The Frankel-His model (y = AK) was expanded by Romer (1990) in his important work by including a lifetime utility function that displays declining marginal utility and positive utility.

He makes the assumption that a firm's labor supply is its utility (L=1), in line with Frankel's theory of production functions with externalities. He asserts that increasing these externalities will lead to the creation of new technical knowledge and economic growth. Romer concentrated on the production function of knowledge by researchers since the notion that knowledge accumulation is still external to the relationship leaves open the opportunity for interpretation. According to this hypothesis, greater technical expertise would boost efficiency in the

workplace. Y= K (AL) 1 is the production function. This approach made the assumption that scientists would come up with technical knowledge. The existing body of knowledge and new ideas are anticipated to develop (as effects of externalities) as there are more researchers on the scene. The second Romer model explicitly assumes market power while also adopting Schumpeter's perspective on innovation. In 1998, Aghion and Hewitt expanded on Schumpeter's paradigm. However, there is reason to think that economic choices influence technical advancement almost as much as capital accumulation. One of the ways an entrepreneur seeks to benefit is by coming up with fresh ideas. Since new knowledge creation and innovation have financial incentives, they must be incorporated into models of economic growth in a way that both encourages and supports innovation. Thus, technological advancement must be regionalized. The capital stock typically includes material components (i.e., physical capital and labor), although Kandrick (1976) recommended adding intangible inputs like human capital (e.g., research and development, education, and training).

The failure of the neoclassical model to incorporate technological advancement (i.e., endogenous technological advancement) in a way that takes into account its sources is largely attributable to technological challenges.

This model works perfectly because the capital-labor ratio is fixed. This means that in the long run, this model will not generate enough incremental revenues to sustain increased output without an increase in labor force. The Frankel-Rohmer model-endogenous growth approach attempts to endogenize the technological advances recently advanced by Paul Rohmer in his second seminal work (1990). The original theory of this article is based on the model of Frankel (1962).

Contrarily, Romer's second endogenous growth model from 1990 acknowledges that human capital is the primary driver of economic growth and technical advancement. Romer views researchers as a source of innovative ideas and financial gain. Research and development are positioned at the core of some endogenous growth models, such as the Aghion-Howitt model.

We contend that this R&D-based growth model is distinct from the neoclassical sluggish model. The prediction of economies of scale is one instance of this. Lucas (1998) raised the issue of how human capital influences economic growth once more. According to him, economic growth

begins with the building of human capital. According to Nelson and Phelps (1996) and Benhabib and Spiegel (1994), an economy's capacity to support technological advancement and spur economic growth is determined by its stock of human capital.

2.1.3 Human Capital Theory

Gary S. Becker in 1962 and Jacob Mincer in 1981 were proponents of this notion. This theory claims that investments in human capital account for most of the income disparities between different employment opportunities. Human capital is defined as all knowledge or characteristics of an employee that contribute to productivity in the workplace. Human capital aims to improve individual labor productivity. Loss of revenue is one of the indirect costs of investing in human capital. According to contemporary economics, enhancing one's health and education can help a nation's economy by strengthening its human capital (Becker, 1993). The idea behind this notion is that investments in people can be evaluated based on their financial worth. Mathematical measurement of this value is possible. The subcategories of human capital include economic capital, social capital, cultural capital, and symbolic capital. Individual labor productivity is the standard unit of measurement for economic capital. Since the power to raise wages is one of its consequences, economic capital may be measured. It is believed that the high salaries are a result of the knowledge that has been attained through education and training. Social and cultural capitals include the benefits an individual brings to society. However, it can be difficult to gauge social, cultural, and symbolic capital. All types of human capital play a significant role since their existence and value can be felt (Becker, 1993). It stands for the intrinsic value of human capital.

This notion also aids us in choosing how to spend our time and how much to put into our social and physical well-being. By making investments in one's physical and mental health, one can maximize one's human capital. This notion has drawn a lot of criticism. One is that it is not clear why there is a correlation between income and educational attainment. Critics contend that if workers are on the outside labor market, even a strong education does not guarantee them great earnings. Additionally, it has come under fire for undervaluing the rationality of human conduct (Becker, 1993).

2.3 Measuring Human Capital

Measuring the human capital stock typically falls into one of three categories. a process that considers yield, expenses, and income. A few examples of outcome-based strategies are enrollment rates, academic achievement, adult literacy, and average time of schooling. A cost-based strategy's fundamental calculation is the cost incurred for knowledge acquisition. The benefits that each individual gains from their investment in education and training are strongly tied to the income-based strategy.

2.3.1 Output-Based Approach

In order to analyze the relationship between human capital and economic growth, some economists have attempted to measure the stock of human capital using the "enrolment rate" as an indicator of human capital. (Barro, 1991; Barro and Lee, 1993). When determining the proportion of people of school age to those enrolled in educational institutions, economists consider the stock of human capital held by each nation. The disadvantage of this approach is that the student's impact cannot be seen until they have engaged in worthwhile activities. Nehru, Swanson, and Dubey (1993), from a scholarly perspective.

As a measure of educational attainment, we tried to determine the relationship between human capital and the "cumulative years of schooling" of working-age students. Assume that each person's grades add up to make up their human capital stock. Since educational achievement is a component of conventional (school-based) education, it is challenging to explain its relevance. To boost their productivity, a lot of adults actually favor taking part in a variety of formal education and training programs.

Romer (1990) suggested using the ratio between skilled adults and all adults as a way to gauge the stock of human capital in the national economy in addition to school enrollment rates and educational attainment. The Organization for Economic Cooperation and Development (OECD) also measures human capital stocks using the International Adult Literacy Survey (IALS), which calculates the proportion of educated adults among all adults. However, the IALS technique has a few negatives. Literacy is readily associated with work productivity, and productivity can be improved through informal/informal learning activities such as face-to-face learning and OJT.

Finally, Psacharopoulos and Arriagada (1986) proposed mean grades to measure human capital stock. They point out that average years of schooling serve as a proxy for measuring human capital stocks. This proposal assumes that individuals will be more productive relative to the average time spent in school. They show that a person who finishes 12 years of schooling is 12 times more productive than she achieves after 1 year of schooling. As mentioned above, this method has the drawback that an individual's school age may be slightly related to productivity.

2.3.2 Cost-Based Approach

The cost-based approach is established on measuring the stock of human capital by summing the costs invested in human capital. To calculate investment costs, Kendrick (1976) used amortized personal investment costs, and Jorgenson and Fraumeni (1989) provided discounted future returns. Because this approach is based on an indirect measure of human capital stock, it is difficult to accurately classify investment and consumption limits in terms of human capital costs.

2.3.3 Income-Based Approach

This approach is based on the benefits individuals derive from investments in education in the labor market. Mulligan and Sala-i-Martin (1995) define total human capital as the sum of each individual's labor force quality adjustment and plot human capital stocks in terms of individual income. This approach is rarely a perfect measure of human capital.

2.4 What level of education is needed for economic growth?

Greater economic growth is stimulated by spending on secondary education than by basic education alone. Therefore, universal elementary education—which was crucial but insufficient—was the emphasis of the United Nations Millennium Development Goals.

The goal of ensuring that large portions of the population have the right to at least higher and secondary education should be included in universal primary education (IIASA 2008). Girls and boys complete free, equitable, and high-quality primary and secondary education that results in learning outcomes that are both relevant and effective, according to one of the Sustainable Development Goals (SDG) for education. This demonstrates a growing understanding of the value of secondary education. The human resources required to pull the majority of their population out of poverty are only available through comprehensive secondary education and

universal elementary education in developing nations. In industrialized nations, higher education for young people is crucial for economic growth (IIASA 2008).

2.5 Empirical Literature Review

It is debatable if there is a correlation between human capital and global economic growth because different scholars have utilized various approximations of human capital. Some academics and modern economists contend that investing in education is largely done for financial gain and should be seen as an investment in human capital that encourages the development of human capital.

Gyimah-Brempong, Wilson, and Odior, 2005; 2011 there was also the suggestion that human capital is only partially explained by education. Health could, at least as well as education, be a factor in explaining the wage gap, according to Strauss and Thomas' 1998 argument. Health capital indicators have a favorable effect on general performance, according to Wilson and Gyimah-Brempong's 2005 research. They claim that between 22 and 30 percent of the growth can be attributed to health care spending and that improvements in health that extend life expectancy by a year are also linked to up to a four-point boost in GDP growth annually.

An empirical study by Arthur and Maxime (2014) explores the impact of macroeconomic changes on aggregate physical capital in sub-Saharan economies. This indicates that an increase of 1 unit within the conditional standard deviation of the real effective exchange rate reduces the physical capital stock by 0.011 percent. Oleg, Daniel, and Romain (2012) suggest that the accumulation of physical capital dominates economic growth in their decomposition of labor productivity growth, while the evidence proposed by Jeffrey and Andrew (1997) are as follows: suggesting that it is the root of the low growth. Africa. Poor economic policies due to geographical factors such as lack of openness to international markets, lack of access to the sea and tropical climate.

Moreover, empirical evidence from developed countries argues that the significance of human capital formation for economic growth has been a main driver of the development process. In any case, Nigeria is the subject of debate, Kanyo (2013). In addition, Bichaka and Christian (2008) attempt to present the aggregate impact of remittances on economic growth using his disequilibrium panel data from 1980 to 2004 for 37 African countries. This shows that

remittances are driving growth in countries with less developed financial systems. However, Valeria (2009) examines the impact of capital flight on economic growth in 139 countries over the period 2002-2006 and shows that it has a negative impact on GDP growth. Bangake and Eggoh (2010) examine international capital flows in 37 African countries using a panel co-integration method over the period 1979-2006. As a result, it was found that non-oil-producing countries had the lowest values compared to oil-producing countries.

Chang and Shi (2016) use demographic data from 30 Chinese provinces using a panel data technique to examine how human capital affects China's economic growth. It covers the mechanics and categorization of the various effects of human capital on economic expansion. Human capital is replaced by factors of production that advance knowledge transfer and boost the productivity of other factors. Physical capital is calculated using the rolling inventory approach. According to the study, human capital, particularly elementary and advanced human capital as assessed by years of schooling, promotes economic growth.

An overview of studies on the relationship between human capital and economic growth in the context of the Economic Community of West African States (ECOWAS) Obiaor (2017) provides official estimates for economic growth in three SSA nations—Nigeria, South Africa, and Ghana—from 1980 to 1990 using the co-integration approach and the vector error correction mechanism (ECM). I researched the effects of investing in human capital in 2013. The results indicate that only in Nigeria do two of the three human capital proxies—health (GIH) and education (GIE)—have a considerable positive impact on growth, while literacy (LR) has a negligible positive impact on all three.

In summary, relevant empirical studies help determine the significance of human capital for economic growth. Some of them describe negative relationships, but they provide important concepts for economic analysis. Therefore, this study essentially builds on this empirical literature and combines specific methods to explore an analysis of the role of human capital resources in economic growth

To assess the effect of human capital on overall output levels in the empirical study on Ethiopia, Woubet (2006) employed the Barro and Lee technique of measuring human capital for the years 1971–2005. He conducted an analysis using integrals. He discovered that there was little

correlation between the two macroeconomic factors. These findings, however, do not take into account health, which is an aspect of developing human capital. According to Kefela and Rena (2007), the health advantages of rural agriculture in Ethiopia are more than twice as great as those of inputs like fertilizers. On the one hand, public spending on health and education is interpreted as an investment in the growth of human capital.

The long- and short-term effects of human capital on Ethiopia's economic growth from 1975 to 2011 are presented by K/Mariam (2013) using real GDP per capita as a measure of economic growth. In order to investigate the long- and short-term effects of human capital on economic growth, he used the ARDL technique for co-integration and error correction models. The findings of bound tests reveal consistent long-term correlations between real GDP per capita, human capital in terms of education and health, labor force, total investment, and government spending, as well as between these variables and official development assistance. According to the long-term model's findings, human capital—specifically, health—is the key driver of real GDP per capita growth, as measured by the ratio of public health spending to real GDP.

Tefera (2017) found that there are consistent long-term correlations between real GDP, health-related spending, labor force participation, gross capital creation, official development assistance, and enrollment rates. The findings of this study demonstrated that both long- and short-term economic growth in Ethiopia is positively and statistically significantly impacted by expenditure on health, education, and growth capital generation. Economic performance might be greatly enhanced by increased spending on healthcare, education, and capital formation. However, official development aid and enrollment rates are statistically significant and have detrimental effects on economic growth over the long and short terms. This shows that boosting the number of students enrolled in schools is insufficient to sustain growth. The kind of use and the teacher's caliber are more crucial.

Shemsedin A. (2020) examines the effect of human capital on Ethiopia's economic growth from 1980 to 2018. A co-integrated VAR was used to estimate the models. The results of this study show that political transition and government expenditure on health and education as a percentage of GDP and dummy labor force have a favorable impact on the Ethiopian economy over the long term. In other words, it is clear that raising the variable has the potential to

significantly boost economic performance. The research period's economic growth, however, has a negative correlation with the overall enrollment in primary schools.

According to Asegidewu (2021), this study looks at the effects of human capital development on economic growth in the context of Ethiopia from 1981 to 2019. This study investigates the effect on economic performance by dividing human capital development into human capital in education and human capital in health. Additionally, this study uses error correction models (ECM) and autoregressive distributed lag (ARDL) methodologies to look at the short- and long-term consequences of human capital evolution. Except for short-term health care, the findings demonstrate that human capital clearly has a beneficial impact on economic performance. The short- and long-term effects of human capital in education on economic growth can be negligible or important.

In 2021, Misganu et al. The development of human capital is crucial in the age of globalization, the knowledge-based economy, and technological advancement. This is mostly about human capital's (HC) creative and adaptable capacity to bring multidimensional change and growth to people, organizations, and entire nations. However, sub-Saharan Africa, notably Ethiopia, continues to have low HC situations by global standards. According to this premise, the objective of this study is to use the autoregressive distributed lags (ARDL) model to investigate the macroeconomic factors that influence the development of HC in Ethiopia. Time series data from 1981 to 2018 were used in the study. The study's empirical findings demonstrated that characteristics such as GDP per capita, openness, and education policy had both short- and long-term, significant positive effects on the development of human capital. On the other hand, inflation only has short-term detrimental consequences for the growth of human capital. On the other hand, there is no proof that government spending or capital-to-labor ratios have a major effect on the growth of human capital. Therefore, in order to support the development of human capital, the Ethiopian government is strongly urged to reassess its approach to investing in education.

Therefore, it is obvious that empirical findings will differ depending on the study nation and the variables and proxies employed to estimate human capital. The majority of studies reveal a link between rising economic activity and increased human capital. On the other hand, some research contends that this link is insignificant or even negative. There is comparatively little research on Ethiopia that examines the link between human capital and economic growth, and there are also relatively few current studies that make use of recent data. In order to give a trustworthy estimate of the relationship between human capital and economic growth in Ethiopia, this study draws on recent data about the country.

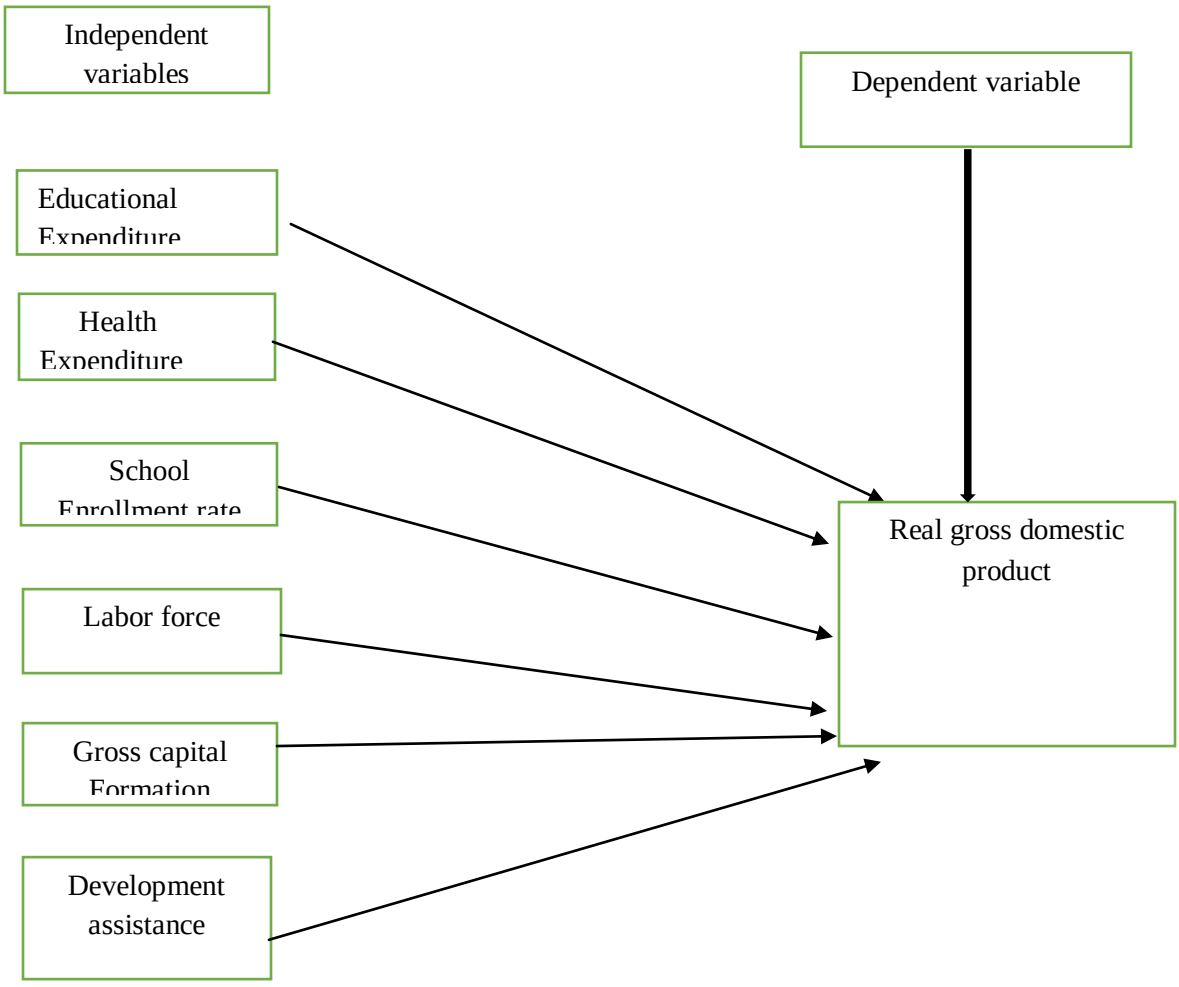
2.6. Gap in Literature

Different studies on Ethiopia's economy and the development of its human capital have been objectively explored using a number of criteria, with varying degrees of success. We discovered that the human capital development component contributed positively to economic growth. However, research indicates that the level of economic growth is only moderately influenced by the human capital factor of education. However, this can be because there is not a consensus on how to assess the growth of human capital. Additionally, there was a lack of consistency in the methodological techniques used in the papers under evaluation when addressing topics pertaining to the link between Ethiopia's economic progress and the development of its human capital.

Some reviews have used the widely used Johansen cointegration method for time series analysis, but the results are unreliable for small sample sizes (Pesaran, Shin, and Smith 1997). Relatively speaking, this work aims to use cointegral autoregressive variance delay (ARDL), which has significant advantages over Johnson's method (Pesaran and Shin, 1997).

2.7. Conceptual Framework

The following conceptual framework is created using the theoretical work (economic growth theory, or endogenous growth theory), as well as a review and discussion of the empirical literature (Zerihun, 2019; Wubet, 2008). The real gross domestic product is the dependent variable. Human capital, which includes the labor force, school enrollment rate, gross capital formation, and official development assistance, is the independent variables.



Source: own constructed

Figure 2.1: Conceptual Framework

CHAPTER THREE

3. RESEARCH METHODOLOGY

3.1. Research Design

A research design serves a framework for investigation as well as a guide for data collection, measurements, and analysis. It guarantees the accuracy, relevance, and legitimacy of the research result. This study used a causal research design to ascertain the effects of human capital development on economic growth in Ethiopia. The design was adopted because the research aims to investigate the impacts of human capital development on economic growth in Ethiopia. Secondary time series data for macroeconomic variables will are use.

3.2. Data types and Sources

Secondary data for 30 years from the period (1991-2021) will be used in this study. The study uses time serious data. Time series data for Applications of econometrics in macroeconomics variables but mostly in financial economics, where it is employed for stock, currency, and derivative price analysis, etc. (Boru, 2017). Data used there are no primary data and only secondary data in this study gathered. Most of the data are obtained from the National Bank of Ethiopia (NBE), Ethiopian Ministry of Finance (MoF), Minister of Education (MoE), United Nation Development Report (UNDP) and World Bank (WB)

3.3. Model specification and Methodology

According to many studies investigating into how human capital development affect economic growth in Ethiopia, Theoretically, the variables can be related to one another as described by the use of the Solow model with added human capital developed by Mankiw, Romer, and Weil (1992).The core concept of this model is that the developing quality of a worker i.e. development in human capital is essential to economic development. This is also in line with the human capital capital theory, which states that enhancing workers health and training (education) results in improving output (Olaniyan and Okemakinde, 2008).

The Mankiw-Romer-Weil model is used the foundation for this analysis because its acknowledges the contribution of human capital development in economic growth.

The model is defined as follows:

$$Y = AK^{\beta}L^{\alpha}H^{1-\alpha-\beta} \quad (1)$$

Where Y stands for output level, K denotes the amount of physical capital stock; H denotes human Capital; L denotes labor force; A refers total factor productivity; β, α, and (1-β-α) are their respective elasticity.

Taking eq 1's log transformation results in:

$$\ln Y = A\ln K^{\beta}\ln L^{\alpha}\ln H^{1-\alpha-\beta} \quad (2)$$

The econometric form of the model can be depicted as:

$$\ln Y = A + \beta\ln K + \alpha\ln L + \delta\ln H + U \quad (3)$$

Empirical model is specified as: the model had been modified to fit Ethiopian context by taking other control variables in to consideration.

$RGDP = f(\ GFCF$, LF, SER,ODA, GEE, GEH)

$$\ln RGDP = \beta_0 + \beta\ln GCF + \beta_2\ln LF + \beta_3\ln SER + \beta_4\ln ODA + \beta_5\ln GE\!E + \beta_6\ln GEH + U \quad (4)$$

Where:

LnGDPt = Natural logarithm of real GDP.

LnLFt = Natural logarithm of labor force.

LnGCFt = Natural logarithm of gross capital formation.

LnSER t = Natural logarithm of school enrolment rate.

LnODA t = Natural logarithm of official development assistance.

LnGEEt = Natural logarithm of government expenditure on education.

LnGEHt = Natural logarithm of government expenditure on health.

β_0= Intercept.

$\beta_1\ to\ \beta_6$ = Coefficients to be estimated.

U = represents an error term.

In order to conduct to empirically analysis of the effects of human capital development on economic growth, the indicators of health and education are used independently in this study. Human capital in the field of education is represented by weighted average school enrolment.

However, Human capital in the field of health is shares of total government expenditure on health.

3.4. Method of Data analysis

The study employed the auto-regressive distributed lag (ARDL), Co-integration and error correction technique to assess the impacts of human capital development effects on economic growth in Ethiopia. The ARDL method of estimations used for estimation short run and long run analysis of the study. The ARDL approaches to co-integration it is suggested by Pesaran and Shin (1997) and Pesaran, Shin and Smith (2001).

As a result, the following ARDL Model Specification in establishes the ARDL equation, as follows:

$$\Delta \ln RGDP = \beta 0 + \beta 1 \ln RGDP_{t-1} + \beta 2 \ln PGR_{t-1} + \beta 3 \ln GEH_{t-1} + \beta 4 \ln GFC_{t-1} + \beta 5 \ln SER_{t-1} + \beta 6 \ln GEE_{t-1} + \Sigma \beta i \Delta \ln RGDP_{t-i} + \Sigma \beta j \Delta \ln ODA_{t-j} \Sigma \beta l \Delta \ln GEH_{t-l} + \Sigma \beta k \Delta \ln GFC_{t-k} + \Sigma \beta m \Delta \ln SER_{t-m} + \Sigma \beta n \Delta lHEE_{t-n} + \varepsilon t \quad (5)$$

We first estimated equation 5 using OLS regression, and then we carried out the bound test to co-integration to determine if there was a long-run relationship between the study variables. The bound test is conducted by comparing the null hypothesis of $\beta 1 = \cdots = \beta 6 = 0$ to the alternative hypothesis of $\beta 1 \neq \cdots \neq \beta 6 \neq 0$. The calculated critical upper bound Statistic and f-statistic values determine the decision rule for whether to reject or not to reject the null hypothesis. The null hypothesis of no Co-integration is rejected if the estimated f-statistic is greater than the upper bound statistic, and vice versa.

The ARDL model's long-run specification is provided as:

$$\ln RGDP = \beta 0 + \Sigma \beta i \ln RGDP_{t-1} + \Sigma \beta j ODA_{t-j} \Sigma \beta l \ln GeH_{t-l} + \Sigma \beta k \ln GCF_{t-k} + \Sigma \beta m \ln SEC_{t-m} + \Sigma \beta n \ln GEE_{t-n} + \varepsilon t \quad (6)$$

The Error Correction Model (ECM) for Short-Run is descried as:

$$\Delta \ln RGDP = \beta_0 + \Sigma \beta_i \Delta \ln RGDP_{t-1} + \Sigma \beta_j \Delta \ln ODA_{t-j} \Sigma \beta_i \Delta \ln GeH_{t-l} + \Sigma \beta_k \Delta \ln GCF_{t-k} + \Sigma \beta_m \Delta \ln SER_{t-m} + \Sigma \beta_n \Delta \log HFCE_{t-n} + \pi ECT_{t-1} + \varepsilon_t \quad (7)$$

Where ECT denotes the first lag of the residual (error correction term of Eq. 6) and π denotes the rate of change toward the long-run equilibrium, which reflects the time the economy is necessary to return the long-run equilibrium after being subjected to shocks.

Where, in the first lag of the residual of Eq. 6, ECT stands for the error correction term.

3.5. Description of Variables, Measurements and Hypothesis

Real Gross Domestic Product (RGDP): As a proxy for economic growth, the dependent variable, real GDP, presents the rise in the gross domestic product as a percentage. The market value of goods and services produced in a given economy over a specific time period is captured. It is determined using the GDP percentage rate (Kidanemariam, 2015).

Gross capital formation (GCF): Gross capital formation serves as a stand-in for the physical capital of the economy: is referred to as a country's GCF, originally gross investment. Because the accumulation of capital is thought to support the expansion of the real GDP by promoting additional production of new products and services, gross capital formation was utilized in this study as a proxy for this variable and had been expected to have a favorable impact on economic growth (Yitayehu, 2017).

Labor force (LF): "The number of people 16 years of age or over who are either working or unemployed "(Robert 2005, p. A4).The labor force participation rate is a crucial component of sustainable economic growth and sustainability. It might serve as the main driver of development for an economy like Ethiopia's, which is labor-intensive. Wasteful utilizing and an underutilized workforce may be a burden on the economy due to the high unemployment rate. Therefore, the symbol is suggested to be either positive or negative (Asegidew, 2021).

Official Development Assistances (ODA): Three points of view can be identified on the connection between official development assistance and economic growth. According to the first perspective, aid helps the receiving nation's socioeconomic situation. The second argument contends that by hindering alternative development plans and institutions, aid may result in low or negative productivity (Rajan and Subramanian, 2005; Ekanayake and Chatrna, 2008). The other notion is that the institutional setting (policy) of the recipient nation determines how much help will provide on a marginal basis. A favorable environment for economic policy is essential for the effective distribution of help to investments that benefit the economy. However, if there is institutional bankruptcy and capacity limitations, It will not have much of an effect on the economy. (Hansen and Tarp, 2000). Ethiopia is one of the main recipients of human capital development assistance in Africa. To ascertain the impact on economic growth, ODA was selected as an independent variable as a component of the development of human capital, aiming to positively contribute to Ethiopia's economic growth.

Government Expenditure on Education (GEE): This is the proportion of overall government spending that goes toward education. It comprises the costs incurred by the government to finance basic through higher education, including remuneration for lecturers and instructors building learning facilities including classrooms, lecture halls, and offices, and buying educational supplies. It also covers the costs of scholarships, both domestically and internationally. Putting more of a focus on education increase worker productivity by offering practical knowledge and skills that help as an intrinsic engine for growth in the economy. (Sileshi, 2012) (Suliman, 2013). Positive results are also anticipated by this thesis.

Government Expenditure on Health (GEH): Health status has an impact on people's levels of human capital and, in turn, on the development of a nation. The productive effectiveness, life expectancy, learning capacity, creativeness, etc. of a person's health capital can all have an impact on economic growth. This is the proportion of public health spending to overall government spending. It consists of the money the government invests in the development of hospitals, including the cost of the buildings, the equipment and medications the hospital needs, the training of the staff members, and the payment of their salaries. Economic growth increases when health spending increases (Abdu, 2014; Tofik, 2012). Because healthier people work harder and longer and because healthy students can study better, there is a clear correlation between health and economic growth (Surya and Stig, 2017). This thesis also expects favorable outcomes

School Enrolment Rate (SER): indicates the number of students who have registered for primary, secondary, and tertiary education, (Aghion et al., 1994). Numerous theoretical and empirical studies suggest that enrolment in schools increases productivity and contributes to economic growth. Expect a significant and favourable influence of school enrolment on economic growth in this study (Aghion et al., 1994).

Human capital development is a factor that influences labor productivity. School enrolment rate was determined in this study using weighted average school enrolment rate. Human resource creation in the form of education and healthcare is thus expected to have a favourable impact on economic growth. Because human capital is the accumulation of information from primary to higher levels, assigning equal weight or evaluating the influence of each level of education independently, as most studies have done, is deceptive (Aghion et al., 1994). We assign a

weighted average of aggregate school enrolment as an education human capital proxy and assign a weighted average of their contribution to removing this prejudice.

3.6. Granger Causality Test

The causality test in this investigation will be performed. To determine the direction of causation between variables, the Granger causality test is used. This notion is concerned with the impact of past values of one or more variables on the current value of the other.

CHAPTER FOUR

4. Results and Discussion

4.1.1. Trends of Primary, Secondary and Higher Education in Ethiopia

The labor force and degree of human capital are the most important production resources in every country. Even in comparison to other low-income countries, Ethiopia still has a ways to go in this area. According to the 2020 Human Development Report (UNDP, 2020), just 2.4 years of schooling were completed by the adult population of Ethiopia, which is less than the average for Sub-Saharan Africa (SSA) and around 2 years less than the average for low-income countries.

However, the second HDI indicator for access to knowledge, school-aged children's expected school age, shows significant improvement from 2000 to 2019. The index assumes school-ready children complete her 8.5 years of schooling when they reach adulthood in 2013, which is her 100% increase from 2000. . Expected achievement rates are depending on the premise that current age-specific enrollment rates will be maintained in the future child's life. The recent increase in primary school enrollment is reflected in improved projected years of education. This pattern could help Ethiopia narrow the education gap between its own youth and those in other SSAs and low-income countries. In SSA and low-income countries, the average number of years of school-age for school-aged children in 2021 was 7.8 and 9.0, respectively.

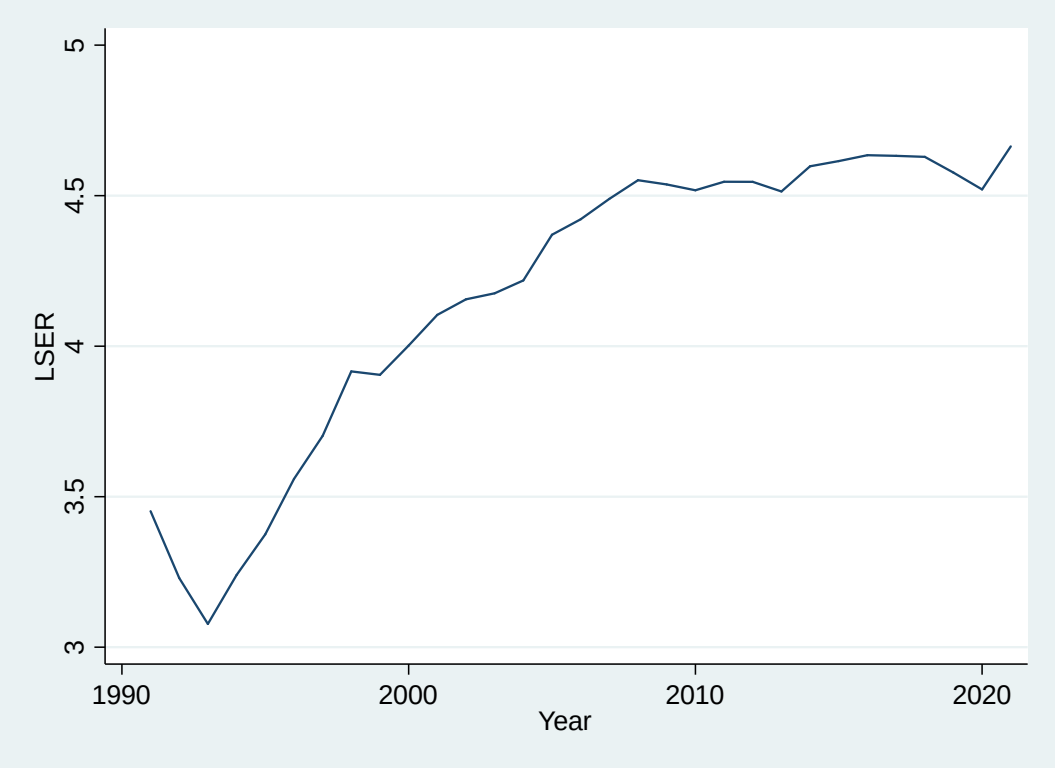
The Federal Ministry of Education's Education Statistics Annual Abstract (2018), which uses data from various issues, shows how access to primary education has expanded quickly in recent years. In fact, from around 33% in 1995 to 100% in 2014, the gross primary enrollment rate grew. Since 2005, enrollment has remained over 95%, with the majority of the growth occurring between 1995 and 2005. Also demonstrates a considerable reduction in the gender gap in primary schooling. In the interim, the percentage of students enrolled in secondary schools rose from less than 10% in 1995 to nearly 25% in 2014. Since 2006, there has been a slowdown in secondary education improvement, which is concerning considering the low secondary enrollment rate. The World Bank (2020) estimates that 41.2% of sub-Saharan African students attended secondary school in 2012.

The continuation of the recent growth momentum depends critically on youth having better educational possibilities. This acknowledgment is generally supported by the government's and its partners' development initiatives.

From 14% of the total government budget in 1995–1996 to almost 24% in 2011–12, government spending on education has increased. The government's expenditure on education as a percentage of GDP increased from 2.5% in 1995–1996 to 4.5% in 2000, where it remained until 2012. There appears to be a sizable commitment to human capital investment given the decline in total government spending from 27% of GDP in 2007 to 17% of GDP in 2012.

While enrollment in primary and secondary schools expanded significantly between 1995 and 2005, enrollment in higher education remained extremely low and largely unchanged. Only after 2005 did enrollment at postsecondary institutions begin to increase. According to the graph, undergraduate enrollment peaked in 2014 at 600,000 after rising from well below 100,000 in 2003 to 300,000 in 2008. Similar to this, by 2007, he had less than 10,000 graduate students enrolled (mostly master's), a little reduction from the late 1990s. Graduate enrolment rose to over 33,000 in 2014, more than tripling from 2008, despite still being quite low.

Between 1995 and 2005, enrollment in higher education remained extremely low and largely consistent, whereas enrollment in primary and secondary schools saw a significant rise. Enrollment in tertiary education did not begin to increase until around 2005. According to the graph, undergraduate enrollment peaked in 2014 at 600,000 after rising to 300,000 in 2008 from a low of less than 100,000 in 2003. The number of graduate students enrolled in his programs (mostly master's) had also decreased slightly since the late 1990s, to less than 10,000 by 2007. Despite remaining extremely low, graduate enrollment rose to roughly 33,000 in 2014, more than tripling from 2008 levels.



Source: own calculation based on World Bank data

Fig.1 School enrolment rate

4.1. 2.Trends of Public Expenditure on Education and Health

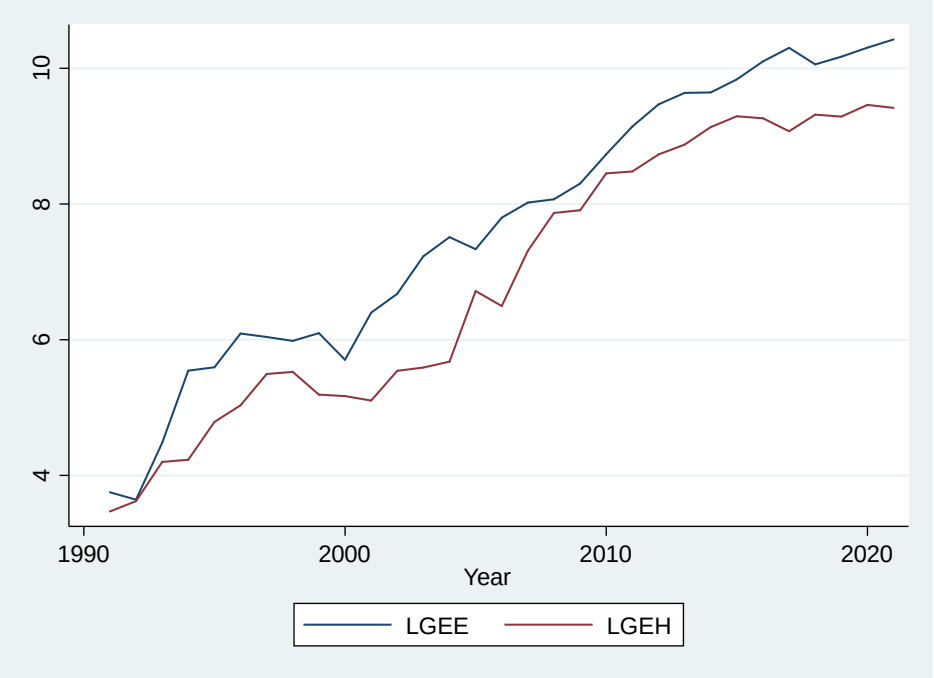
Economic growth, social development, general services, and other categories are used to categorize government spending. While social development spending is made up of money spent on things like education and training, health care, urban development and housing, and culture and sport, economic development spending includes agricultural development, commerce and tourism, construction, and industry.

The majority of these spending on social development are for health and education. Spending on education made about 11.5% of all government spending in 1999. The data below illustrates that the percentage climbed to 25.2% in 2013 and complies with the UNESCO minimum budget allocation guideline, which states that at least 20% of budgetary allocation should go into the education sector.

Ethiopia has also made tremendous strides in tackling the human and financial difficulties facing the health system. Innovative health promotion initiatives will particularly benefit the health of women and children. Nevertheless, inefficient, unequal, and rather sluggish progress is being

made in health financing (Eskinder 2014). Levels of success and deteriorating health (African Economic Outlook 2013).

Although progress is being made slowly, the sector still needs additional funding to increase access to healthcare and, ultimately, the well-being of the workforce (Ministry of Health). 2014 survey). With the exception of 1993, the public sector's share of spending on health fell below 10% from 1981 to 2004. However, growth has accelerated since 2004. According to the United Nations Development Program's 2014 ranking, Ethiopia is one of the top 10 nations in the world for the highest increases in their human development index. However, according to the African Economic Outlook 2013 (AEO), it continues to have low levels of educational attainment and poor health outcomes.



Source: own calculation based on minister of finance data

Fig.2. Government Expenditure on Education and Health

Figure 2 shows the continued growth of total education and health spending as a percentage of GDP. However, the total spending on education as a percentage of real GDP was higher than the total spending on health care in each period. Percentage of medical expenses real GDP has increased than before the military dictatorship was overthrown. From 1990/91 to 2010/2011, the

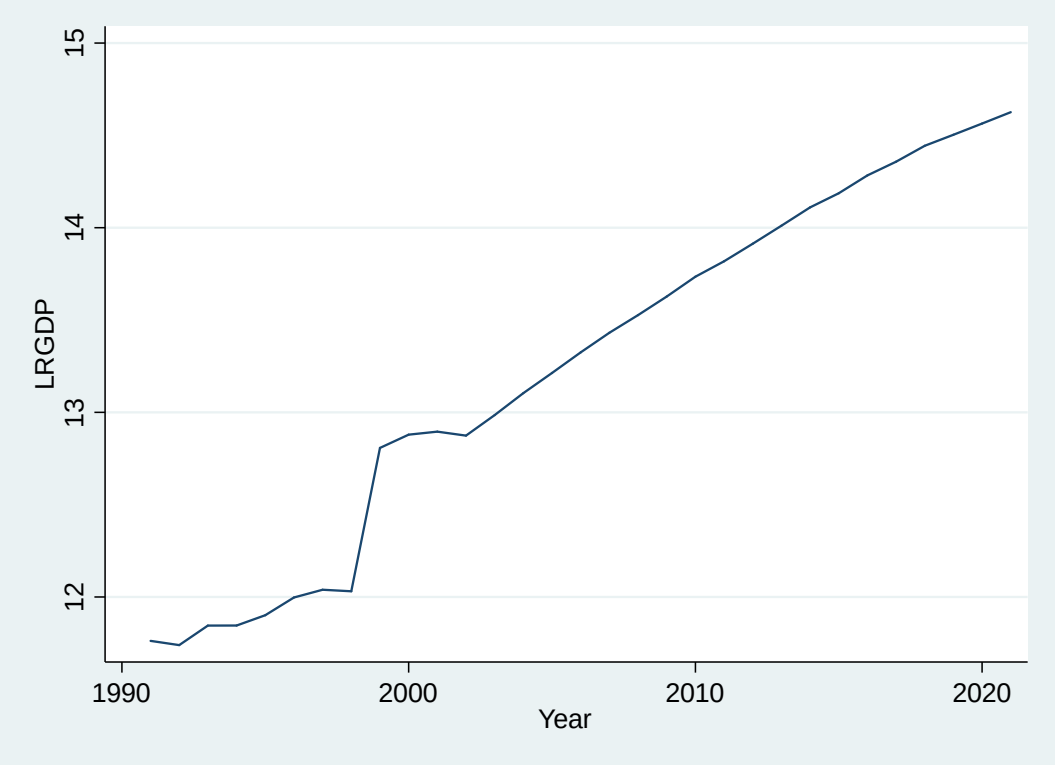
average ratio of healthcare expenditure to GDP was about 2.1%. The average contribution of education to GDP in comparable years was about 1.5%. Then, between 2011-2012 and 2014-2015, health and education averaged 1.6 percent and 3.6 percent, respectively. Expenditure on health, education and training (both capital and recurring expenditures) has often been used to measure human capital, the main driver of economic growth. Compared to the current government, the level of health and education service provision was very low under the military regime. Prior to 2009, spending on health care, education and other social services tended to be relatively low. After 2009, it increased even more rapidly and then peaked. The importance of health and education to economic growth is because both factors of production lead to higher yields and products that directly benefit human well-being.

4.1.3. Trends in Economic Growth in Ethiopia

Ethiopia wants to become a lower-middle-income country by 2025. From 2010 to 2019/20, the country's economy grew strongly and broadly across the board, averaging 9.4% each year, but the COVID-19 (coronavirus pandemic) caused it to slow down to 6.1% in 2019-20. According to (MoF, 2020), the growth rate of the Ethiopian economy typically fluctuates from -11.144 to 13.86 percent. It exhibits an upward and downward tendency during this time. This is so because the nation is dealing with numerous difficulties like a civil war, starvation, and drought. Real GDP trends show how real GDP has changed over time; hence, it is important to keep in mind that growth trends are highly irregular (Figure). One cause could be the agricultural sector's performance, which is connected to the variations in nature.

Ethiopia's real gross domestic product (GDP) growth fell to 6.1% in 2019/20 as a result of COVID-19 (the corona virus pandemic), although the country still has a goal of reaching lower-middle-income status by 2025. From 2010 to 2019/20, Ethiopia's economy grew strongly and broadly, averaging 9.4% annually. Generally speaking, the Ethiopian economy has grown by a negative 11.144 to a positive 13.86 percent. It has an ups and downs tendency during this time. This is due to the numerous difficulties the nation suffers, including a civil war, a famine and drought (World Bank, 2020).

4.1.1. Trends of Primary, Secondary and Higher Education in Ethiopia



Source: own calculation based on national bank Ethiopia of data

Fig.3 Real Gross Domestic Product

4.2. ECONOMERICS MODEL RESULT

4.2.1 Unit Root Test

Testing for stationary is essential when working with time series data. Utilizing non-stationary time series could leads to wrong results. In other words, they might imply a relationship between variables that is false. We must differentiate the non-stationary data from the stationary data in order to provide a reliable and consistent outcome. The stationary process reverts around a fixed long-run mean and has a constant variance regardless of time, in contrast to the non-stationary process, which has a variable variance and a mean that does not maintain or return to a long-run mean over time. The ADF unit root tests can be used to do this test. Because the regression has been supplemented with the lagged changes, the supplemented Dickey-Fuller (ADF) test is a progression of the Dickey-Fuller test. The null hypothesis of unit root is rejected when the augmented Dickey-Fuller test statistics are more than the critical value in absolute terms, and it is not successfully rejected when the augmented Dickey-Fuller test statistics are less than the critical value in absolute terms. This process examined the features of the variables selected to avoid the problems of wrong correlation often come with non-stationary time series and long-run equilibrium relationships simultaneously generated. The variables were examined in logarithmic forms to help in achieving linearity.

Table 1. Unit Root Test Result

Variables	Test-statistics at level	Test-statistics at first difference	Critical values			Decision for stationary
			1%	5%	10%	
LRGDP	4.453	-6.644	-4.343	-3.584	-3.230	I(0)
LGCF	-0.796	-4.472	-4.343	-3.584	-3.230	I(1)
LLF	-10.76	-10.97	-4.343	-3.584	-3.230	I(0)
LSER	-1.152	-3.926	-4.343	-3.584	-3.230	I(1)
LODA	-2.277	-5.581	-4.343	-3.584	-3.230	I(1)
LGEE	-3.266	-4.392	-4.343	-3.584	-3.230	I(1)
LGEH	-2.410	-5.702	-4.343	-3.584	-3.230	I(1)

Source: own computation

The outcome of the tests indicated that the Real GDP and labor force growth rate are stationary at level, while Government expenditure on health, Government expenditure on education Gross capital formation, official development assistance and school enrolment rate were non-stationary at the level, which means they had unit roots in the data set. That is to say, the data did have a constant standard deviation or mean when they were collected RGDP and Labor force are stationary, that is the integrated order I (0) because the Augmented Dickey-Fuller value of each of these variables is above the critical values at the 5% level of significance, at order one, the means and variances becomes stationary or integrated when the variables are divided by their first order difference (1). Due to the fact that none of the variables are stationary at the same level, but some variables are stationary at level and some variables are stationary at first difference. The prerequisite for Johnson co-integration is not satisfied. Then using ARDL co-integration is suggested.

4.2.2. Optimum Lag Selection

The Akaike Information Criterion (AIC) information criterion was used to determine the appropriate lag length. This is because choosing fewer lags tends to result in observable differences in the random disturbance terms, while choosing more lags gives less degree freedom than adding one delay. Add more late lags and variables.

Table 2 optimal lag selection

Opt.lag used	AIC	HQIC	LR	SBIC	FPE
0	**-6.19482**	**-6.09492**	**-**	**-5.85886**	**4.8e-12**
1	**-15.776**	**-14.9768**	**356.69**	**-13.0883**	**3.8e-16**
2	**-21.2557***	**-19.7572***	**245.95***	**-16.2163***	**3.7e-18**

Source: own computation

Sample: 1995 - 2021 Number of obs. = 27

The outcomes of above table show that, the AIC and SBIC (Schwarz information criterion) and chosen optimal two lag. The model will perform better if the Akaike information criteria (AIC) are smaller.

4.2.3. Bounds Tests for Co-integration Relationship

To determine if the variables are related over the long term, the ARDL bound test for co-integration was used. The F-statistic (19.359) is higher than the upper bound critical value (3.23), which shows that there is enough proof that the variables in the model have long-term associations. As a result, the alternative hypothesis is accepted, demonstrating that there is a long-term relationship between Ethiopia's economic progress and the development of its human capital. We are now able to estimate the coefficients of the long-run relationship and the short-run error correction model because there is adequate evidence of a long-run link among the study variables.

Table 3. Bound Tests Result

	At 1% level		At 5% level	
Description	**Lower bound, I(0)**	**Upper bound I(1)**	**Lower bound, I(0)**	**Upper bound I(1)**
Critical values F	**2.12**	**3.23**	**2.45**	**3.61**
Critical values t	**-2.57**	**-4.04**	**-2.86**	**-4.38**
The calculated F statics 19.359				
The calculated t statics -5.054				

Source: own computation

4.2.4. ARDL Long Run Model Estimation

Estimated long run coefficients using the Autoregressive Distributed Lag Approach: ARDL (2, 2, 1, 2, 0, 1, and 2) selected based on Akaike Information Criterion.

Table 4. Long Run Model Result

Dependent variable is LRGDP				
Independent v.	**Coefficient**	**S.E**	**T-Ratio**	**Prob.**
LGCF	**0.352128**	**.0465622**	**7.56**	**0.000*** **
LLF	**-1.579868**	**.9524897**	**-1.66**	**0.123**
LSER	**1.049617**	**.0958904**	**10.95**	**0.000*** **
LODA	**-.1484756**	**0.646902**	**-2.30**	**0.041** **
LGEE	**-.0352461**	**.055298**	**-0.64**	**0.536**
LGEH	**-.2272169**	**.0680755**	**-3.24**	**0.006*** **
R-square	**0.9731**	**Log likelihood**	**77.39379**	
Adj, R-square	**0.9373**	**DW-Statistics**	**1.874**	
F-Statics		**S.E Reg.**	**0.0261**	

Source: own computation

Note: The ***, ** and * sign indicates the significance of the coefficients at 1%, 5% and 10% significant level respectively.

The calculated coefficients for gross capital formation, official development aid, government spending on health, and the percentage of students enrolled in school, as shown in the above table, are statistically significant over the long term. During the estimation period, the estimated coefficients of government spending on education and the labor force had little effect on Ethiopia's economic growth. Official development assistance and government spending on health have an unexpected correlation.

The dependent variable's coefficient can be thought of as elasticity with regard to real GDP in this study's growth model, which was described in log-linear form. The coefficient of gross capital formation is 0.357607. This indicates that, in the long run, holding other things constant, a one percent change in gross capital formation brought a 0.35 percent change in real GDP.

The school enrollment rate, one of the key variables of interest in this study, was also found to positively impact economic growth. According to the school enrollment coefficient, a 1% increase in enrollment rates affects economic growth by an additional 1.04%.This finding is consistent with those of Tefera (2016), Asegid (2021), and Kidanemariam (2014). The findings emphasize how enhanced access to education for the population, particularly at the secondary school level where important life skills are taught, has contributed greatly to Ethiopia's economic success. Increased education not only improves individual abilities and output, but also efficiency and employability. People with some education or skill acquisition are considered to be more productive than those without. Therefore, we expect macro-level growth to broaden generally after increased output due to increased education. Educated people are not only part of the workforce in need of recruitment, but also have the opportunity to challenge entrepreneurship and contribute to economic growth.

Real GDP is unaffected by labor force growth in any meaningful way. This might be the result of the interaction between rapid population growth and low labor force productivity.

On the one hand, government spending on health and official development assistance has a significant negative impact on the Ethiopian economy.

Government expenditure on health has a statistically significant negative influence on long-term economic growth, according to the results of long-run models. These outcomes a 0.22% decrease in real gross domestic product, with healthcare costs decreasing by 1% at the 1% significance level and other variables remaining constant. Significant results are consistent with research findings conducted by Gisore et al. (2014), Kidanemariam (2014), Dinkene (2015) and Fadila et al. (2019). These consistent outcomes may suggest that supporting a country's economy is of the utmost importance and makes sense if budgetary resources are properly allocated and applied by all relevant agencies. However, there are also negative opinions about the research results. This may include problems or corruption in the allocation, availability and/or use of budget funds. The results of this study on the long-term negative effects of healthy human capital are supported by endogenous growth theories (primarily theories put forward and/or developed by Lucas (1988), Romer (1990), and Mankiw et al. (1992)).) is inconsistent with argues that improved human capital (skilled and healthy workforce) leads to increased productivity, thereby increasing output.

It is consistent with the findings of Tofik (2012) and K/Mariam (2014) that government spending has a major negative impact on the Ethiopian economy. This outcome may be mostly attributable to the government's propensity for wasteful and ineffective spending (rent, debt service, remittances, wage and salary payments, etc.). These expenditures are useless to the economy.

Furthermore, given the influence of the investment on human capital and other investments, the analysis anticipates that net ODA will have a favorable long-term impact. The effects, however, are an unexpectedly negative indicator, according to the research. In contrast, analyses that attempt to explain the results of the relationship between net foreign aid and economic growth reveal that it has a considerable long-term negative influence on economic growth, at a level as high as . The fact that the time span is too short to detect the detrimental effects of debt service on economic growth may be one reason why development aid is harming the Ethiopian economy. Included in this study's definition of official development assistance are grants, external loans, and aid. Findings demonstrate that, when all other factors are held constant, a 1% increase in official development assistance caused a real gross domestic product drop of 0.14 %. Despite the fact that development assistants have a detrimental effect on long-term progress, this is nevertheless true. Economic growth is only marginally impacted by it. The outcome is also

consistent with research by Tewodros (2015), Kidanemarian (2014), and Mulugeta (2017) that found external debt has a considerable adverse influence on Ethiopia's economic growth over time due to insufficiency and crowding effects.

4.2.5. Short run ECM estimation result

Table 5. Short run estimation result

Dependent variable is Dlrgdp				
Explanatory var.	**COEFFICIENT**	**S.E**	**T-ratio**	**Prob.**
dLGCF	**-.0903454**	**.1059446**	**-1.92**	**0.079**
dLGCF(-1)	**-0.556362**	**.1102084**	**-5.05**	**0.000*** **
dLLF	**.902635**	**.3873395**	**2.33**	**0.038** **
dLSER	**-.8428884**	**.1399899**	**-6.02**	**0.000*** **
dLSER(-1)	**-.8702167**	**.1117066**	**7.79**	**0.000*** **
dLGEH	**.1096172**	**.0351461**	**3.12**	**0.009*** **
DLODA	**-.0169988**	**.0309261**	**0.55**	**0.593**
dLODA	**0.1712671**	**.0287363**	**5.96**	**0.000*** **
Constant	**8.026045**	**0.9207556**	**8.72**	**0.000*** **
ECM(-1)	**-0.8611711**	**.1704061**	**-5.05**	**0.000*** **
R-Sq	**0.9946**	**F-Stat,**	**212.39**	
Ad R-Sq	**0.9899**	**Root MSE**	**0.0912**	
Log-likelihood	**37.849365**			

Source: own computation

The short-run Error Correction Model (ECM) is estimated once the growth equation's long-run coefficients have been accepted. ECM denotes how quickly the dynamic model will react to regain equilibrium. It is a residual with one lag that was derived from the estimated dynamic long-run model. How rapidly variables converge to equilibrium is shown by the coefficient of error correction.

At a 1% level of significance, the adjustment or error correction term's coefficient is a negative number and statistically significant. The long-run steady state is fairly adjusted, according to this information. This suggests that RGDP will eventually converge into equilibrium, even though it may momentarily depart from its long-term equilibrium value. According to the findings, 86% of the disequilibrium at one time will be addressed at another. Such a highly significant error correction term provides further evidence of the existence of stable long-term relationships between variables (Banerjee et al., 2003).

The estimated short-run model shows that government spending and official development aids (with a one-period lagged value) are the next largest contributors to real GDP. The short-term effects on the economy of a 1% increase in enrollment are a 0.876% increase in real GDP. But, Labor force, unlike its long runs positive significant impact; labor force has significant short run impact on the economy.

4.2.6. Diagnostics Test and Model Stability

To assess the robustness of the estimated model, a number of diagnostic tests were performed on the ARDL model. The Breusch-Godfrey heteroskedasticity, LM serial correlation, Jarque-Bera normality, and CUSUM plot stability tests were applied in order to do this. These tests' findings are shown in the table and figure below.

Table 6. Diagnostic Test Results

Test	**Statistic**	**Pro.**
Serial Correlation	**0.976**	**0.3223**
BP Heteroskedasticity	**1.90**	**0.1677**
Jarque-Bera Normality	**0.6878**	**0.709**

Source: own computation using stata15

The test statistic for examining serial correlation and its related probability value revealed the following from the results shown in Table 4.2.6:

*The null hypothesis of **no serial correlation** (Brush Godfrey LM test) is failed to reject the null hypothesis for the reason that that the p-values associated with the test statistic is greater than the Standard significant level (I.e. 0.3223> 0.05).

***The Heteroskedasticity:** To ensure that the OLS estimation is reliable and efficient, a test was conducted. The null hypothesis of no heteroskedasticity cannot be ruled out because the P-value of 0.1677 is greater than 0.05. As a result, it is determined that the model is homoskedasticity-free.

***Test for Normality:** The distribution of the residuals is the subject of another time series model and data test. The residual, according to the null hypothesis, has a normal distribution. We cannot rule reject the null hypothesis since, according to figure 4.6, the p-value for the Jaque-Berra normality test is higher than the threshold for standard significance (0.68> 0.05). The residual has a normal distribution as a result.

* The estimated model is stable because the plot is contained within the boundaries, as shown by the CUSUM and CUSUM sum of squares figures.

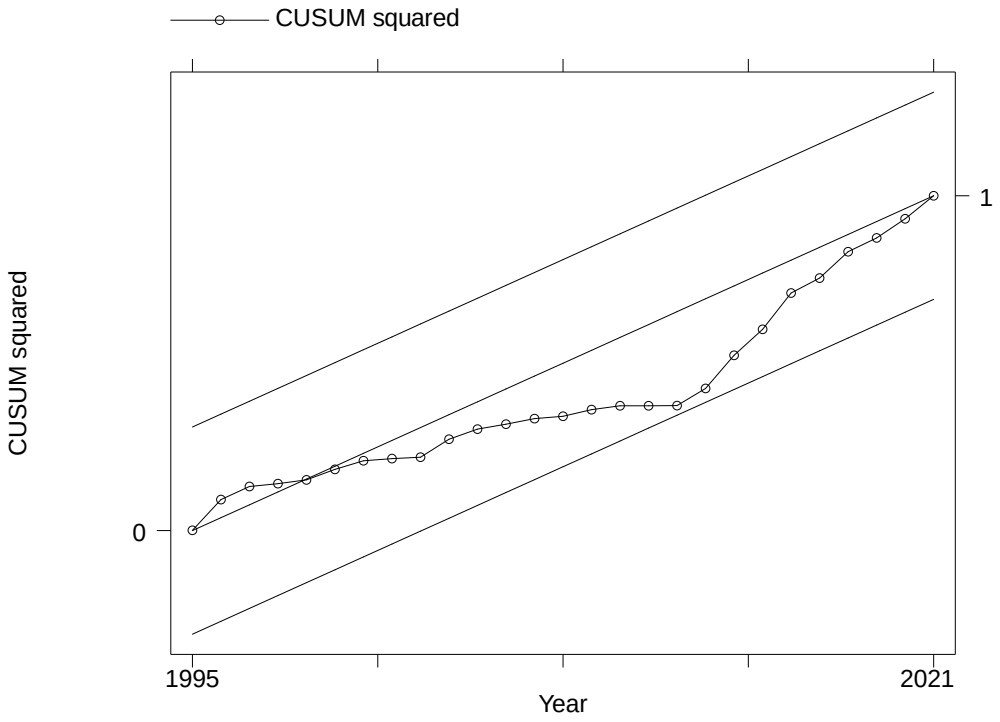


Figure 4.6 Result of model stability test

Using the sum of recursive residuals representation suggested by Pesaran and Shin (1999, 2001), it was possible to determine if the Cumulative Sum of Squares of Recursive Residuals (CUMSUMSQ) model is structurally stable. The cumulative sum of squares exceeds two limits.

The straight line represents the critical limit at the 5% significance level. The plot of CUMSUMSQ fits within the boundaries, as shown in the figure above. This confirms that the equations are written correctly and the model is stable.

4.2.7. The Pair wise Granger Causality

Granger causality tests are used to establish the relationship between the independent variable (human capital; substituted by education, health, and enrollment rates) and the dependent variable (real GDP). The existence of causation was examined using the pairwise Granger causality test. The influence of previous values of one or more variables on current values of other variables is referred to as causation. Granger (1969) initially suggested the causality test.

The findings indicate that there is a unidirectional causal relationship between government health spending and real GDP, but a bidirectional association between real GDP and school enrollment (education) is found. The fact that there is a positive and negative link between real GDP and education suggests that education (i.e., the enrollment rate in schools) has both a cause and an effect on changes in real GDP. The real GDP, education human capital (school enrolment rate), and health human capital (government expenditure on health), however, do not significantly correlate when the lag length of the ARDL model is increased to two.

Table7. Pair wise granger causality test result

Null Hypothesis	F- stat	Prob.
SER does not granger cause RGDP	2.534	0.10
RGDP does not granger cause SER	7.67	0.03
GEH does not granger cause RGDP	1.60	0.22
RGDP does not granger cause GEH	1.33	0.28

Source author's computation

CHAPTER FIVE

5. CONCLUSSTION AND RECOMMENDATION

5.1. Conclusion

This study uses health and education as substitutes for human capital to highlight the significance of human capital development in fostering long-term economic growth in Ethiopia. Using real GDP, total gross capital formation, labor force participation, government spending on education and health, and official development assistance, an analysis of the general consensus that education and health positively contribute to the economic growth of the Ethiopian economy is conducted.

Using yearly data covering the period from 1991 to 2021, an ARDL model is run to investigate the effect of human capital on economic growth in Ethiopia. The relation between RGDP, student enrollment, and overall investment is statistically significant as being positive. ODA and government health spending, however, are statistically significant and adversely associated with real GDP.

On the other hand, overall government spending on health care and official development assistance has an ongoing negative impact on economic growth. Ethiopian public health spending may not include enough investments in health to sustainably and significantly enhance human health. Additionally, the duration of official development aid is too short to fully understand the adverse impacts of debt repayment on economic growth. Grants, external debt, and aid are all examples of official development assistance in this article.

Due to the complementary nature of human capital and physical capital, additional concerns that encourage human capital development must be addressed if Ethiopia is to see sustained economic progress. Modern ideas about growth place a strong emphasis on human capital. Despite a sizable body of literature on the subject, there is still much to be learned. There is no agreement on its contribution to growth and development, probably because this contribution differs across various institutional contexts and national situations. In order to understand more about Ethiopia's circumstances, this study was conducted.

5.2. Recommendations

Based on the results of the data analysis, the researchers have reached their own conclusions and propose the following points as starting points for Ethiopia's development journey. , including

1. More funding should be allocated to physical capital formation and education in order to accomplish economic growth. Such actions have a significant impact on human productivity, which increases national output. The Ethiopian government has provided appropriate funding to work on improving the quality of education and providing basic health care to the public in order to increase the contribution of human capital. Thus, technological advancement and innovation—which are seen as a springboard for economic growth—will be brought about by educated and healthy cultures.

2. The findings imply that the government and any other relevant entity should pay more attention to the development of human capital stocks by introducing policies that encourage innovation, support education, and provide practical and technological tools to support economic growth. In addition, the government recommended offering additional job opportunities in order to maintain a balance with rising enrollment rates and produce a high-income economy.

3. We have demonstrated that the majority of developing nations experience poor economic and healthcare circumstances. Additionally, our empirical data indicates that fixing the nation's poor healthcare system can stimulate economic growth. In order to accomplish this, affiliates suggest raising the stock of health-related capital. This can be accomplished by spending money on your health. This can be accomplished by spending money on your health. Therefore, policymakers, governmental bodies, and non-governmental groups devoted to supporting growth and development advice investing in health and acquiring this asset. Governments should also conduct audits, maintain checks on how funds allocated to particular industries are being used, and implement stronger regulations to increase access to facilities. Also conduct audits, maintain checks on how funds allocated to particular industries are being used, and implement stronger regulations to increase access to facilities.

Reference

Adenuga, A. O. 2002. "Economic Growth and Human Capital Development (1970-2000)", Proceeding of the Annual Conference of the Nigerian Economic Society: Human Resources Development in Africa, University of Ibadan

Aghion, P. and P. Howitt (2009). *The Economics of Growth.* Cambridge, Massachusetts: *The MIT Press*.

Asegidewu L. (2021). The impact of government spending on economic growth: the case of Ethiopia: unpublished thesis, Addis Ababa University, Addis Ababa, Ethiopia.

Barro, R. J. and J. W. Lee. 1993. "International Comparison of Educational Attainment", Journal of Monetary Economics, Vol. 32.

Barro, R.J. and X. Sala-i-Martin (2004).Economic Growth. 2nd Edition, Cambridge, Massachusetts, London, England: The MIT Press.

Boru (2017).The impact of industry concentration on Performance exploring a comprehensive bank Performance Model. The case of Ethiopian private banks.

Becker, G. S (1993). Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education. 3rd edition, Chicago and London: University of Chicago Press.

Birhanu, L. (2018). Education Policy & the Politics of Change in Ethiopia. East African Policy Research Institute.

Bloom, D.E, Canning, D, & Sevilla, J.2004. The effects of health on economic growth: a production function approach. World development, 1-13.

Chang, X. and Shi, Y. (2016), The Econometric Study on Effects of Chinese Economic Growth of Human Capital, Science direct, Procedia Computer Science,91,1096-1105.

Dickey, D.A. and Fuller, W.A. (1979), "Distribution of the Estimates for Autoregressive Time Series with Unit

Root," *Journal of the American Statistical Association*, Vol. 74, No. 366, pp. 427-431.

Dickey, D.A. and Fuller, W.A. (1981), "Likelihood Ratio Statistics for Autoregressive Time Series with a Unit

Root," *Econometrica,* Vol. 49, No. 4, pp. 1057-1072.

Engle F. and Granger J. (1987), "Co-Integration and Error correction: Representation, Estimation and Testing", Journals of Econometrica, Vol 55, No 2: 251-276.

Fadila Kabir Usman, & Olure-Bank Adeyinka. (2019). Effect of Human Capital Development on Economic Growth of Ecowas Member States. Vol. 5, No. 1, 2019, pp. 27-42.

Fitzsimons, P. (1999). Human capital theory and education. The Encyclopedia of Education. London: Macmillan.

Gyimah-Brempong, K. and M. Wilson (2005).Human Capital and Economic Growth. Is Africa Different? Journal of African Development, 7 (1): 73-109.

Harbison, F.&C. Meyers (1964): Education, Manpower and Economic Growth: Strategies of Human Resource Development, McGraw Hill, New York.

Harbison, F.H. 1973. *Human Resources as the Wealth of Nations.* New York, Oxford University Press.

Johansen, S., & Juselius, K. (1990). Maximum likelihood estimation and inference on co integration with applications to the demand for money. Oxford Bulletin of Economics and statistics, 52(2), 169-210.

Johansen, S. (1995).Estimation and Hypothesis Testing of Co integration Vectors in Gaussian Vector Autoregressive Models. Econometric, 59, 1551-1580.

Kefela, G. and R. Rena (2007). Human Capital Investment Is a Continuous Proposition: A Study of North East African States. Indus Journal of Management & Social Sciences, 2(1):54-70.

Kendrick, J.W (1976). The Formation and Stocks of Total Capital. National Bureau of Economic Research No 100. New York and London: NBER Inc.

Kidanemariam, G. G. (2013): The Impact of Human Capital Development on Economic Growth in Ethiopia: Evidence from ARDL Approach to Co-integration, Ethiopian Civil Service University, Addis Ababa.

Lawanson AO, Olaniyan O. Health expenditure and health status in Northern and Southern Nigeria: A comparative analysis using national health account framework. Afr J Health Econ.2013; 2:31-42.

Lucas (1988): On the Mechanics of Economic Development, Journal of Monetary Economics, Vol. 22, #1, pp. 3 – 42.

Mankiw, G., Romer, D., Weil, D. (1992). A Contribution to the Empirics of Economic Growth. *Quarterly Journal of Economics*, 107, 407-37.

MOFCE (2020): Ministry of Finance and Economic Cooperation. UNDP (2020). *Human Development Report*.

Michael P. Todaro/Stephen C.Smith. (2010). Economic development. 11th edition

Mincer, J.(1981).Human Capital and Economic Growth. National Bureau of Economic Research, Working Paper No 803, Massachusetts Avenue, Cambridge.

Mincer, J. (1989). Human capital responses to technological change in the labor market, Proceedings of a Conference on Economic Growth at Suny, Buffalo, New York.

Misganu Legesse Bareke (2021). Education Research International Volume 2021, Article ID 6619674, 10 pages https://doi.org/10.1155/2021/6619674'

Mulligan, C., & Sala-i-Martin, X. (1995). Measuring Aggregate Human Capital. NBER Working Paper No. 5016. Combridge, MA: National Bureau of Economic Research.

Obialor M. C (2017). The effect of government human capital investment on the economic growth of Sub-Sahara African (SSA) countries evidence from Nigeria, South Africa and Ghana (1980 to 2013). International Journal of Asian Social Science, 2017, 7(4): 328-339.

Odior, E. S. O. (2011). *Government expenditure on health, economic growth and long waves in A CGE micro-simulation analysis: The case of Nigeria*. European Journal of Economics, Finance and Administrative Sciences.

Organization for Economic Co-operation and Development 2001, the well-being of nations, the role of human and social capital, Paris: OECD.

Pesaran, H. and Y. Shin (1999).An Autoregressive Distributed Lag Modeling Approach to Co-integration Analysis, Cambridge, England.

Pesaran, H. Shin, Y, and R. Smith (2001).Bounds Testing Approaches to the Analysis of Level Relationships. Journal of Applied Econometrics, 16(3):1924-1996.

Romer, P. (1989): Capital Accumulation In The Theory Of Long-Run Growth in R. Barro (Ed), Modern Business Cycle Theory, Harvard University Press, Cambridge MA.

Romer, P. 1986. Human capital and growth: Theory and evidence, NBER working paper 3173. Schultz, T. W. 1961. "Investment in Human Capital, American, Economic Review 51: 1-17.

Romer, P. M. 1986."Increasing Returns and Long-Run Growth", Journal of Political Economy, Vol. 94 (October), pp. 1002-1037.

Romer, P. M. 1990.'Endogenous Technological Change,' Journal of Political Economy, 98.

Shemsedin Abdu (2018), the Impact of Human Capital Development on Economic Growth in Ethiopia, American Journal of Theoretical and Applied Business. Volume 6, Issue 4, December 2020, pp.47-51.

Sileshi, E. (2012). Determinants of economic growth in Ethiopia Addis Ababa university, Ethiopia.

Suliman, Z. (2013). The Impact of Human Capital on Economic Growth. Empirical Evidence from Sudan Research in World Economy Vol. 4, No. 2; 2013 Published by Sciedu Press.

Solow, R.M (1956). A contribution to the Theory of Economic Growth. Quarterly Journal of Economics, 70(1): 65-94.

Tefera Y. (2017). The impact of government spending on economic growth: the case of Ethiopia: unpublished thesis, Saint Mary's University, Addis Ababa, Ethiopia.

Temple, J. 1999. The new growth evidence. Journal of Economic Literature, Vol. 37, No 1, p.112-156.

Tewodros, G. (2015). The determinants of economic growth in Ethiopia: A time series analysis. Addis Ababa University,

Tofik, S. (2012). Official Development Assistance (ODA), Public Spending and Economic Growth in Ethiopia. Journal of Economics and International Finance.

Todaro, M.P. and Smith, S.C. (2011). Economic Development (11th Edition). India: Pearson Education.

UNDP (2020). Human development report.

World Bank (2020). World Bank, World Bank Database. Washington DC

Woubet, K. (2006). Human Capital and Economic Growth in Ethiopia, unpublished Master Thesis, Addis Ababa University, Addis Ababa, Ethiopia.

Ying Wang, Shasha Liu (2016). Education, Human Capital and Economic Growth: Empirical Research on 55 Countries and Regions (1960-2009). School of Government, Beijing Normal University, Beijing, China.

ANNEX

1. Stationarrity Test Result

```
. dfuller LRGDP, trend lags(1)

Augmented Dickey-Fuller test for unit root         Number of obs   =        29

                                 ------------ Interpolated Dickey-Fuller ------------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)            -3.417           -4.343            -3.584           -3.230
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0492

. dfuller LLF, trend lags(1)

Augmented Dickey-Fuller test for unit root         Number of obs   =        29

                                 ------------ Interpolated Dickey-Fuller ------------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)           -10.766           -4.343            -3.584           -3.230
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000

. dfuller dLGCF, trend lags(1)

Augmented Dickey-Fuller test for unit root         Number of obs   =        28

                                 ------------ Interpolated Dickey-Fuller ------------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)            -4.472           -4.352            -3.588           -3.233
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0017
```

```
. dfuller dLGEH, trend lags(1)

Augmented Dickey-Fuller test for unit root         Number of obs   =        28

                                 ———— Interpolated Dickey-Fuller ————
                    Test         1% Critical       5% Critical      10% Critical
                Statistic           Value             Value            Value
——————————————————————————————————————————————————————————————————————————
 Z(t)             -5.702           -4.352            -3.588           -3.233
——————————————————————————————————————————————————————————————————————————
MacKinnon approximate p-value for Z(t) = 0.0000

. dfuller dLGEH, trend lags(1)

Augmented Dickey-Fuller test for unit root         Number of obs   =        28

                                 ———— Interpolated Dickey-Fuller ————
                    Test         1% Critical       5% Critical      10% Critical
                Statistic           Value             Value            Value
——————————————————————————————————————————————————————————————————————————
 Z(t)             -5.702           -4.352            -3.588           -3.233
——————————————————————————————————————————————————————————————————————————
MacKinnon approximate p-value for Z(t) = 0.0000

. dfuller dLSER, trend lags(1)

Augmented Dickey-Fuller test for unit root         Number of obs   =        28

                                 ———— Interpolated Dickey-Fuller ————
                    Test         1% Critical       5% Critical      10% Critical
                Statistic           Value             Value            Value
——————————————————————————————————————————————————————————————————————————
 Z(t)             -3.926           -4.352            -3.588           -3.233
——————————————————————————————————————————————————————————————————————————
MacKinnon approximate p-value for Z(t) = 0.0112

. dfuller LLF, trend lags(1)

Augmented Dickey-Fuller test for unit root         Number of obs   =        29

                                 ———— Interpolated Dickey-Fuller ————
                    Test         1% Critical       5% Critical      10% Critical
                Statistic           Value             Value            Value
——————————————————————————————————————————————————————————————————————————
 Z(t)            -10.766           -4.343            -3.584           -3.230
——————————————————————————————————————————————————————————————————————————
MacKinnon approximate p-value for Z(t) = 0.0000
```

2. ARDL Bound Co-integration Test Results

Pesaran/Shin/Smith (2001) ARDL Bounds Test

H0: no levels relationship F = 19.359
t = -5.054

Critical Values (0.1-0.01), **F-statistic**, Case 3

	[I_0] L_1	[I_1] L_1	[I_0] L_05	[I_1] L_05	[I_0] L_025	[I_1] L_025	[I_0] L_01	[I_1] L_01
k_6	2.12	3.23	2.45	3.61	2.75	3.99	3.15	4.43

accept if F < critical value for I(0) regressors
reject if F > critical value for I(1) regressors

Critical Values (0.1-0.01), **t-statistic**, Case 3

	[I_0] L_1	[I_1] L_1	[I_0] L_05	[I_1] L_05	[I_0] L_025	[I_1] L_025	[I_0] L_01	[I_1] L_01
k_6	-2.57	-4.04	-2.86	-4.38	-3.13	-4.66	-3.43	-4.99

accept if t > critical value for I(0) regressors
reject if t < critical value for I(1) regressors

k: # of non-deterministic regressors in long-run relationship
Critical values from Pesaran/Shin/Smith (2001)

3.Long-run and Short-run Model Estimation Result

```
. . ardl LRGDP LGCF LLF LSER LGEE LGEH LODA, lags(2 2 1 2 0 1 2) ec

ARDL(2,2,1,2,0,1,2) regression

Sample: 1993 - 2021                             Number of obs     =         29
                                                R-squared         =     0.9731
                                                Adj R-squared     =     0.9373
Log likelihood =  77.393799                     Root MSE          =     0.0261
```

D.LRGDP	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ADJ						
LRGDP						
L1.	-.8611711	.1704061	-5.05	0.000	-1.232454	-.4898881
LR						
LGCF	.352128	.0465622	7.56	0.000	.2506776	.4535784
LLF	-1.579868	.9524897	-1.66	0.123	-3.655165	.4954288
LSER	1.049617	.0958904	10.95	0.000	.8406897	1.258544
LGEE	-.0352461	.055298	-0.64	0.536	-.1557301	.0852378
LGEH	-.2272169	.0680755	-3.34	0.006	-.3755406	-.0788932
LODA	-.1484756	.0646902	-2.30	0.041	-.2894235	-.0075276
SR						
LRGDP						
LD.	.1803735	.0938704	1.92	0.079	-.0241525	.3848996
LGCF						
D1.	-.0903458	.1059446	-0.85	0.410	-.3211794	.1404877
LD.	-.556362	.1102084	-5.05	0.000	-.7964854	-.3162386
LLF						
D1.	.902635	.3873395	2.33	0.038	.0586948	1.746575
LSER						
D1.	-.8428884	.1399899	-6.02	0.000	-1.1479	-.5378766
LD.	-.8702167	.1117066	-7.79	0.000	-1.113605	-.6268288
LGEH						
D1.	.1096172	.0351461	3.12	0.009	.0330404	.186194
LODA						
D1.	.0169988	.0309261	0.55	0.593	-.0503835	.084381
LD.	.1712671	.0287363	5.96	0.000	.1086561	.2338782
_cons	8.026045	.9207556	8.72	0.000	6.019891	10.0322

4. Post Estimation Test Result

```
. estat bgodfrey

Breusch-Godfrey LM test for autocorrelation
```

lags(*p*)	chi2	df	Prob > chi2
1	0.976	1	0.3233

H0: no serial correlation

```
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of D.LRGDP

         chi2(1)      =     1.90
         Prob > chi2  =   0.1677
```

```
. vif
```

Variable	VIF	1/VIF
LODA	11.97	0.083553
LSER	11.10	0.090123
LLF	10.14	0.098640
LGCF	8.92	0.112063
LGEE	6.05	0.165251
LGEH	3.70	0.270437
Mean VIF	8.65	

```
. predict resid, residuals
(2 missing values generated)

. jb resid
Jarque-Bera normality test:  .6878 Chi(2)    .709
Jarque-Bera test for Ho: normality:
```

5. Granger causality test result

```
. vargranger
```

Granger causality Wald tests

Equation	Excluded	F	df	df_r	Prob > F
llgdp	Lscr	7.6722	2	22	0.0030
llgdp	LGEH	1.3302	2	22	0.2849
llgdp	ALL	3.8711	4	22	0.0158
Lscr	llgdp	2.5348	2	22	0.1022
Lscr	LGEH	1.2695	2	22	0.3008
Lscr	ALL	1.8605	4	22	0.1533
LGEH	llgdp	1.6021	2	22	0.2241
LGEH	Lscr	4.1696	2	22	0.0291
LGEH	ALL	3.4535	4	22	0.0246