NEXUS BETWEEN ECONOMIC GROWTH AND HUMAN CAPITAL FORMATION IN ETHIOPIA

COLLEG OF BUSINESS AND ECONOMICS

DEPARTMENT OF ECONOMICS

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DEBRE BERHAN, ETHIOPIA

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DECLARATION

I, Beshwerk Gulint declare that, this study, “Nexus between economic growth and human capital formation in Ethiopia” is my own work. I have undertaken the research work independently with the guidance and support of the research advisor. This study has not been submitted for any degree or diploma program in this or any other institution. It is in partial fulfillment for the requirement of the program for the degree of Master of Science in Development Economics. All sources of material used for the research have been acknowledged.

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ENDORSEMENT

As Thesis Research advisor, I hereby certify that I have read and evaluated this thesis prepared, under my guidance, by **Beshwerk Gulint** entitled **"Nexus between economic growth and human capital formation in Ethiopia".** I recommended that it be submitted as fulfilling the thesis requirement for the degree of masters of Science in Development Economics.

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THESIS APPROVAL SHEET

As members of board of examining of the final MSc thesis, we certify that we have read and evaluated the thesis prepared by **Beshwerk Gulint** entitled "Nexus between economic growth and human capital formation in Ethiopia" and recommend that the thesis is accepted as fulfilling the thesis requirement for the degree of Master of Science in Development Economics.

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Name of Internal Examiner	Signature	Date

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LIST OF ACRONYMS

ADF	Augmented Dickey-Fuller
AIC	Akaiki Information Criterion
ARDL	Autoregressive Distributed Lag
CO_2	Carbon Dioxide
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
RGDP	Real Gross Domestic Product
GNP	Gross National Product
HC	Human Capital
HCD	Human Capital Development
HD	Human Development
HDI	Human Development Index
HDR	Human Development Report
IMF	International Monetary Fund
RGDP	Real Gross Domestic Product
SSA	Sub-Saharan African
UNDP	United Nation Development Program
VAR	Vector Auto Regressive
VECM	Vector Error Correction Model
WB	World Bank

ABSTRACT

Ethiopia's HDI is below the average for countries in the low HD group and Sub-Saharan Africa, indicating that our country's HD is minimal and the same too for economic growth. This study is entitled with the nexus between economic growth and human capital formation in Ethiopia. The core objective of the study is to examine the nexus between economic growth and human capital formation using annual secondary time series data from 1980-2020 in Ethiopia by ARDL and ECM model. Long-run relationship among variables is confirmed through ARDL bound test and granger causality test reveals bidirectional causality between human capital formation and economic growth. According to ARDL result the lag of real gross domestic product, human capital index, carbon emission and trade openness have significant positive long-run impact on real gross domestic product but income equality has significant negative impact. But human capital index, carbon emission and trade openness shows negative significant impact while income equality revealed positive impact on real gross domestic product in the short run. The empirical results also showed that real gross domestic product and growth in gross capital formation have significant positive impact, whereas political freedom and growth in income equality have significant negative impact on human capital in the long run. Nevertheless the short-run coefficients of real gross domestic product and growth in gross capital formation are negative but political freedom and growths in income equality have positive coefficients. Hence the government should increase expenditure on social and economic infrastructure and create enabling environment that encourage better investment in human capital by the private sector. In line with this as carbon emission has positive impact on economic growth, the respective government bodies needs to encourage industrial development and rapid urbanization, should open the economy and guarantee freedom to the society.

Keywords: *Ethiopia, Human Capital Index, ARDL, Real Gross Domestic Product*

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

HD refers to a person's stock of knowledge, skill, experience, and ability to invent. As the highest rates of HD in society have become a driving factor in one nation's development or country progress (Suhaill & Mustafa, 2016), all around the world, HC has been used as a fundamental measure of economic and social growth (Kotsantonis & Serafeim, 2020). The role of HC specialization within industrial organizations and labor markets has been a global priority as the world economy transitions into the fourth industrial revolution. In line with this international organizations like the World Bank and the IMF are emphasizing the importance of HCD in attaining a sustainable future. For instance, World Bank announced the HC Project in 2018, which is essentially a global effort to encourage more effective policies and investments to accelerate and strengthen the accumulation of HC (WB, 2018).

In the real world countries with a high HDI, which is mostly attributable to education, also have a high level of economic development. This is mostly related to human capital's creative and adaptive capacity in delivering multidimensional changes and developments to individuals, organizations, and the country as a whole. At the micro and macroeconomic levels, HC accumulation influences efficiency and productivity by considerably contributing to growth and poverty reduction. From a microeconomic standpoint, education improves one's chances of finding job and boosts one's earning potential. HC is thus defined as a component of education that adds to an individual's labor productivity and wages while also being an important component of business production at the micro level. From a macroeconomic standpoint, HC accumulation boosts worker productivity, facilitates technical advancements, increases return on capital, and makes growth more sustainable, all of which help to reduce poverty. HC is thus seen as a key factor of production in the economy's overall production function at the macro level (Yitayew, 2017).

Because health and education are the key determinants affecting the composition of growth in output and exports, the formation of HC is dependent on education, training, and the amount of health and social services that help build and sustain HC. Thus the existing profound connection between education and economic growth is as follows: higher education levels

provide skilled labor, which works efficiently and effectively, stimulating economic growth, either directly or indirectly (Hall, 2016).

In cognizant of the importance of economic growth and human development a number of studies were undertaken in examining their relationship. In this regard the relationship between human development and economic development is a two-way relationship, as each of them has a negative and/or positive impact on the other. Economic growth occurs by improving human capabilities, and achieving the desired growth is reflected in human development by expanding the options available to human resources in general and to individuals in particular (Mukherjee & Khakraborty, 2010).

According to the IMF's regional outlook, the SSA region has been the worst performing region globally, with average economic growth reducing from approximately 4.75% in 2010 to 2.4% in 2018, and lifting GDP growth to 4.7% in 2021. But growth in 2022 is expected to slow sharply to 3.6%, as global strike, tighter international financial conditions, and global inflation spill in to a region already wearied by an ongoing series of shocks (IMF, 2022). When we came to Ethiopia, in 2017 economic growth increased 10.06% from 2016, in 2018 it increased 3.06% from 2017, in 2019 it increased 13.82% from 2018, in 2020 rise 12.25% from 2019, and in 2021 increased 3.36% from 2020 (WB, 2022). Also between 2000 and 2019, Ethiopia's HDI value increased from 0.292 to 0.485 and between 1990 and 2019, Ethiopia's life expectancy at birth increased by 19.5 years, mean years of schooling increased by 1.4 years and expected years of schooling increased by 5.7 years and GNI per capita increased by about 189.3%. Although this improvement is observed Ethiopia's 2019 HDI of 0.485 is below the average of 0.513 for countries in the low human development group and below the average of 0.547 for countries in SSA, which put the country in the low human development category positioning it at 173th out of 189 countries. When the HDI is discounted for inequality, the value drops to 0.348 in 2019. Also in 2021/22 Ethiopia ranked 175th out of 191 countries in HDI (UNDP, 2022).

Regarding the direction of causality understanding the major causes of economic growth and HC, as well as the causal relationships between them, is essential for macroeconomic management as Ethiopian economic history is characterized by ups and downs of performance. The objective of this study is to look at the nexus between economic growth and HC. The requirement for determining the link mechanism between economic growth and HD stemmed from the fact that a nation's ability to provide improving living standards for its

people is determined by its ability to sustain a long-term pace of economic growth. As a result, one of the most important subjects that have garnered a lot of attention in international political economy is economic growth and also it is one of all countries' primary objectives. Furthermore the process of economic growth and the origins of differences in economic performance across nations are the most interesting, significant, and complex subjects in modern social science. When we come to performance of our country Ethiopia's HDI is below the average for countries in the low HD group and Sub-Saharan Africa, indicating that our country's HD is also minimal relative to standard set and the target set and the same too for economic growth. This motivates me to study and understand more about the main factors that influence economic growth and HC formation in Ethiopia, as well as their nexus relationship. Because the outcome may shine a spotlight on development planners in order to improve performance.

1.2. Statement of the Problem

The role of HCD in the era of globalization, knowledge-based economy, and technological development cannot be underestimated. This is mainly attached to the creative and adaptive capacity of HC in bringing multidimensional changes and developments. The strong justification for advocating HC is its contribution to sustained economic growth as the key ingredient for development (Eigbiremolen & Anaduaka, 2014). However, the scenario of HC and economic growth in SSA and specifically in Ethiopia remains the lowest compared to the world standard.

Different scholars such as Bareke et al. (2021), Dawud (2020), Sisay (2019), Babasanya et al. (2017), Mustafa et al. (2017), Kifle (2016), Amassoma & Ephraim (2016), Teixeira & Queirós (2016), Gebrehiwot (2015), Borojo & Yushi (2015), Gebru (2015), Qadri & Waheed (2014), Amiria & Gerdtham (2013), Elmi & Sadeghi (2012), Tang (2011), Mukherjee & Khakraborty (2010) and others have used a variety of techniques and approaches to look at the relationship between HD’s and economic growth in both developing and developed economies over the course of the year, with varying results, though the majority of them show that HC investment stimulates economic growth. For instance, Amiria & Gerdtham (2013), Bandara et al. (2014), Tang (2011), Mohamed & Anis (2019) and other reveals bi-directional causality between economic growth and HCD. Also Elmi & Sadeghi (2012), Amassoma & Ephraim (2016), Bareke et al. (2021), Mehrara & Musai (2013) and other

presented that per capita income growth have positive and significant effect on HCD's. But then again Kifle (2016), Mehrara & Musai (2013), Elmi & Sadeghi (2012) and Babasanya et al. (2017) concluded that HCD has insignificant impact on output growth added to Mustafa et al. (2017) and Mukherjee & Khakraborty (2010) shown that economic growth (per capita income) did not translate into HC. Together with divergences have been seen in the long run and short run results.

Using merely education or health indicator variables as HC measure might be inadequate as HC is multidimensional in its nature. For instance, Jamel et al. (2020) used average years of labor force study and test score, Teixeira & Queirós (2016), Kifle (2016) and Bareke et al. (2021) used average years of schooling, Qadri & Waheed (2014) and Sileshi (2012) employed education spending, Tang (2011) and Elmi & Sadeghi (2012) used health care spending, and also Amiria & Gerdtham (2013) used under five and maternal mortality rate, Amassoma & Ephraim (2016) and Mehrara & Musai (2013) used enrollment as human capital proxy. So we need comprehensive measure of HC. As a result in this study HCI was employed, which is considered a superior measure in capturing multidimensional facets of HC.

Using equally important variables for determination of both HC and growth is very critical issue in the causality analysis. However, different researchers does not give due emphasis to this. For instance in the study of Amassoma & Ephraim (2016) and Fashina et al. (2018) exchange rate and term of trade are considered as equally important for determination of both HC and economic growth but they are not. This may results in model misspecification problem. This study solve this problem by focusing on equally important variables only by reviewing literature i.e. employment, trade openness, official development assistance, grosses capital formation, income equality, carbon emission and political freedom (institution).

My research adds to this expanding body of knowledge by looking at the relationship between HC and economic growth in Ethiopia, and it differs from earlier work in two ways. To begin, this research looks at political freedoms, income equality and carbon emissions, all of which have a significant impact on HC and economic growth. Second, rather than using the traditional measures of HC such as school enrollment, average years of schooling, life expectancy, health and education spending, and other this research employs the recently released human capital index (HCI) provided by the penn state world tables, which is considered a superior measure in capturing multidimensional facets of HC, the elimination of

an income component and the addition of a quality adjustment in education are two notable modifications from the HDI (Feenstra et al., 2015). To the best of my knowledge, no other study has used this indicator to investigate the HC growth nexus in Ethiopia, emphasizing the uniqueness of this research. Furthermore, no other study has looked at the effects of political freedoms, income equality and environmental conditions on HC nexus economic growth, as far as I'm aware. Thus, the novelty of this study is to analyze the linkages between HC and economic growth in Ethiopia by adding these often neglected but crucial variables and applying this superior measure of human capital using up-to-date data from 1980 to 2020.

1.3. Objectives of the Study

1.3.1. General Objective of the Study

The core objective of the study is to examine the causality between economic growth and human capital formation.

1.3.2. Specific Objectives of the Study

Specifically, the study tried:

- To assess the trend of human capital formation and economic growth of Ethiopia.
- To look the long run and short run analysis of economic growth and human capital formation.
- To examine the direction of causality between economic growth and human capital formation.

1.4. Significance of the Study

Appropriate studies on the link between economic growth and HC will greatly contribute to the country's efforts to better the lives of its residents by pointing to more relevant strategies to ensure long-term growth and development. As a result,

- This research will serve as an input for policy makers by indicating the crucial variables with their impacts on economic growth and human capital formation.
- A future focus area for future researches or it can be used as a base for further study.

1.5. Scope of the Study

The study examines the long and short-run causality between economic growth and HC in Ethiopia from 1980 to 2020 fiscal years, using trade openness, official development assistance received, gross capital formation, carbon emission, income equality, employment and political freedoms as control variables.

1.6. Limitations of the Study

- The study's drawback was the lack of data on the Gini index to measure income inequality. Income shares of lower fifty percentages used instead of Gini index.
- Features that may affect HC and economic growth, such as rules of economic regulation (monitoring and fiscal policy) and social unity are not addressed here.

1.7. Organization of the Paper

The paper has five parts. The first section contains the introduction, which includes the background, problem statement, research objective, significance, scope, and limitations of the study. The second part deals with literature review. Part three came up with the methodology and variable description. The fourth part is data analysis, and the last part encloses the conclusion and recommendation.

CHAPTER TWO

LITERATURE REVIEW

The development of human capital and economic growth in Ethiopia are discussed in this section. It presents the theoretical as well as the empirical foundations.

2.1. Theoretical Review

2.1.1. Definition of Human Capital and Economic Growth

According to Boyes & Melvin (1994), natural resources, labor, capital, and entrepreneurship are four production components that are essential to the production process. Natural resources refer to all of the basic materials that nature makes available to humans. The size of the economically active population is included in labor. Capital is divided into the following: physical capital, for example, roads; manufactured capital, like machines, tools, and buildings; financial capital, like banknotes and shares, which refers to funds required to buy capital goods; social capital, for example, communities and schools; and human capital, for example, educational qualifications.

Humans, on the other hand, are the subjects who are in charge of economic activities such as production, distribution, consumption, and transactions (Boldizzon, 2008). Schultz (1961), HC was identified as something like property, and he understood that human beings' productive capacities outnumbered all other forms of wealth grouped together (value combined).

HC is often referred to as formal and informal education, but it may also include things like the expense of raising children, health costs, and ability (Leeuwen, 2007). The importance of both health and education is acknowledged, yet education takes precedence over health. HC, according to Appleton & Teal (1998), is a broad term that defines human attributes that may be gained and can improve revenue. It is widely understood to encompass people's knowledge and abilities gained in part via education, but it may also refer to their strength and vitality, which are influenced by their health and nutrition. As a result, health and education are two umbrellas that all other acknowledged elements can fall under.

Economic growth is synonymous with the production of goods and services, the creation of

jobs, and the accumulation of wealth. It's usually calculated as a percentage rise in gross domestic product (GDP). As a result, GDP represents the entire market value or monetary value of all finished goods and services produced inside a country's borders during a given time period and is computed annually. National income accounting is used to calculate economic growth. The term "economic growth" usually refers to the increase in potential output. It is employed as a measure of a country's level of living as well as an indicator of its economic health. Economic growth, while not a cure for the country's problems, does promote the implementation of public policies that compensate for growth's shortcomings. In short the growth is a necessary condition but not sufficient to ensure social welfare (Mamoudou, 2011).

Economic development, on the other hand, is defined as economic growth accompanied by an improvement in the poor's material well-being; a decrease in agriculture's share of national output; an increase in the output share of industry and services; an increase in the labor force's education and skills; and technological advances developed within the country. Economic progress leads to higher living standards, better medical care, a better educational system, and more equitable income distribution (Todaro, 2012).

2.1.2. Human Capital and Growth Theories

Growth theories: Some of the most interesting, significant, and demanding subjects in modern social science are the process of economic growth and the origins of disparities in economic performance across nations. Classical economists such as Adam Smith, Thomas Malthus, David Ricardo, and Karl Marx all studied the process of economic growth. These economists' interest in economic growth issues stemmed from the realities of their day. According to Smith (1776), the importance of the "invisible hand" (the force of supply and demand in a competitive market), specialization/division of labor, accumulation of physical capital (investment), and technological progress were the most determinants of long-term economic growth and thus the prosperity of nations. Smith (1776) also acknowledges that saving is a necessary condition for growth.

According to neoclassical economic theory labor, capital, and technology are the three pillars on which the economy is built. As stated by this theory, technical progress has a significant impact on an economy, and economic growth is impossible to sustain without technological advancements. Human capital was not given specific consideration in the neo-classical

growth model of the 1950s. The basic argument was that the increase in physical capital has an impact on the growth of the economy. The so-called Harrod-Domar model, which produced the first significant contribution to aggregate growth theory, was the most popular model of economic growth long before neoclassical theories. Independently, Harrod (1939/1948) and Evsey (1946) developed the growth model that connects an economy's rate of growth to its capital stock. While Keynes focused on the effects of investment on aggregate demand, Harrod and Domar focused on how investment spending boosted a country's productive potential (a supply-side effect). In the 1950s and 1960s, these aggregate growth models were expanded, with Solow's classic articles playing a critical role.

The Solow-Swan Model

The Solow model convincingly indicates that technological advancements, rather than capital or labor, boost growth. The approach, on the other hand, falls short of explaining what causes technological advancement. In other words, it detects what can potentially generate growth, but because technology is treated as random or exogenous, it fails to predict the precise cause of the economic growth that it identifies. This is why the model should only be used as a starting point for studying economic growth determinants. If you want to learn more about what causes and sustains long-term growth, you'll need to go beyond this model. Solow (1956) demonstrated that the steady-state level of income per capita is determined by the rates of saving and population growth, which are assumed exogenously by assuming a standard neoclassical production function with decreasing returns to capital.

$\dot{k}(t) = sf(k(t)) - (n + g + \delta)k(t)$

Where, sf(k(t)) = total investment, s = saving rates, k(t) = capital stock, $\dot{k}(t)$ = capital stock growth rate, n = population growth rate, g = the rate of technological progress and δ = depreciation rate. We conclude that according to Solow model persistently rising living standards can be explained only through technological progress.

The Ramsey-Cass-Koopmans Model

David Cass and Tjalling Koopmans formulated the final version of Frank Ramsey's model of society optimal saving by fusing it with the Solow model. The resultant model became known as The Ramsey-Cass-Koopmans model or simply the Ramsey model.

This Model adopts a production function of the form $Y = AK^{\alpha}L^{\beta}$

Where; Y is output, A is technology, K is capital, L is Labor and α & β is a constant positive fraction whose sum is one. This production function can be written in intensive form as $y = Ak^{\alpha}$

Where; $y = \frac{Y}{L}$, $k = \frac{K}{L}$ taking natural logarithm gives us

$\ln y = \ln A + \alpha \ln k$ Differentiating each term with respect to the variables yields

$$\frac{y}{y} = \frac{A}{A} + \alpha \frac{k}{k}$$

This means that exogenous technical change and capital accumulation drive output growth. While this model, like the Solow model, fails to account for technology development, it really does attribute growth to capital accumulation as well as technical change. As a result, unlike the Solow model, this one does not downplay the role of capital, but rather elevates it to the same level as technological advancement.

The Diamond Model

Savings are viewed as exogenous in both the Solow and Ramsey models, and hence are never modeled, and a change in the savings rate only results in a transitory change in output, according to these models. There was no indication of the actual elements that drove the saving. It's the so-called Diamond overlapping generations model (OLG), which models savings as a function of real interest rates. According to the Diamond model, the savings rate is given by

$$S(r) = \frac{(1+r)^{(1-\theta)/\theta}}{(1+\rho)^{1/\theta} + (1+r)^{(1-\theta)/\theta}}$$

Where; r is real interest rate,θ is s a positive fraction and ρ is subjective inter-temporal discount factor.

The savings rate is a function of the real interest rate (r) and, as a result, the money supply, according to this equation. Economic growth can be influenced by changing the real interest rate and the money supply, since an increase in national savings is thought to favorably influence economic growth. Capital and consumption decisions, in addition to saving, have a significant impact on economic growth. Young people favor second-period consumption when the discount rate lowers, which leads to a temporary boost in output.

Endogenous Growth Theories

These exogenous neoclassical growth models were extended to endogenous growth models in the late 1980s and early 1990s Lucas (1988) and Romer (1986). Endogenous growth theories, unlike exogenous growth theories, aim to model technological development and, as a result, identify prospective elements that can influence economic growth through technology. The pace of technological growth is dependent on the rate of expansion of capital, according to Arrow and Romer's endogenous growth and learning hypothesis.

The mathematical formulation is; $A= BK^{1-\alpha}$

Where; A is technology, B is a constant learning factor, K is capital and α is a constant positive fraction less than 1. Taking the natural logarithm of the equation and then differentiating each term yields

$$\frac{\Delta A}{A} = (1- \alpha)\frac{\Delta K}{K}$$

As a result, capital accumulation represents technological advancement and, as a result, leads to economic growth. There will be technological improvement and, as a result, economic growth as a country accumulates more capital. This contradicts the Solow model, which claimed that capital stock had no impact on economic growth.

Lucas-Romer's endogenous growth models challenged the old neoclassical model by underlining the role of endogenous elements (such as human capital stock and research and development activities) as the primary engines of economic growth. While early neoclassical models assumed that total factor productivity growth (or technological progress) was exogenously determined, newer endogenous growth models attributed this component of growth to the learning by doing effect that occurs between physical and human capital, resulting in increasing returns to scale in production technology (Lucas, 1988). The most significant distinction between neoclassical exogenous and endogenous growth theories is that the former assumes constant returns to scale, while the latter anticipates increasing returns to scale. In endogenous growth theories, the notion of increasing returns to scale provides a plausible path to long-run sustained growth. These endogenous economic growth theories emphasize the importance of expanding investment opportunities in a liberalized, market-friendly environment to achieve high economic growth. In neoclassical models, capital accumulation was still driven by household savings rather than firm investment

spending, and aggregate demand factors played no role. Because investment is both a demand and a supply phenomenon, the addition of an investment function would provide a point of entry for aggregate demand factors. Human capital has been addressed as a key factor in determining economic growth rates in a variety of endogenous growth models (Lucas, 1988).

Endogenously accumulated HC has a direct impact on labor productivity, according to the Lucas-Romer endogenous growth model, and as a result, HC becomes distinctive to the individual, leaving innovation in the stock of knowledge as an exogenous element. It is a significant source of long-term growth, either as a direct input into research Romer (1990), as a result of positive externalities Lucas (1988), or as a result of policies that encourage public and private investment in human capital. Nonphysical capital investment boosts the productivity of the current labor force; hence, HC variables are included in endogenous growth models to capture quality differences in the labor force. They usually relate to education and are measured by an educational achievement index, mean years of schooling, or school enrolment. The most common variable in endogenous growth research is secondary school enrollment. According to microeconomic studies, individuals with higher levels of education have better salaries. By reducing fertility and boosting health and life expectancy, educational investment may indirectly contribute to economic growth (Levin & Raut, 1997).

Human Capital Theory: Theodore Schultz and Gary Becker created the notion of human capital in the 1950s and 1960s to show how individuals' investments in themselves were equivalent to firms' investments in physical capital. As a result, human capital can be viewed as a means of production through which extra outputs can be obtained through investment. For a long time, economists largely linked variations in economic well-being to differences in the amount of physical capital because richer individuals had more physical capital than others, Becker explains. However, studies of income growth have revealed that factors other than physical resources have a larger influence than previously thought, directing emphasis to less tangible resources like knowledge. As a result, concern about human capital investment is closely linked to the new emphasis on intangible resources, and it may be useful in attempting to comprehend wealth disparities between people (Becker, 1962).

Schultz (1961) human capital refers to an investment in people and that education, training, and healthcare investments provide chances and choices that would otherwise be unavailable to many people. He equates obtaining knowledge and abilities with acquiring the means of production. Workers no longer have to rely on others for a living; instead, they can take

charge of their own productivity and earnings. According to Schultz, disparities in salaries are related to access to education and health care. Food and shelter are primary concerns in many developing nations, and short-term expenditures are undertaken to address these challenges. Long-term investment in education, health, and migration is possible in societies whose primary priority is not basic needs. These investments will boost the economy and increase the standard of living in the long run. According to Schultz, investments in human capital should focus on assisting people in obtaining an education because skills and knowledge are what determine one's capacity to perform productive work. An investment to improve these competencies results in increased human productivity, resulting in a positive rate of return and criticizing those who view human capital investment as an expense. While there may be a cost in the short term (e.g., facility costs, workers' lost wages while in school, etc.), he claims that the investment's long-term return will much surpass the cost.

Schultz explores the theory's, social implications and policy implications. This can be boiled down to nine points:

1. Existing tax regulations (as of 1961) discriminate against human capital investment.
2. Human capital deteriorates as a result of unemployment (i.e., sitting idle).
3. There are barriers to having a free choice of occupation.
4. There is a need for funding to invest in human capital, so students should be permitted to take out long-term public and private loans.
5. Investments in migration should be undertaken (i.e., in helping people settle and find education).
6. There has been a failure to invest appropriately in people on the margins of society (i.e., African-Americans, Puerto-Ricans, Mexican Nationals, etc.).
7. There has been a widespread lack of investment in human beings (beyond just those on the margins).
8. The benefit of public investment in human capital should not be distributed to individuals directly. Individuals will win from a booming economy and will receive a return in the form of salaries.
9. We must help developing nations achieve economic growth and begin investing in human capital as a society.

Mincer (1974) extended the work of Schultz (1961) and Becker (1962) by developing the earnings function, a model for predicting rates of return on years of schooling and on-the-job

training. Mincer's findings also have key importance for understanding the relationships between human capital investment and earnings across an individual's lifespan, demonstrating that salaries grow at a decreasing rate with time, resulting in a concave earnings profile for the majority of people. For labor analysis, the earnings function has become the acknowledged standard.

Not all economists agreed that HC does automatically boost productivity. For example, Harvard economist Richard Freeman stated in 1976 that HC simply served as a signal of potential and aptitude, with real productivity coming later from training, motivation, and capital equipment. He came to the conclusion that HC should not be regarded as a production factor. Around the same time, Marxist economists Samuel Bowels and Herbert Gintis argued against the HC theory, claiming that turning labor into capital effectively eliminates class struggle and attempts to strengthen workers' rights. With the emergence of behavioral economics in the 1980s and 1990s, additional criticisms of the HC theory were raised, claiming that it relies on the premise that humans are rational agents. As a result, when attempting to explain events, the HC theory will run into the same problems and limitations because it’s underlying assumptions about human motives, objectives, and actions are unfounded. Modern sociologists and anthropologists criticize the HC theory, claiming that it provides overly simplistic concepts that attempt to explain everyone's earnings all of the time or a universal link between HC, productivity, and income. However, when researchers investigate further, they discover that productivity variations between people cannot be quantified objectively in the vast majority of cases. According to a 2018 study, studies that claim to show a relationship between income and productivity use circular logic. Individual productivity disparities are routinely too tiny to account for levels of income inequality when we limit ourselves to objective measurements of productivity (Sean, 2021).

Thomas Davenport (1999) proposed that the component of HC was made up of abilities, knowledge, skills, personal talent, conduct, and effort, and that when those components were combined with time, he came up with;

1. The knowledge included IQ, intellect, and specific and general work knowledge.
2. A skill is knowledge that is applied to a task, such as the physical body and job movement.
3. Talent is an inherent quality that can be developed through training.
4. Behavior manifests observable behavior, norms, ethics, and personal beliefs.

5. Effort is when people try to succeed by utilizing their natural or personal resources, such as skills, experience, knowledge, and the ability to work, and finally, time.

Ulrich (1998) claimed that the human resources of labor and business functions have historically been considered as a cost to be minimized. Human resources, on the other hand, are today seen as HC, which results in a source of value. According to Phillips (2005) the idea of HC has undergone a massive paradigm shift from the old to the current approach. These reforms shifted the human resource function from an activity-based to a result-based approach, making it more integrated and aligned with the company's strategy and viewing HC as a source of value to be utilized in strategic management. Furthermore, Vejchayanon (2005) claimed that personnel are an asset that should be developed and integrated with multi-dimensional technology.

In advancing HD theory and practice Stewart & Samman (2018) provide a worldwide overview of progress in the many dimensions of HD over the last four decades, while also analyzing why some nations have fared better than others in boosting their HD status. They searched beyond basic HD as measured by the familiar HDI to other aspects of human flourishing, paying special attention to the role of social institutions (including norms and organizations) and social capabilities in advancing HD, as well as identifying some of the political factors that lead to success. The following are some of their findings:

1. While economic growth should not be the primary goal of development, it is an essential element of progressing humanity. Simultaneously, greater HD is required for sustained economic prosperity.
2. As a result, they discovered nations in both virtuous and vicious development cycles, in which excellent (or bad) HD and economic progress reinforced one other.
3. Political freedoms, community unity, the decrease of inequities, and environmental variables are only a few of the dimensions of HD that go beyond the fundamental ones represented by the HDI. These non-HDI variables are not strongly related to the HDI; a country may score well on the HDI but perform poorly on other dimensions.
4. Individualistic approaches, such as neoclassical economics and the majority of capability work, tend to overlook social institutions and social capabilities, which are critical components of human flourishing and vital inputs into HD.
5. There is no one-size-fits-all approach to success; some nations prioritize growth while maintaining social sectors, while others prioritize social spending and flourish despite

moderate or poor growth. Likewise, the principal agents of change vary: in some countries, such as Ethiopia, the government takes the lead with assistance backing; in others, it's a mix of progressive bureaucrats and politicians; and in a few cases (Bangladesh), NGOs are the primary agents of change. However, all of the success stories demonstrate significant development in the areas of gender equality and female empowerment.

6. Despite significant advances in basic HD and many other aspects, critical variables such as social wellbeing, inequities, and, above all, environmental issues have seen less improvement or even retreat.

2.1.3. Human Capital and Economic Growth Measurements

HC refers to a person's mental and physical abilities that are obtained via education, skill development, training, health care, and other human capacities in order to improve their production and efficiency. It refers to any aspect of a person that has monetary value, such as health, nutrition, education, and talents (Todaro, 2012).

HC, according to Schultz (1961) is defined as the resources that each human being possesses that may be transferred between users and owners to better their respective living situations. According to him, knowledge (understanding what to do), skills (understanding how to perform what has to be done), and attitude (behavioral demonstration of a favorable inclination while doing that which is to be done) are among the intrinsic resources in humans. HC is defined as an investment in people that encompasses all expenditures for education and health care. Human capital refers to a country's social and economic dimensions, which are measured by the HDI and are based on people's health, education, and living standards (UNDP, 2017).

Although the conceptual notion of HC is obvious, measuring it is challenging due to the impossibility of seeing individual competence and it is much more difficult to construct a metric that is comparable across individuals and nations. Conventionally HC investigation is based on production, cost, and income notions. The output-based approach, which was first implemented in the 1990s, is based on one of the following criteria: the average number of school years, the ratio of qualified adults to total adults Romer (1990) school enrollment rates, or the total number of school years worked during the employment period (Nehru et al., 1993). While these proxies provide general information about education levels, according to

Judson (2002) their effectiveness depends on the assumption that the proxy is collinear with the country's entire HC stock, and most proxies should not be expected to be collinear with HC accumulation over the full range observed in cross-county datasets. In cross-country growth recessions, the adult literacy proxy, for example, has had poor explanatory ability. Literacy is beneficial in emerging nations where basic education is rising, but even as higher educational attainment continues to rise, literacy finally stabilizes at near 100 percent. Furthermore, literacy is not defined objectively or uniformly across nations, making global comparisons difficult.

Enrollment rates may be used as a measure of HC. They only capture part of the buildup of stock since they are gauges of the flows of investments in HC rather than its stock. Second, there is a significant time delay between educational investment and HC stock increases. Furthermore, some educational investments may never result in HC stock since current students may drop out, repeat grades, or opt out of the labor market. In other words, enrollment numbers reveal little about enrollment outcomes.

The most common metric of HC is educational attainment, which is expressed as an average number of years of schooling (Cohen & Soto, 2007). Initially, the most well-known data series was created by (Barro & Lee, 1993). To account for children who start school sooner or later, they employed gross enrollment ratios adjusted for repetition in their 2001 version. Furthermore, more "quality" HC measurements, such as international test scores Hanushek & Woessmann (2012), were adopted. Despite advancements in the computation of educational attainment, average years of schooling cannot account for the fact that the cost of a year of education varies across elementary, secondary, and tertiary levels and is not similar between nations.

Complex multi-criteria approach is a multi-criteria method that is complex which centered on education. The four publications on the HCI established and refined by the World Economic Forum offer us a more in-depth and sophisticated look at the HC evaluation issue (World Economic Forum, 2017). It defines and employs four key elements: the level of formal education of younger and older generations as a result of previous education investment (capacity); skills application and accumulation among the adult population (deployment); formal education of the next-generation work force and continued up skilling and reskilling of the current work force (development); and the breadth and depth of specialized skills used at work (know-how), all of which are designed to quantify key concepts and practices.

According to the World Bank (2018) the HCI was developed with 157 nations in mind. It claims to be trying to figure out how much HC a child born today may have by the age of 18. The HCI values are said to represent future worker productivity when compared to a baseline of complete standard education and good health. The HCI is made up of three constituents:

1. Survival, as measured by under-5 mortality rates;
2. Expected years of Quality-Adjusted School, which combines information on education quantity and quality (quality is measured by harmonizing test scores from major international student achievement testing programs, and quantity is measured by the number of years of school that a child can supposed to obtain by age 18 given the current pattern of enrolment rates across grades in respective countries); and
3. Health environment using two proxies; adult survival rates and the rate of stunting for children under age 5.

The UNDP has been developing the HDI for several years. The United Nations HDI measures development by using life expectancy at birth as a measure of health, the number of years of schooling as a measure of education, and per capita income as a measure of development, while HCI measures health using survival rates and stunting rates rather than life expectancy, and education using quality-adjusted learning rather than just years of schooling. The HDI utilizes per capita income, although the HCI does not. The elimination of an income component and the addition of a quality adjustment in learning are two notable modifications from the HDI. If the HCI focused on allowing poor nations to assess and improve the cost-effectiveness of their health and education spending, it would be more beneficial to them. Differences in development results due to governance concerns, political systems, socio-cultural environment, and legacy issues have also been completely overlooked. The HCI metric is oversimplified. As a result, HCI is regarded as a superior measure in capturing multiple elements of HC as opposed to the conventional usage of school enrolment, life expectancy, and health and education spending as indicators of HC. As a result, this study used HCI to measure HC.

The national accounts of a given economy may be measured in a number of ways. Here are a few:

1. GDP
2. Gross national income (GNI): which is calculated as GDP plus residents' main income from outside the country minus non-residents' primary

income from the economy.

3. Net Domestic Product (NDP): GDP minus depreciation.
4. Net Disposable Income (NDI): the difference between net national income and taxes at current market prices. Most economies, however, measure their national accounts using GDP (Mankiw, 2010). The production of products and services, the creation of jobs, and the accumulation of money are all synonymous with economic growth. It's usually calculated as a percentage rise in GDP (GDP).

2.1.4. Human Capital Development: Investing in Health and Education

HC investment is measured in terms of its return rather than its cost. While any capability developed via human investment becomes a part of the human agent and thus cannot be sold, it nevertheless has an impact on the market by influencing the earnings and salaries that the human agent may receive. The yield on the investment is the rise in earnings as a result of the investment. Just as the value of a physical capital product can be estimated by discounting its revenue stream, the value of an investment can be determined by discounting the additional future profits it generates.

Despite the difficulties of measuring human investment precisely, evaluating some of the most essential activities that increase human capacities may provide a wealth of information. One of the early contributions to the study of the value of human capital Schultz (1961) suggests five methods in which human capital might be produced. They are there:

1. Health facilities and services, which are widely defined as all expenditures that impact people's life expectancy, stamina, strength, vigor, and vitality. Economists' speculations on the implications of improved health have mostly been focused on population expansion, or quantity. Health-related policies, on the other hand, almost certainly improve the quality of human resources.
2. On-the-job education, such as traditional firm-sponsored apprenticeships;
3. Formalized primary, secondary, and postsecondary education
4. Adult education programs that are not run by businesses, such as agricultural extension programs,
5. Individuals and families migrate in order to adapt to changing employment prospects. All of these activities aim to increase an individual's productivity. HCD is thus

facilitated by investments in health and education (the two components of HC).

2.1.5. The Role of Education and Health on Growth

HC is a broad term that refers to human attributes that may be learned and used to boost earnings. It is often understood to refer to people's knowledge and abilities, which are acquired in part via education, but may also refer to their vigor and vitality, which are influenced by their health and nutrition. Health and education as inputs to economic output are the focus of HC theory. In contrast, the notion of HD regards health and education as fundamentally important outcomes that should be measured alongside economic productivity as indicators of human welfare. It is vital to evaluate the various relationships between human capital and other kinds of capital, income, and growth when considering the function of HC as a development input. While it is true that better educated individuals earn more than less educated people in every nation for which data exists, this does not imply that there is a straightforward link between investing in people and countries' growing wealthier. Certain types of physical capital and HC may be complimentary (Yitayew, 2017).

Countries with a high HDI, which is mostly attributable to education, have a high degree of economic development, as measured by per capita income. This is mostly due to HC's inventiveness and adaptability in delivering multifaceted changes and advancements to individuals, organizations, and society as a whole. The contribution of HC to long-term economic growth as an essential element for development is a compelling argument for its support (Eigbiremolen & Anaduaka, 2014).

Emphatically, there is a strong argument that without adequate HC investment, progress becomes more of a desire than a reality. This emphasizes the significance of HC investment. Education spending is beneficial to society since it is justified by the likelihood of a positive return in the form of economic growth (Gillies, 2011). Simeonova-Ganeva (2010) adds to this by arguing that HC stocks are an important production component in both the firm and the economy. This accumulation, once again, impacts efficiency and productivity by contributing considerably to micro and macroeconomic growth.

Economic progress is intimately linked to investments in development, health, and education. On the one hand, increased health capital may boost the value of education investments, in part since a child's health is a key determinant in his or her attendance at school and formal

learning. Longer life increases the return on education investments; improved health at any time throughout one's working life can reduce the rate of depreciation of educational capital. Increased education capital, on the other hand, may enhance the return on health investments as many health programs depend on basic skills learned in school, such as personal hygiene and sanitation, as well as basic literacy and numeracy. Education is also required for the formation and training of health professionals. Finally, an increase in productive efficiency as a result of education expenditures boosts the return on a life-saving health investment (Todaro, 2012).

Education is a good investment since it fosters progress. Schultz looked at the role of education in national income growth and came to the conclusion that educational resources increased by around 6.5 times when compared to consumer income in dollars and the gross formation of physical capital in dollars. Education investment increased national revenue by 3.5 times more than investment in other sectors. People's health improves their productive potential, which leads to a quantitative rise in HC. Many experts, such as Gillies (2011) believe that schooling is a critical component in the development of HC (Maran et al., 2009). It occupied a pivotal position in the development of HC, which is crucial for economic success. In contrast, because the HC context might have a larger meaning, our perceptions of it vary. It is nested in a larger concept of HCD that may include human freedoms: freedoms to achieve the full potential of every human life, not just a few or most of them, but all lives now and in the future in every corner of the world. The HD method is distinct because of its comprehensiveness (UNDP, 2016).

The notion that nations follow a common, balanced growth path has been widely criticized in cross-country assessments. In a series of multi-country assessments, Sunde & Vischer (2015) found substantial evidence to reject the premise of a balanced development path. If the assumption is eliminated, HC as a production element or an innovation input has no direct impact on growth. The contribution of HC to growth is boosted when living conditions are good. It was demonstrated that nations do not always follow identical growth pathways; rather, countries may be categorized, each with its own distinct growth processes. Economic complexity and institutional quality are two of the most significant drivers of variability in this regard. According to a recent study Zhu & Li (2017) economic complexity has a moderating influence on the contribution of HC to economic growth. They find a positive interaction effect, implying that economic complexity boosts the growth effect of human

capital. The quality of a country's institutions has an impact on its growth environment and process through influencing the impacts of the typical elements of production, such as HC accumulation. For example, Farida & Ahmadi-Esfahani (2008) offered empirical findings on the influence of corruption on the productivity and growth of Lebanon's HC. Their research adds corruption to the Solow development model as an extra driver. In the expanded model, not only did the corruption variable have a significant coefficient, but the other growth determinants had lower coefficients than when the corruption variable was not present. This finding suggests that corruption causes economic inefficiency by limiting investment, diminishing the efficiency of government spending, and weakening human capital productivity. In the absence of sufficient demand for competent labor, skilled workers must either settle for a lower-paying job or emigrate.

2.1.6. Growth and Its Impact on Human Development

According to Sen's capacities approach, "a person's capability to have multiple functioning vectors and to have the accompanying well-being accomplishments" is the best predictor of wellbeing, provides the theoretical underpinnings for human growth (Sen, 1985). This viewpoint shifts development analysis to a vector of not only attributes (as in the more traditional utilitarian or even the original basic needs view of human welfare), such as income, education, and health, but also the vector of potential opportunities available to individuals in a given state. Naturally, there is a correlation between the two: a person who is hungry or illiterate has fewer options than a person who is healthy and educated. However, the capacities approach examines the effect of the social environment on human choice and agency, going well beyond individual characteristics; an individual in an open, free society would have a greater range of potential functioning than one in a closed, repressive culture. While capabilities are an enticing development aim, they are notoriously difficult to evaluate due to the fact that the complete range of human skills is practically by definition unobservable.

The UNDP Human Development Report of 1990 was the first significant attempt to translate the capabilities approach into a comprehensible ranking of countries. The goal of the HDR was to provide a quantitative way to combine numerous socio-economic variables into a measure of HD in order to better represent the complexity of human life. The World Development Reports' "over concern with GNP growth and national income accounts has superseded a focus on objectives by a fixation with only the means" and contradicted the

perceived mainstream knowledge in development economics (UNDP, 1990). The transition from a normative theory of capacities to a quantitative variable, on the other hand, was far from straightforward. The inclusion of life expectancy, literacy, and GDP as components of a HDI is arguably a crude approximation of the original capacity hypothesis. Political freedom and wealth disparity indicators were noticeably absent. Furthermore, any quantitative ranking involves tough empirical concerns, such as how to account for income's declining marginal utility and the arbitrary weighting of each component of HD. Nonetheless, the HDRs have had a significant impact on development thought, prompting poor nations to produce their own national HD reports and indexes, as well as change policy.

Because it incorporates the economy's command over resources, income growth impresses one as the primary contributor to directly enhancing individual capacities and, as a result, the HD of a nation (Sen, 2000). While citizens of the Indian state of Kerala have life expectancies and literacy rates comparable to those of many advanced nations, the fact that they do not have access to many of the same benefits (such as better housing, transportation, or entertainment) highlights the importance of GDP as a tool for achieving a wide range of capabilities. GDP, on the other hand, has a significant impact on literacy and health outcomes, both through private spending and government initiatives. As a result, larger earnings have an indirect influence on HD insofar as they assist in the fulfillment of other important HD goals.

According to research by Chevalier (2011) parents' income has the most significant impact on educational spending. As a result, this investment has a favorable impact on HCD. The underlying premise is that when per capita income rises, parents increase their investment in their children's education, resulting in a positive contribution to HCD. Economic growth has an influence on a country's extent of HD, but other societal factors also have a role. The importance of income distribution, both at a micro and macro level within a household, is critical. Individual and household consumption may be a significant component in enhancing HD at the micro level and may respond more closely to the population's true needs than government initiatives. Individual consumption, on the other hand, may not necessarily go toward products that contribute the most to HD. Spending on human development-oriented commodities is expected to be greater in societies where women contribute more to family income and have more influence over household decision-making. For example, the more the amounts of food are under women's control in Gambian families, the higher the household

calorie intake (von Braun, 1988). Similarly, in the Philippines, it has been demonstrated that when women's proportion of income grows, so does their consumption of calories and proteins (Garcia, 1990).

The distribution of increasing income from economic expansion will have a significant influence on HD at the macro-economic level. Because poorer households devote a larger proportion of their income to commodities that directly promote improved health and education, economic growth that favors the poor has a stronger influence on HD, both via increased food spending and through increased educational expenditure. According to Birdsall et al. (1995) if Brazil's wealth distribution were as equal as Malaysia's, impoverished children would attend school 40 percent more often. Economic growth's effects on government HD spending are guaranteed to complement private spending channels. In reality, Anand & Ravallion (1993) indicate that the majority of the benefits of economic development on HD are likely to come through central or local government budgetary spending. The extent of this effect, however, is totally dependent on the efficiency with which expenditures are targeted and delivered. The government must designate key sectors with the greatest potential for HD progress, such as basic education and health. Government spending on HD should be targeted primarily towards low-income people and places, as this will have the greatest marginal impact. The government must also have the institutional competence to deploy these funds properly. Rajkumar & Swaroop (2002) found that the efficiency of government spending is dependent on the quality of governance, with government accountability likely to play a key role. While empirical data is sparse in this area, theory implies that a decentralized, locally accountable government structure might improve resource allocation and service delivery.

2.1.7. Human Capital Development in Ethiopia

Ethiopia Between 1995/96 and 2010/11, per capita health spending climbed from US $4.5 to US $20.8, with a move toward Rest-of-the-World countries (ROW). From 1999/00 to 2010/11, ROW spending has surged by over tenfold. Out-of-pocket (OOP) spending has more than quadrupled, while government spending has climbed by less than a couple of percent. As a result, in 2004/2005, external assistance overtook domestic aid as the most important source, accounting for over half of all health spending by 2010/11. Government spending as a percentage of GDP, on the other hand, fell from 33.4 percent to 15.6 percent. Ethiopia's total health expenditure looks to be modest in comparison to other low-income

nations, relying on both foreign help and out-of-pocket spending. Ethiopia ranks third in terms of per capita expenditure, fifth in terms of total health expenditure as a percentage of GDP, and 12th in terms of out-of-pocket expenditures among the 25 low-income countries in SSA with statistics available. Ethiopia is also towards the top of the list in terms of the percentage of overall health spending spent on external help (WB, 2016).

Ethiopia's government is likewise dedicated to investing in education, as indicated by the education budget's consistent 20 percent share of overall government spending over the previous 10 years. In 2011/12, education received nearly 33% of the government's recurrent budget. Education's share of GDP has been on a declining trend, partially reversed from 2001 to 2003 but dropping to 3.9 percent in 2004. This is attributable to a decrease in government spending as a percentage of GDP, from 23% in 1996 to 18% in 2004. As a result, we may conclude that the massive rises in public real education spending were made feasible not by the Ethiopian government's prioritizing education more, but by persistent economic development. As a share of GDP, Ethiopia, in fact, spends less than the SSA average (4.7%) and way below Kenya (6.7%) and Tanzania (6.2%) (WB, 2016).

The HDI is a summary metric for evaluating long-term progress in three core aspects of HD: a long and healthy life, knowledge access, and a reasonable quality of life. Life expectancy is a metric for a long and healthy life. Access to learning and knowledge is measured by expected years of schooling for children of school-entry age, which is the total number of years of schooling a child of school-entry age can expect to receive if current patterns of age-specific enrolment rates remain the same throughout the school year. Gross national income (GNI) per capita is calculated using purchasing power parity conversion rates and represented in constant 2017 international dollars. According to this, Ethiopia's HDI rating for 2019 is 0.485, placing the nation at 173 out of 189 countries and territories in the poor HD category. Between 2000 and 2019, Ethiopia’s HDI value increased from 0.292 to 0.485, an increase of 66.1 percent. Between 1990 and 2019, Ethiopian life expectancy grew by 19.5 years, the mean years of schooling climbed by 1.4 years, the predicted years of schooling increased by 5.7 years, and the GNI per capita increased by 189.3%. Nonetheless Ethiopia's 2019 HDI of 0.485 is lower than the 0.513 average for low-human-development nations and the 0.547 average for Sub-Saharan African countries. When the value is discounted for inequality, for 2019 the HDI falls to 0.348, a loss of 28.2 percent due to inequality in the distribution of the HDI dimension indices. Also in 2021/22 Ethiopia ranked 175th out of 191 countries in HDI

(UNDP, 2022). This demonstrates that Ethiopia is still regarded as the least developed country in terms of HC investment and stocks when compared to other countries. This poor level of HD has a negative impact on the country's economic progress. HC has improved, yet it is still insufficient. How high we can leap does not limit how far we can jump; rather, the most important need is to land safely.

Generally investments in health care and educations are important. Weak and restricted coverage, particularly in rural regions, means that health facilities and standardized education are insufficient, leaving insufficient funds for expenditures on the other key inputs for academic achievement. Low education and health results as a result of these difficulties jeopardize employees' future productivity and the economy's future competitiveness.

2.1.8. Trend of Economic Growth in Ethiopia

Since 1930, Ethiopia has gone through several policy reforms and economic development cycles, including the imperial government (1930–1974), the Derg regime (1974–1991), the EPRDF and the current government. GDP increased by 4.6 percent, 3.8 percent, and 1.9 percent at constant factor cost during the decades 1953–59, 1960–65, and 1966–73, respectively. During the Derg regime, GDP grew at a rate of 1.6 percent. Because of the civil conflict and instability, the growth rate was just 0.4 from 1974 to 1978. Between 1979 and 1983, when the economy was relatively stable and weather was favorable, the growth rate increased to 4.2 percent. There were times of severe drought from 1984 to 1985, when growth fell to -5.3 percent. In 1986-87, the rate increased to 7.9%, owing to the strongest rainy season at the time, while in 1988-89, the average per capita GDP growth rate was negative 2.3 percent. This occurred due to Ethiopia's protracted internal conflict aimed at toppling the Derg regime (Geda, 2001).

Ethiopia's economic improvement began to accelerate in 1992, and it increased much more in 2004. Between 2003/04 and 2008/09, Ethiopia's real GDP growth averaged 11.2 percent per year, making it among the best performing countries in Sub-Saharan Africa (SSA). It has had a strong growth record over the last decade, with an average GDP growth rate of 11%, more than double the average growth rate for SSA (NBE, 2013). Ethiopia has lately emerged as one of Africa's fastest-growing non-oil-dependent countries. Its economy has improved dramatically, with real GDP growth averaging 10.9 percent between 2004 and 2014 (WB, 2016). Despite the worst drought in its history, Ethiopia's real GDP growth rate in 2015/16

was 8.0 percent, far higher than the SSA average of 1.4 percent. The economic growth was broad based with industry growing 20.6%, service 8.7% and agriculture 2.3% (NBE, 2015/16). Economic growth for 2017 was $81.77Billion, a 10.06% increase from 2016, for 2018 was $84.27Billion, a 3.06% increase from 2017, for 2019 was $95.91Billion, a 13.82% increase from 2018, for 2020 was $107.65Billion, a 12.23% increase from 2019, and in 2021 increased 3.36% from 2020 (WB, 2022).

Yet Ethiopia's economic growth is often characterized by varied, irregular, and averagely low performance, with both positive and negative real GDP growth rates. Between 1981 and 2010, it had seven instances of negative growth rates (WB, 2011). This indicates that it has been shifting back and forth due to various circumstances. Ethiopia's fundamental difficulty is unpredictable growth, which is compounded by the lowest living standards. Ethiopia has no assurance that it will not suffer the challenges that it has had in the past three regimes in terms of economic growth until these issues are resolved. The growth trends that the country has seen over the previous four decades support this assertion. In comparison to previous decades, Ethiopia's economy has performed well in the last decade. Some argue, however, that even at this rate of development, a small country like Ethiopia will not be able to meet its stated goals of entering the middle income countries and, more importantly, lifting its people out of poverty.

In general, it is clear that economic growth theory is filled with inconsistencies. In growth theory, it is widely agreed that technical advancement is a significant factor of economic growth. According to both exogenous and endogenous growth theories, technology has an impact on economic growth. The distinction is that, whereas exogenous theories fail to explain how technology drives growth, endogenous theories highlight growth determinants such as HC, physical capital accumulation, interest rate, government expenditure, and taxation through technological change. HC theory claims that one's capacity to conduct productive work (productivity) is influenced by skills and knowledge, although not all economists believe that HC directly increases productivity. As a result, there is a debate on how much HC influences economic growth. Despite its popularity, the HC idea is not without flaws. HC-based analytics that exclude institutional factors like job title, for example, may be incomplete. While the theory focuses on individuals and their attributes, it implies that salaries change according to job quality, which is an adherence to classic economic principles. For example, if a company offers a risky job, it may be willing to pay more than a

company offering a less dangerous position to compensate for the greater risk, a concept known as compensating differentials. To put it another way, while determining wages, the features of the work, not only the individual, are important. Finally, an analyst who simply relies on HC theory must be prepared to decide if a HC model ignores crucial institutional aspects that affect compensation.

For this study Lucas-Romer's endogenous growth models is appropriate because the model underline the role of endogenous elements (such as human capital stock and research and development activities) as the key engines of economic growth. While early neoclassical models assumed that total factor productivity growth (or technological progress) was exogenously determined. In endogenous growth theories, the notion of increasing returns to scale provides a plausible path to long-run sustained growth. These endogenous economic growth theories emphasize the importance of expanding investment opportunities in a liberalized, market-friendly environment to achieve high economic growth. Endogenously accumulated HC has a direct impact on labor productivity and as a result, HC becomes distinctive to the individual, leaving innovation in the stock of knowledge as an exogenous element. It is a significant source of long-term growth, either as a direct input into research as a result of positive externalities or as a result of policies that encourage public and private investment in human capital. Nonphysical capital investment boosts the productivity of the current labor force; hence, HC variables are included in endogenous growth models to capture quality differences in the labor force.

2.2. Empirical Literature Review

Different studies have articulated HC in different ways. They include HC such as health, education, knowledge, migration, training, and other labor-related investments that can boost labor productivity and contribute to the country's GDP. The enormous advent of endogenous growth theory, reported by Lucas (1988) and Romer (1986), has dominated the growth literature in the last two decades of the twentieth century. They claimed that if capital is allocated to the HC effectively, the return may be restored in the shape of a stable return to scale, despite the diminishing and low return to scale. Romer (1986) described a long-term economic growth model in which human education capital is a production input that boosts marginal production and growth over time. He goes on to say that a country with a large HC size will grow significantly faster than one with a small HC size.

Munir & Arshad (2018) use the endogenous growth model to study the long-term and short-term implications of the stock of HC and real physical capital on Pakistan's economic growth. The findings support the endogenous growth model, implying that HC and real physical capital accumulation factors enhance employment rates, per capita income, labor productivity, and economic growth sources, resulting in higher GDP per worker. Likewise Neeliah & Seetanah (2016) study the beneficial association between HC and economic growth in Mauritius in both the short and long term. According to the study, there is a bi-directional relationship between HC and growth in emerging nations.

Ali & Yilmaz (2017) used primary, secondary, and tertiary school enrolment rates as a proxy for HC to demonstrate the influence of HC on economic growth for 32 upper-middle income developing nations. It has been demonstrated that HC has a favorable impact on economic growth. It has also been shown that as education levels have grown, their favorable influence on economic growth has decreased.

Eggoh, et al. (2015) indicated that government spending on education and health had a negative influence on economic growth, but HC stock indices had a minor favorable impact. Using the Monte Carlo technique, however, Qadri & Waheed (2014) found a positive association between HC (education spending) and economic development in Pakistan. Their findings show that there is a weak relationship between health care and the labor market; nevertheless, a change in education investment has an impact on production via increasing productivity.

Joseph & Obikaonu (2021) evaluate the association between HC (as assessed by HCI), social capacity, and economic growth in 40 African nations and showed that HC had a considerable favorable influence on income per capita growth rates across nations. They observed that without taking social capacities into account, the influence of HC on development, while good, is only weakly significant. However, taking into consideration social capacities, emphasizes the importance of HC in driving growth rates across countries.

Amassoma & Ephraim (2016) discovered that per capita income and public expenditure has a significant positive relationship with investment in HC (as assessed by primary and secondary school enrolment). Nonetheless, the Mehrara & Musai (2013) findings reveal causal relationship between economic growth and HD’s in underdeveloped nations. However, enrollment has no meaningful impact on GDP. The quality of education seems to be

deteriorating as the number of students grows. In addition, formal education systems in many nations are not market-oriented. This might be why these emerging countries' massive educational spending isn't yielding faster development.

In the majority of studies, it can be said that human capital is related to education. In that, education is regarded as a dynamic social force that changes the structure of society and provides better living standards for individuals. In addition, no matter how large the physical, financial and natural resources are, there is a need for qualified labor force that can effectively use these resources for the sustainable economic growth. In this respect, the increase in education level has a positive effect on total output by contributing the accumulation of human capital and increasing the quality of the labor force (Cakmak, 2008); (Yalcinkaya & Kaya, 2016).

Mohamed & Anis (2019) using both dynamic OLS and fully modified OLS methods, showed that there is bidirectional causality between economic growth, FDI inflows, CO_2 emissions, and HC for all of the Mediterranean countries panels studied, except for the Euro and Asian. In addition, with the exception of the African Mediterranean countries panel, there is unidirectional causality running from GDP to HC and from HC to CO_2 emissions. Nevertheless employing HDI as proxy to HD's Mukherjee & Khakraborty (2010) and Mustafa et al. (2017) discovered that while HD's contributes positively to economic growth, growth does not appear to have had a positive influence on HD.

Bandara et al. (2014) discovered bi-directional causality. The size of the effects of major growth factors like income per capita and expenditure per capita on HD outcomes is smaller. But, growth proxies such as having a bank account, having durable assets, and having wealth have a greater impact on HC and also HD components such as literacy, schooling, and food security have a significant positive influence on economic growth proxies.

Employing ARDL approach Gebru (2015) and Gebrehiwot (2015) disclose that health and education expenditures have a favorable impact on economic growth. Likewise Borojo & Yushi (2015) also found that public spending on health and education, as well as primary and secondary school enrollment, has a positive influence on economic growth but tertiary school enrollment has insignificant impact on economic growth. This might be due to the fact that most graduates are finding themselves redundant as there are no jobs and their skills are not being utilized for the betterment of the economy. Most of the graduates are also looking for

greener pastures abroad. Similarly, the co-integrated VAR approach Dawud (2020) revealed that both government expenditure on health and education as a percentage of GDP had a long-term favorable influence on Ethiopia's economy. Gross primary school enrollment, on the other hand, appears to be negatively related to economic growth. However, unlike its long-term significant impact, government spending on education has a negligible influence on the economy. It may be due to the time lag between educational investment and its fruit, whereas government spending on health has a considerable negative impact.

Related empirical studies in Ethiopia

Sisay (2019) investigations disclosed that the HC components of secondary and teritary school enrolment have a favorable long-term impact on economic growth. In the long run, however, primary school attendance, health spending, and government development aid all have an unfavorable impact on economic growth. Long-term economic growth is negatively influenced by educational spending. The findings suggest that primary school enrolment and government development aid were the variables that had the most favorable short-term effects on the RGDP. While, Gashe (2020) discovered that HC proxy factors such as government education spending, life expectancy, and primary school enrollments show favorable long-run associations with economic growth, However, HC as measured by government health spending and secondary school enrollment has a negative influence. The HC proxy of primary and secondary school enrollments shows a unidirectional causal link with real GDP.

Using ARDL model, Mekonnen (2017) and Negash & Federici (2019) proved that HC (expenditures on education and health) had a positive significant impact on the growth of real GDP.

Tewodros (2014) investigations of the association between education, health, and economic growth suggested that investing in education and health would have an impact on future economic growth. Similarly, Borojo & Yushi (2015) found that public spending on health and education, as well as elementary and secondary school enrollment had a beneficial impact on economic growth. Enrollment at tertiary schools, on the other hand, has little impact on economic growth. Furthermore, enrolments in elementary, secondary, and tertiary schools, as well as overall government expenditure on education were positively connected to

development (Mitike, 2019). However, using an error correlation methodology Kifle (2016) it is indicated that education HC has had no meaningful influence on the level of output.

According to Asaminew (2020) research, there is a long-run relationship between HC investment, the labor market, and economic growth. According to the VECM findings, increasing HC investment raises unemployment rates in the short term. This positive shift in unemployment causes a short-term reduction in real GDP. Still utilizing the VECM approach Babasanya et al. (2017) discovered that in the short run, HCD has the greatest influence on improving environmental sustainability, but that in the long run, HCD is weak and has a negligible impact on environmental sustainability.

Bareke et al. (2021) empirically scrutinized the determinants of HCD in Ethiopia using ARDL model. According to the findings, GDP per capita has a favorable and considerable impact on HCD. However, education spending is less likely to influence HCD.

In general, there are a number of studies which have examined the nexus between investment in HCD and economic growth in many countries around the world by using different methods of analysis at different time by using different indicator of HC and economic growth. Moreover, those descriptive facts and econometrics based studies indicate that, there have been different scenarios in economic growth and HC. From the different arguments advanced by the studies, one can safely conclude that there is no general agreement among researchers on this issue. This inconsistency may be sourced from diversified approach (methodology), and diversified variables of interest as proxy to HC. For instance, Qadri & Waheed (2014) employed education spending, Amassoma & Ephraim (2016), Ali & Yilmaz (2017) and Mehrara & Musai (2013) enrollment rate, Kifle (2016) and Bareke et al. (2021) mean years of schooling, Mekonnen (2017) and Tewodros (2014) expenditure on health and education as proxy to HC. Using merely education or health indicator variables as HC proxy might be inadequate as HC is multidimensional in its nature. So we need to employ better proxy. In this study HCI is used which is considered a superior measure in capturing multidimensional facets of HC.

In addition to the inconsistency of results, most researches in Ethiopia examine only the impact of HC investment on economic growth without considering the impact of economic growth on HCD. Contrary to the previous empirical studies in Ethiopia this research tries to examine both the backward and forward relationship between HC and economic growth.

Therefore, this study is attempted to add both theoretical and empirical knowledge to the existing literature.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Type and Source of Data

The study investigated the nexus between human capital investment and economic growth by using secondary time series data from 1980-2020 on human capital index, gross capital formation, gross domestic product, trade openness, income equality, political freedoms, environmental factors (CO_2 emission), employment and net official development assistance in Ethiopia.

3.2. Research Design

An explanatory research design is used. Furthermore the study employed a quantitative research technique to investigate the relationship between human capital and economic growth in Ethiopia from the period 1980 to 2020.

3.3. Methods of Data Analysis

Data was collected, processed, analyzed, and explained in order to answer the research questions. The information gathered is examined using descriptive and econometric methods.

3.3.1. Descriptive Analysis

Descriptive analysis is a type of economic statistics that involves acquiring, tabulating, and analyzing data in order to determine the relationship between variables. To highlight the patterns within the variables graphical illustrations are presented.

3.3.2. Econometric Analysis

The study used the ARDL model, based on the stationarity test. The ARDL model is utilized as the stationarity test involves a blend of first difference and level (i.e., I (0) and I (1)). ARDL has certain benefits over the traditional methods of Engle and Granger, Johansen's, and Johansen and Juselius co-integrating analysis, which require all variables to be I (1) and a relatively large sample size. Even when some of the regressors are endogenous and limited time series observation, the ARDL technique yields statistically unbiased and accurate

estimates of the long-run coefficients regardless of whether the variables are I (1) or I (0). Also, in the ARDL formulation, lag length symmetry is not needed; each variable may have a different number of lag lengths. Furthermore, unlike traditional co-integration methodologies, the ARDL methodology enables the investigation of co-integration relationships to include dummy variables. The other advantages of bound testing approach in the long run and short run parameters of the model in questions are determined simultaneously.

3.4. Model Specification

Human capital and its development processes are at the core of endogenous growth models, which display increasing returns to scale. It implies that in the economic growth process, new knowledge is more significant than existing knowledge.

The standard endogenous growth model, Y (t) = f ($K_{(t)}$, $H_{(t)}$, $L_{(t)}$, $A_{(t)}$), relates Y (per capita GDP growth) to K (capital accumulation in the economy), H (human capital development), L (labor force), and A (proxy for technological progress). Economic growth function for Ethiopia specified as follows: growth of real GDP is a function of physical capital, human capital, exports and import of goods and service (trade openness), political freedom, income equality, CO_2 emission and employment. Studies like Yitayew (2017), Amassoma & Ephraim (2016) and Sisay (2019) used parallel approach to examine the impact of HC on economic growth. Moreover, the variables are preferred based on their relevance and data availabilities. Therefore the mathematically relationship between real GDP and its major macroeconomic determinant are expressed as follows:

GDP = f (HCI, GCF, PF, TO, CO_2, EMP, INL)

The level of production is determined by the amount of endogenously created human capital, as defined by Lucas (1988), and Romer (1990). Human capital, as they define it, is the knowledge that can be gained via education and training. Existing human capital is seen as critical for the development of new knowledge and the expansion of future human capital. Improvements in education and knowledge sector productivity lead to higher labor force marginal productivity, higher earnings, and output growth. Increased human capital may also hasten innovation and technical progress, both of which are necessary for long-term growth.

Suppose that the current level of aggregate output (Y(t)) is produced according to the following Cobb–Douglass production function:

$$Y(t) = H^{\varphi}{}_{(t)}\, K^{\alpha}{}_{(t)}\, (A_{(t)}\, L_{(t)})^{1-\alpha} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

Where $H_{(t)}$ is human capital stock, $K_{(t)}$ is the stock of physical capital, $L_{(t)}$ is the labor employment, $A_{(t)}$ is the economy level of technology, φ measures human capital elasticity of aggregate production, and α is the share of capital. By taking natural logarithm on both sides and rearranging, the above model can be re-specified as follows:

$$\ln (Y_{(t)}) = \varphi \ln (H_{(t)}) + \alpha \ln (K_{(t)}) + (1 - \alpha)(\ln (L_{(t)}) + \ln (A_{(t)})) \ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

According to Acemoglu et al. (2014), HC is determined by individuals' education decisions in the face of exogenously determined capital market pricing. Schooling decisions itself determined by the net present value of the individuals and other socioeconomic and institutional factors. He stated that individuals are born with some level of HC (i.e., $h(0) \geq 0$), and HC develops according to the following modified differential equation:

$$\dot{H}_{(t)} = F\,(t, H_{(t-1)}, S_{(t)}, X_{(t)}) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3)$$

Where S (t) is the share of resources dedicated to education, and F (t) describes how human capital evolves over time, taking into account the current stock of human capital, schooling decisions, and other socioeconomic factors (X (t)). However, as Papageorgiou & Perez-Sebastian (2006) demonstrated, the evolution of schooling through time is influenced by the percentage of people who attend school and population increase. The human capital growth model may be re-specified by merging equations (2) and (3) to form the following equation:

$$\dot{H}_{(t)} = F\,(t, H_{(t-1)}, Y_{(t)}, K_{(t)}, L_{(t)}, S_{(t)}, X_{(t)}) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (4)$$

Where K(t) captures the externality effect of physical capital accumulation on HC. The supply of HC is determined by household schooling decisions, while the demand for HC is determined by technological progress. The need for a trained workforce is growing as a result of technological development, improving the return on investment in education and, as a result, encouraging HC growth. Greater demand for skilled workers may enhance the return on investment in education, leading to higher HC.

A system of equations would be generated using the functional form above. This set of equations will assist in constructing a system of simultaneous equations model. The explanation for this is not far from the fact that economic growth and human capital are

jointly determined. However, the current research does not forget the fact that ignoring reverse causality can lead to simultaneity bias, as identified by (Gujarati, 2009). As a result, the two equations are written as follows:

$GDP_t = \alpha_0 + \alpha_1 HCI_{t-i} + \alpha_2 GCF_{t-i} + \alpha_3 PF_{t-i} + \alpha_4 TO_{t-i} + \alpha_5 EMP_{t-I} + \alpha_6 CO_{2t-i} + \alpha_7 INL_{t-i} + \varepsilon_{1t}$..... (2)

$HCI_t = \beta_0 + \beta_1 GDP_{t-i} + \beta_2 GCF_{t-i} + \beta_3 PF_{t-i} + \beta_4 TO_{t-i} + \alpha_5 ODA_{t-i} + \beta_6 CO_{2\ t-i} + \beta_7 INL_{t-i} + \varepsilon_{2t}$…… (3)

Where, GDP = gross domestic product, HCI = human capital, GCF = gross capital formation, PF = Political freedom, TO = trade openness, EMP = employment rate, ODA = net official development assistance, CO_2 = carbon emission, INL= income equality, α_0& β_0 and are the constant terms , ε_{1t} and ε_{2t} are the disturbance terms, α_1, α_2, α_3, α_4, α_5, α_6, $\alpha_7$and β_1, β_2, β_3, β_4, β_5, β_6, β_7, are the estimated coefficients, t = is the time period, i = is the number of lags and t-i are the time lags.

3.5. Description of Variables

GDP = is Annual percentage growth rate of GDP at market prices based on constant local currency and used as proxy to economic growth. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. High levels of economic growth result in more income per capita and wealth, allowing a country to earn more cash that may be used to fund human capital development initiatives (Shuaibu & Oladayo, 2016). According to research by Chevalier (2011), parents' income has the greatest impact on educational expenditure, and as per capita income rises, parents increase their investment in their children's education. As a result, this investment has a favorable impact on the development of human capital.

GCF = Gross fixed capital formation (gross domestic fixed investment) includes land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings and used as proxy to investment. Every country that has succeeded in attaining sustainable growth has managed a huge rise in both domestic and foreign investment as a proportion of GDP. Significant technology has been widely embodied in capital assets like plants and machines

that aid in a country's technological advancement. As people's enhanced capacities absorb technical developments, investments in education, skills, machinery, and plants deliver growth and human capital development.

HCI = Used to measure the amount of human capital that a child born today can expect to attain by age 18. The HCI values are contended to convey the productivity of the next generation of workers, compared to a benchmark of complete standard education and full health. The HCI has three components Survival, Expected years of Quality-Adjusted School and Health environment using adult survival rates and the rate of stunting. Human capital is a vital source of development (Barro & Sala-i-Martin, 1995). As people's enhanced capacities absorb technical developments, investing in education and skills may be just as significant as investing in machinery and plants in generating growth. Investing in human capital is particularly enticing since it leads to enhanced human development while also assisting in growth. To stimulate and sustain economic growth, a diverse set of labor skills is required, including education at all levels, from elementary schools to universities, as well as technical and vocational training and learning by doing.

PF = Political freedom is the ability of a nation's citizens to participate freely in the political process. It involves both the freedom of the majority to influence and guide policy (rather than merely entrenched insiders doing so) and the freedom of political minorities to publicly advocate for their positions. Political persecution is one of the factors holding developing countries back. Dictatorships and military juntas hinder the development of economy and human capital. A society with a wide berth for the political activity of its citizens also encourages civic participation, concern for the common good, and a sense of personal responsibility (traits that support enterprise and economic growth). When political achievement is more lucrative than commercial success, the most brilliant and ambitious people would prefer to focus their efforts on achieving personal success in politics rather than producing employment and money via economic activity. When minorities or individuals believe they are powerless victims rather than active participants in politics, they will transfer their skills, creativity, and drive to another nation, robbing their own country of its most valuable resource: human capital.

PF produces annual scores representing the levels of political rights and civil liberties in each state and territory, on a scale from 1 (most free) to 7 (least free). Depending on the ratings, the nations are then classified as "Free", "Partly Free", or "Not Free".

TO = Trade openness refers to the orientation of a country's economy in the context of international trade. It refers to how open and flexible the host country is to foreign investors for international trade. The degree of openness is determined by the actual magnitude of an economy's registered imports and exports, which is computed as the ratio of a country's total exports and imports to its national income (GDP). Research on economic growth has widely exploited trade openness as a primary driver of growth performance (Artelaris, 2007). Economic growth is influenced by openness in numerous ways, including the use of comparative advantages, technology transfer and information dissemination, increased scale economies, and exposure to competition. It has been discovered that economies with more open trade and capital flows have greater GDP per capita and expand more quickly. Openness to trade influence human development by improving access to products and services, increasing income, and capturing the impact of globalization on human capital development via knowledge transfer and increased demand for skilled labor.

ODA = Net official development assistance consists of disbursements of loans made on concessional terms (net of repayments of principal) and grants by official agencies of the members of the Development Assistance Committee (DAC), by multilateral institutions, and by non-DAC countries to promote economic development and welfare in countries and territories in the DAC list of ODA recipients. It includes loans with a grant element of at least 25 percent (calculated at a rate of discount of 10 percent).

ODA is primarily used to improve access to water, healthcare, and high-quality education; to protect biodiversity; and to combat climate change; all of which are critical goals for both developing-country populations and international stability. ODA may be utilized to improve a country's human capital, production, and export capacity, resulting in increased output growth and domestic resource mobilization. It may also be utilized to improve food security and assist education, health, and public infrastructure development, as well as agricultural and rural development. Despite the growing importance of foreign private flows, official development assistance (ODA) remains a substantial source of external finance for many developing nations (Wambugu & Adem, 2008).

CO_2 = Carbon dioxide emissions are those stemming from the burning of fossil fuels and the manufacture of cement. They include carbon dioxide produced during consumption of solid, liquid, and gas fuels and gas flaring, which do not account for emissions embedded in traded goods (consumption-based emissions). Annual production-based emissions of carbon dioxide

(CO2), measured in kiloton. Environmental degradation has a causal impact on economic growth, and a prolonged rise in CO2 emissions may have a negative externality on the economy by hurting human health and lowering productivity over time. CO2 emissions cause environmental deterioration, which in turn impacts human health by increasing respiratory illness when smog and air pollution levels rise. Afolayan et al. (2020) aforementioned explanation also yielded consistent results.

INL = income equality is used to measure the Percentage share of income or consumption of the share that accrues to subgroups of population. Income share of the bottom 50% have taken as measure of income equality. Its value ranges between 0 and 1and lowest value indicate greater inequality. According to Stiglitz (2012), inequality slows economic development and decreases aggregate demand for those at the bottom, so they spend a larger share of their income than those at the top; the poor frequently need to spend all of their wages just to get by. Furthermore, governmental reactions to weak demand can be detrimental to the economy. Imperfect capital markets, demand for redistribution and socio-political instability are all mentioned as potential factors for a negative relationship between income inequality and economic development in the theoretical literature. If there is no functional credit market, investments will be based on an individual's own earnings and assets. As a result, the impoverished may not make any or adequate investments to improve their human capital. It can make difficult for the poor to educate their children, start enterprises, or purchase insurance. These obstacles restrict the country from realizing its full economic potential, which might have been realized if wealth was distributed more evenly.

EMP = Creating jobs (employment) is a keystone of any economic recovery program. Many activities can fall under the rubric of job creation, including immediate short-term opportunities that yield quick impact, or the development of more enduring livelihoods in the civil service or private sector. Providing jobs is vital on many levels. Politically, employment opportunities give the population a stake in the peace process by providing young men and women with alternatives to violence. Economically, employment provides income to poor families, revives domestic demand for goods and services, and stimulates overall growth. Socially, employment can also promote social healing, encourage the return of displaced persons, and improve social welfare in the long run.

Table 3.1: Summary of Characteristics of Variables

Variable Name	Variable Coding	Source Of Data	Measurement Of Variables	Expected Impact On	
				Economic Growth	Human Capital
Economic growth	GDP	NBE	Birr	Positive	Positive
Human capital formation	HC	Penn world table	Human capital index	Positive	Positive
Gross capital formation	GCF	NBE	Birr	Positive	Positive
Trade openness	TO	NBE	Size of imports & exports in birr	Positive	Positive
Net official development assistance	ODA	World bank	U.S. dollars	Positive	Positive
Political freedom	PF	World bank	Political freedom index	Positive	Positive
CO_2 emission	CO_2	Global Carbon Project	Kiloton	Negative	Negative
Income equality	INL	World bank	Percentage	Positive	Positive
Employment	EMP	World bank	Employed labor	Positive	Positive

3.6. Diagnostic Tests

3.6.1. Pre-estimation Tests

A, Stationery Test

The majority of economic time series variables are non-stationary, and using non-stationary time series results in misleading regression that can't be utilized to make accurate decisions. The mean, variance, and auto-covariance of a variable are considered to be stationary if they remain constant regardless of where we measure them. The Augmented Dickey-Fuller (ADF) test will be used in this research. The ADF test equation is specified below as follows:

$$\Delta Y_t = \alpha + \delta_t + \gamma Y_{t-1} + \sum_{i=1}^{p} \Delta Yt - 1 + \varepsilon_t$$

Where Yt is a time series variable under consideration in this model at time t, and t is a time trend variable; Δ represents the first difference operator; ε_t is the error term; and p is the appropriate lag length of each variable selected so that first-differenced terms produce

ε_t white noise. As a result, the ADF tests the null hypothesis that there is no unit root (stationary).

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

The null hypothesis (i.e., H_0) cannot be rejected if the t-statistic in absolute value is larger than the critical values, and the conclusion is that the series is stationary.

B, Determination of Optimal Lag Length

Because ARDL co-integration analysis is sensitive to the number of lags included in the model, the next step after the stationary test is to identify the ideal lag length option. In general, it appears that too few delays in the model lead to too easy rejection of the null hypotheses, whereas too many lags in the model reduce the test's power. This suggests that there is an ideal lag length. The Akaiki Information Criterion (AIC) was considered.

C, Co-integration Test

The statistical feature of co-integration defines the long-run interdependence of economic time series. The long-run link between economic growth and human capital will be investigated using the ARDL bound test. The test provides F-statistics along with upper bound and lower bound critical values at 1%, 2.5%, 5% and 10%. According to the test, three cases should be considered so as to accept or reject the null hypothesis which estates no long run relationship exists. The first case is where F-statistic is less than lower bound critical value the null hypothesis should be accepted. The second case is where the F-statistics is above the upper critical bounds the null hypothesis should be rejected. As to another possibility, if the F-statistics found in between the lower and upper bound critical values, the test result is inconclusive.

D, Granger Causality Test

The Granger causality technique will be used to examine the patterns of the causal links between variables (Granger, 1969). The Granger causality test is a statistical hypothesis test used to see if one time series may be used to foretell another. If the previous values of a variable (y) significantly help in forecasting the future value of another variable (x), then y is said to be the Granger cause of x.

3.6.2. Post Estimation Tests

Post-estimation diagnostic tests are important to confirm the basic assumptions of the residual and the validity of the results. This includes the following tests:

A, Autocorrelation test

It's a good idea to check that the model's disturbances aren't auto-correlated. If the disturbances are auto-correlated, it indicates that certain variables are missing. The Durbin Watson d-statistics test for serial correlation is used in this investigation.

B, Omitted variable test

Ramsey RESET test is used to test variables omission or model fit.

C, Heteroscedasticity Test

The existence of heteroscedasticity is checked by Breusch-Pagan test.

D, Stability Test

The goal of stability testing is to show how a variable changes over time under the impact of a number of determining variables. CUSUM and CUSUMQ tests are used to ensure parameter stability. The cumulative sum of recursive residuals is used in the CUSUM test, which is updated recursively and shown against the break points. The CUSUMQ test, on the other hand, is based on squared residuals and follows the same technique as the CUSUM test. If the CUSUM statistics are within 5% of the significance threshold, the estimated coefficient is said to be stable.

CHAPTER FOUR

RESULT AND DISCUSSION

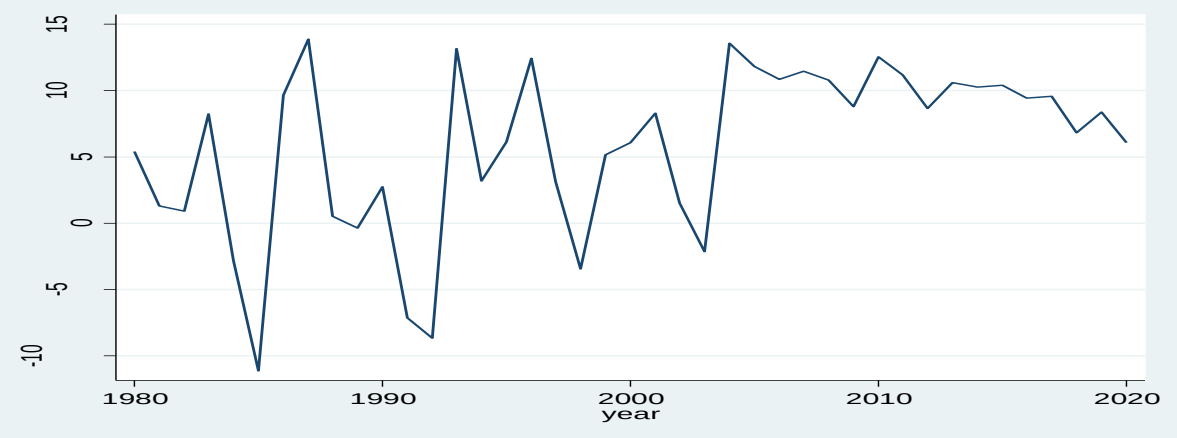
The general objective of this paper is to analyze the nexus between human capital and economic growth in Ethiopia. In line with this the study aims to assess the trend of human capital formation and trend of economic growth of Ethiopia.

4.1. Descriptive Analysis

4.1.1. Trends of Economic Growth

Ethiopia's economic growth is often characterized by varied, irregular, and averagely low performance, with both positive and negative real GDP growth rates. This indicates that it has been shifting back and forth due to various circumstances. Ethiopia's fundamental difficulty is unpredictable growth, which is compounded by the lowest living standards. Thus Ethiopia has no assurance that it will not suffer the challenges that it has had in the past three regimes in terms of economic growth until these issues are resolved as the growth trends that the country has seen over the previous four decades support this assertion. In comparison to previous decades, Ethiopia's economy has performed well in the last decade. Some argue, however, that even at this rate of growth, a small country like Ethiopia will not be able to meet its stated goals of entering the middle income countries and, more importantly, lifting its people out of poverty.

Figure 4.1: Trends of RGDP in Ethiopia from 1980 - 2020



Source: Own Calculation based on NBE Data using Stata14, 2023

The RGDP growth rate is used as a proxy for economic growth rate. Since 1980, Ethiopia's economic growth has been uneven (see Figure 4.1). From 1980 through 1992, there was little economic growth, but things began to change in 1993 (1993 to 2001). However, the rate of economic growth decreased from 2002 to 2003 before rebounding from 2004 to 2015. It marginally decreased from 2016 to 2020 compared to 2004 to 2015.

The economy suffered from a downturn from 1980 to 1992, with the exception of the years 1982/83 and 1986/87, and GDP growth decreased as a result of the drought in 1984-85, which resulted in widespread famine (Wubneh, 1993). Additionally, there were 17 years of civil war and brutal political repression under the Derg regime, which lasted until 1991. Between the middle of the 1970s and the beginning of the 1990s, Ethiopia fought many wars against Somalia and Eritrea. Since 1991, the Ethiopian government has been implementing an economic reform program that includes privatizing state-owned businesses, streamlining administrative rules, and significantly lowering tariff rates, which fell from 79 percent in 1993 to 20 percent by 1998 (Bigsten et al., 2016). While the process is still ongoing, the reforms have attracted much-needed foreign direct investment (Seid et al., 2016).

Since 1991, a strategy known as "agricultural development led industrialization" (ADLI) has been used. The government also started programs in the early 2000s that involved significant public funding for infrastructure, educational institutions, and healthcare facilities. The policy produced an economy that grew quickly and steadily, reduced poverty significantly, improved health outcomes, and increased educational participation. In the previous period (1992–2002), economic growth was insufficient to reduce widespread poverty, maintain pace with population expansion, and achieve structural transformation. Due to this, notably from the PASDEP period (2005/06–2009/10), the policy emphasis switched from ADLI to encompass the industrial and urban sectors. During this time, the government made large investments in infrastructure and promoted FDI with a variety of incentives, such as tax breaks and the development of industrial parks. Throughout the GTP I phase (2010–2015) and the early stages of the GTP II period (2015–2020), the government increased its infrastructure expenditure. As a result of the buildup of debt and consequent macroeconomic instability, the policy of the government has changed since 2019 towards ensuring macroeconomic stability. Apart from the economic policy change, the period (2003-2018) was characterized by relative political stability and the absence of significant weather shocks. The economy grew quickly and steadily throughout this time with less instability. The

average GDP growth rate was 9.6% which was mainly driven by large public investments that are mainly financed through foreign borrowing (Telaye, 2021).

Ethiopia has experienced rising instability and anti-government demonstrations in recent years. Since late 2015, there have been protracted economic slowdowns. More importantly, RGDP growth slowed in 2019-20 and further in 2020-21 as a result of COVID-19 and the rise in violence, notably in the North after November 2020, having a significant negative impact on lives, livelihoods, and infrastructure.

4.1.2. Trend of Human Capital

The index of human capital is used as a HC proxy. The HCI values are said to represent future worker productivity when compared to a baseline of complete standard education and good health. The HCI is made up of: Survival (under-5 mortality rates), expected years of Quality-Adjusted School and health environment (adult survival rates and the rate of stunting for children under age 5).

HC in Ethiopia has been growing unevenly since 1980 (see Figure 4.2). From 1980 to 1990 and 2001 to 2010 growth rate of HC was recorded lower. However, the higher growth rate was recorded from 1991 to 2000 and from 2011 to 2019, but in 2020 it fell.

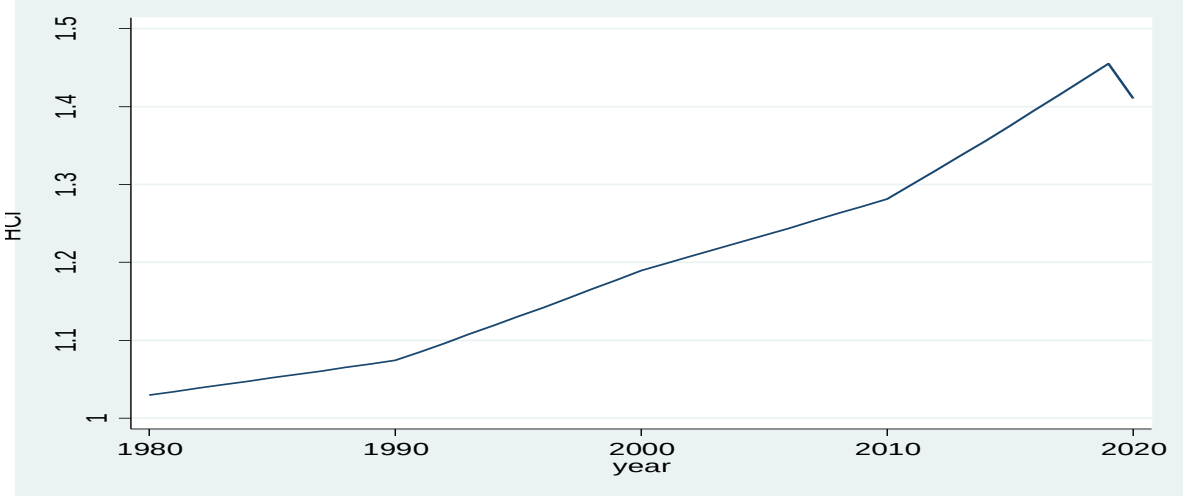
Under the Derg regime there were 17 years of civil war and violent political persecution until 1991, which were the main causes of these fluctuations. According to some estimates, Ethiopia lost up to 75% of its trained workers during the Derg regime as a result of the professionals and intellectuals fleeing the nation to avoid persecution and bloodshed (Stefan, 2018). On the other hand there was favorable education policy change. One of the first policy changes was the right of every citizen to free primary education with the general idea of education for the masses. Following the national literacy campaign that began in early 1975 primary schooling expanded with national enrollment reaching 34.1%. Generally throughout the Derg regime, civil war, severe drought and famine had negative effect on educational improvements that had been achieved.

In the years following the Derg regime's fall in 1991, Ethiopia's educational system grew quickly. The number of elementary schools tripled from 11,000 in 1996 to 32,048 in 2014, and the number of students enrolled in these schools increased from less than 3 million to more than 18 million. These trends can be seen in the net enrollment rate (NER) in

elementary education, which increased from 29% in 1989 to 86% in 2015. The NER in upper secondary education increased from 16% in 1999 to 26% in 2015 and 18,000 students were enrolled in just three public universities, 16 colleges, and six research institutes. There are now more than 40 state universities, and the private sector is expanding. The total number of tertiary students across public and private institutions increased dramatically from 34,000 in 1991 to 757,000 in 2014 (Stefan, 2018). Additionally, Ethiopia's government has significantly boosted its investment in education in recent years, tripling its public education spending from 21.6 billion Ethiopian Birr in 2009/10 to 67.9 billion Birr in 2015/16. The enhancement of HC between 2011 and 2019 is influenced by the improvement in the education sector and other relevant favorable circumstances.

Additionally in 1993, the Ethiopian government produced the first health policy in the nation, attempting to restructure the way health services are provided. The primary goals of this program are to expand the primary healthcare system, to decentralize fiscal and political power, and to foster partnerships and non-governmental actor engagement. Following this between 1996-1997 and 2001-2002, the total number of facilities in Ethiopia increased by 55% as a result of the expansion of health facilities, which also resulted in an increase in HC (Wamai, 2009). The fact that the projected healthy life expectancy at birth has grown from as low as 45 years in 1990 to 64.8 years in 2016 indicates that the health sector has also had success (WHO, 2018). More importantly, HCD slowed in 2019-20 and further in 2020-21 as a result of COVID-19 and the rise in violence, notably in the North after November 2020, having a significant negative impact on lives, livelihoods, and infrastructure.

Figure 4.2: Trends of Human Capital index in Ethiopia from 1980 - 2020



Source: Own Calculation based on Penn World Data Table using Stata14, 2023

The trends of control variables i.e. income equality, gross capital formation, trade openness, political freedom, carbon emission, employment and official development assistance are attached on the appendixC1.

4.2. Econometric Analysis

4.2.1. Pre-estimation Tests Result

4.2.1.1. Stationery Test

The level of integration is assessed using a unit root test based on the Augmented Dickey-Fuller (ADF) test. Additionally, while employing the ARDL model, none of the variables included in the regression should be of order 2. A unit root test is run to confirm these conditions prior to performing any action. Although per-testing variables are not necessary for the ARDL framework, using the unit root test can help determine whether it should be used. As shown in Table 4.1, I(0) and I(1) can be combined, but order two is missing.

Table 4.1: Stationery Test (Augmented Dickey-Fuller Test)

Variables	Augmented Dickey-Fuller test with drift				Stationarity Status
	Level		First Difference		
	ADF	P-value	ADF	P-value	
lnRGDP	1.486	0.9265	-2.299	0.0142	(I_1)
HCI	-0.670	0.2538	-2.031	0.0252	(I_1)
lnGCF	1.291	0.8977	-3.435	0.0008	(I_1)
lnODA	-1.392	0.0868	-3.048	0.0023	(I_1)
$lnCO_2$	-0.305	0.3810	-3.278	0.0013	(I_1)
lnTO	-0.296	0.3846	-2.722	0.0053	(I_1)
lnPF	-1.679	0.0515	-2.780	0.0046	(I_1)
lnEMP	-0.131	0.4485	-1.928	0.0313	(I_1)
lnINL	-1.959	0.0294	-	-	(I_0)
GRGDP	-2.272	0.0151	-	-	(I_0)
GGCF	-3.156	0.0018	-	-	(I_0)
GODA	-3.032	0.0024	-	-	(I_0)
GCO2	-3.258	0.0014	-	-	(I_0)
GTO	-2.859	0.0038	-	-	(I_0)
GPF	-2.968	0.0029	-	-	(I_0)
GINL	-3.075	0.0022	-	-	(I_0)
GEMP	-1.943	0.0303	-	-	(I_0)

Source: Own Calculation using Stata14, 2023

As we have seen from the table income equality and all the growth form of the variables are stationary at level (I_0) while gross domestic product, human capital index, gross capital formation, trade openness, political freedom, carbon emission, employment and official development assistance are stationary at first difference (integrated of order one). So we may deduce from the table that none of the variables entered into the regression are of order two, which is undesirable when using the ARDL model. As a result, the ARDL co-integration methodology is the most suitable way for estimating or checking the long-term relationship among the variables.

4.2.1.2. Optimal Lag Selection Results

The optimal lag order is determined by varsoc test with the Akaiki Information Criterion (AIC) with maximum lag of 3. AIC selected due to the following reasons; as rule of thumb choosing information criteria with the lowest value is recommended. In line with this the results of optimal lag selection in this study shows that AIC value is lower than values presented in other Information Criteria. In addition to this, the study have used AIC because it is a better choice for smaller sample size data as this study.

Table 4.2: Results of Optimal Lag Selection when RGDP is Dependent Variable

Lag	P-value	AIC	HQIC	SBIC
0		-5.20285	-5.08006	-4.85454
1	0.000	-17.4066	-16.3015	-14.2719
2	0.000	-20.1685	-18.081	-14.2472
3	0.000	-23.1836*	-20.1137*	-14.4759*

Endogenous: lnRGDP, lnGCF, GEMP, HCI, lnTO, lnPF, lnCO2, lnINL

Exogenous: _cons

Source: Own Calculation using Stata14, 2023

Table 4.3 Results of Optimal Lag Selection when HCI is Dependent Variable

Lag	P-value	AIC	HQIC	SBIC
0		20.3833	20.5061	20.7316
1	0.000	11.5899	12.6951	14.7247
2	0.000	10.6027	12.6902	16.5239
3	0.000	5.99913*	9.06899*	14.7068*

Endogenous: HCI, lnRGDP, GGCF, lnODA, GTO, PF, lnCO2, GINL

Exogenous: _cons

Source: Own Calculation using Stata14, 2023

The optimal lag order determined by varsoc test with the Akaiki Information Criterion (AIC) for both economic growth and human capital model is maximum lag of 3.

4.2.1.3. Co-integration Test

Table 4.4: Bounds Test Result when RGDP is Dependent Variable

F-bounds test Null hypothesis: No levels relationship

Test Statistic	Value	Level of Significant (%)	I(0)	I(1)
F-statistic	15.906	10	2.03	3.13
K	7.000	5	2.32	3.50
		2.5	2.60	3.84
		1	2.96	4.26

Source: Own Calculation using Stata14, 2023

Table 4.5: Bounds Test Result when HCI is Dependent Variable

F-bounds test Null hypothesis: No levels relationship

Test Statistic	Value	Level of Significant (%)	I(0)	I(1)
F-statistic	4.145	10	2.03	3.13
K	7.000	5	2.32	3.50
		2.5	2.60	3.84
		1	2.96	4.26

Source: Own Calculation using Stata14, 2023

According to the aforementioned finding, the F-statistic is larger than the upper and lower bond values. This suggests that the alternative hypothesis that there is a long-run relationship should be accepted rather than the null hypothesis, according to which there is no relationship between the variables over the long term. As people's enhanced capacities absorb technical developments, investing in education and skills may be just as significant as investing in machinery and plants in generating growth, human capital is a vital source of development. Investing in human capital is particularly enticing since it leads to enhanced human development while also assisting in growth. To stimulate and sustain economic growth, a diverse set of labor skills is required, including education at all levels, from elementary schools to universities, as well as technical and vocational training and learning by doing. High levels of economic growth also result in more income per capita and wealth, allowing a country to earn more cash that may be used to fund human capital development initiatives. As a result, this investment has a favorable impact on the development of human capital.

4.2.1.4. Granger Causality Test when RGDP and HCI are Independent Variable

A granger causality test is made to identify the direction of causality between the dependent variable (RGDP and HCI) and independent variables such as real GDP, human capital, official development assistance, trade openness, political freedom, carbon emission, income equality, employment and gross capital formation.

Granger Causality test results when RGDP is dependent variable

Granger causality test revealed that carbon emission, human capital, trade openness and income equality individually granger cause the real GDP and then gross capital formation, employment, trade openness, political freedom, carbon emission, income equality and human capital are jointly granger causes real GDP. Then again carbon emission and human capital individually granger causes gross capital formation and then real GDP, employment, trade openness, political freedom, carbon emission, income equality and human capital are jointly granger causes gross capital formation. Moreover, real GDP, human capital, trade openness, political freedom, carbon emission, income equality and gross capital formation are jointly granger causes employment however, all variables except that of gross capital formation, trade openness and carbon emission does not individually granger cause employment. Furthermore real GDP, trade openness, political freedom, carbon emission, income equality, employment and gross capital formation are jointly granger causes human capital and trade openness, real GDP, gross capital formation and employment individually granger cause human capital.

Real GDP, human capital, political freedom, carbon emission, income equality, employment and gross capital formation are jointly does not granger causes trade openness. However, employment and political freedom individually granger causes trade openness. Real GDP, human capital, trade openness, carbon emission, income equality, employment and gross capital formation are jointly granger causes political freedom. Too only income equality individually granger causes political freedom. In addition real GDP, human capital, trade openness, political freedom, income equality, employment and gross capital formation are jointly granger causes carbon emission likewise real GDP, trade openness, gross capital formation, income equality and political freedom individually granger causes carbon emission. Finally all variables including real GDP, human capital, trade openness, political freedom, carbon emission, employment and gross capital formation granger cause income

equality both jointly and individually but carbon emission does not individually granger cause income equality.

Granger Causality test results when HCI dependent variable

All variable including real GDP, official development assistance, trade openness, political freedom, carbon emission, income equality and gross capital formation granger cause human capital both jointly and individually. In the same way all variables including real GDP, official development assistance, trade openness, political freedom, carbon emission, income equality and human capital granger cause gross capital formation both jointly and individually. As well as all variables including real GDP, official development assistance, trade openness, political freedom, carbon emission, human capital and gross capital formation granger cause income equality both jointly and individually.

All variables including official development assistance, human capital, trade openness, political freedom, carbon emission, income equality and gross capital formation jointly and individually granger cause real GDP. Real GDP, human capital, trade openness, political freedom, carbon emission, income equality and gross capital formation jointly and individually granger cause official development assistance. While for trade openness; real GDP, human capital, official development assistance, political freedom, carbon emission, income equality and gross capital formation jointly and individually granger cause trade openness. Real GDP, human capital, official development assistance, trade openness, carbon emission, income equality and gross capital formation jointly and individually granger cause political freedom. Finally, political freedom, real GDP, human capital, official development assistance, trade openness, income equality and gross capital formation jointly and individually granger cause carbon emission.

4.2.2. Post Estimation Diagnostic Test

The study used Ramsey RESET test to test variables omission or model fit. Based on the test results the null hypothesis is accepted this is because the p-value was unable to reject the null hypothesis specified for the test, for the reason that that the p-values associated with test statistic is greater than the standard significant level (i.e. 0.4221> 0.05). Therefore, the model has no variables omission problem. Therefore, it is best fit model. The existence of heteroscedasticity is checked by Breusch-Pagan test. The result reveals that there is no heteroscedasticity problem, for the reason that that the p-values associated with test statistic is

greater than the standard significant level (i.e. 0.6959> 0.05). Finally, serial correlation tested by using Durbin Watson d-statistics. In Durbin Watson d-statistics, d-statistics value near to zero implies positive serial correlation, d-statistics near to two implies no serial correlation and d-statistics near to four implies negative serial correlation. Accordingly, the study accepted null hypothesis that is there is no serial correlation, for the reason that the d-statistics associated with test is 2.614. Moreover CUSUM statistics are within 5% of the significance threshold so the stability test confirmed that the model is stable.

Table 4.6: Long run Diagnostic Tests

Test	**Hypothesis**	**F/Chi2/dstats**	**P-value**
Ramsey RESET test: Functional form of Model	H_o: Model has no omitted variables H_1: Model has omitted variables	$F_{(3,19)} = 0.98$	0.4221
Breusch-Pagan test: Heteroskedasticity	H_o: Constant variance H_1: Not constant variance	$chi2_{(1)} = 0.15$	0.6959
Durbin Watson d-statistics	H_o: no autocorrelation H_1: autocorrelation	$dstats_{(16,38)}$= 2.614	

Source: Own Calculation using Stata14, 2023

4.2.3 Long Run ARDL Model Estimation

The result indicates us the existence of a long-run relationship among RGDP, employment, human capital index, gross capital formation, trade openness, income equality, political freedoms and CO_2 emission. After confirming the existence of long-run co-integration relationship among the variables, the estimated long-run relationships between the variables are estimated and the estimated coefficients are reported in table 4.7 below.

Table 4.7: Long run Estimation Result using the ARDL selected based on AIC when RGDP is dependent variable

Dependent Variable: lnRGDP

Variables	**Coefficients**	**S. E**	**T-ratio**	**P-value**
L_3.lnRGDP	0 .2468	0. 1160	2.13	0.055*
LnGCF	-0.0218	0.0335	-0.65	0.527
GEMP	-0.0086	0.0049	-1.76	0.103
HCI	12.5418	2.9692	4.22	0.001***
LnTO	0.1800	0.0476	3.78	0.003***
LnPF	0.1080	0.0733	1.47	0.166
lnCO2	0.1999	0.0477	4.18	0.001***

LnINL	-0.5397	0.2002	-2.70	0.019 **
Constant	1.7510	0.7347	2.38	0.035**
F stast = 2875.42		R-squared = 0.9998		
Prob > F = 0.0000		Adj R-squared = 0.9995		

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

Source: Own Calculation using Stata14, 2023

The long run estimated model presented as follow with figures including the coefficient and standard error

$lnRGDP = 1.75+0.247L_3.lnRGDP+12.54HCI+0.18lnTO+0.199lnCO2-0.539lnINL$

(0.735) (0.116) (2.969) (0.048) (0.048) (0.2)

The long-run coefficients of lag of real GDP, human capital index and trade openness are in a way of thinking with theory and are also statistically significant but income equality and carbon emission revealed unexpected negative and positive significant impact on real GDP respectively.

Lag of real GDP has statistically significant positive long run impact on the current economic growth at 10 percent significance level. As a result a one percent increase in the lag of real GDP has resulted in 0.247 percent improvement in current real GDP on average citrus paribus.

At a 1% significance level, human capital has a statistically significant positive long-run influence on the growth of the Ethiopian economy. Therefore, over the long run, if the level of human capital rises by one unit real GDP rises by 12.54 percent on average, citrus paribus.

The results of this study's analysis of the long-term beneficial effects of human capital on Ethiopian economic growth are in line with those of Borojo & Yushi (2015), Mekonnen (2017), Negash & Federici (2019), Sisay (2019) and the endogenous growth theories (mainly advocated and/or developed by Lucas (1988), Romer (1990)) which argue that improvement in human capital leads to productivity improvement that enhances output. According to the theoretical literature, developing human capital is a fundamental goal of development and an important end in itself as human capital plays a vital role in the ability of a developing nation to absorb contemporary technologies and build the capability for self-sustaining growth and development. It plays dual function as both an input and an output (Todaro, 2012). The main difference between developed and developing nations is the rate of growth in human capital,

which is a source of both greater productivity and technical innovation. Developing nations require human capital to staff new and increasing government services, implement innovative land use and agricultural practices, create innovative communication channels, advance industrialization, and establish educational institutions. Investing in labor has a history of improving employment conditions in economies all across the world. When the employment market is doing well consumers spending also increases, which boosts corporate income and new investment (Nickolas, 2021).

Generally the positive impact of human capital on Ethiopian economic growth are presented through its favorable impact on productivity improvement, technical innovation, absorption of contemporary technologies, building the capability for self-sustaining growth, and improving employment conditions.

Openness has statistically significant positive long run impact on the Ethiopian economic growth at 1 percent significance level. A one percent improvement in a country's level of exposure to international trade increases its economic growth by 0.18 percent on average citrus paribus in the long run.

The results of this study's investigation into the long-term benefits of openness to Ethiopia's economic development are in line with the priori predictions and findings of Bedasa & Alemu (2017), and Debel (2004) which discovered a strong correlation between trade liberalization and economic growth. More open nations are better positioned to take advantage of market possibilities by diversifying and differentiating their products, by efficiently allocating resources, by promoting the transmission of knowledge and technology through the direct import of high-tech items (Almeida & Fernandes, 2008). Likewise trade makes it easier to connect to the sources of innovation and increases the benefits from foreign direct investment. Trade openness also enlarges the market, enabling economies to better reap the potential advantages of increasing returns to scale and economies of specialization (Alesina et al., 2000). Grossman & Helpman (1993) demonstrate in their theoretical models how trade openness promotes the transfer of new technologies, promoting technological advancement and productivity growth, and how these advantages rely on the level of economic openness. The long-term effects of trade liberalization policies are anticipated to transfer resources away from import substitutes and into tradable goods, particularly exportable goods. In addition to this Rajan & Zingales (2003) note that under the strain of

international competition, trade liberalization can also compel governments to commit to reform initiatives, thus boosting economic growth.

Trade fosters economic incentives that raise productivity through two dynamics: first, it reduces resource misallocation in the short term, and second, it allows the transfer of technical advancement over the long run. Therefore, trade liberalization has frequently been put into practice in developing nations with the hope of boosting GDP.

Carbon emission has shown positive and statistically significant long run impact on the Ethiopian economic growth at 1 percent significance level. A one percent increase in a country's level of carbon emission is associated with 0.199 percent increase in economic growth on average citrus paribus in the long run.

The result implies that carbon emissions cause economic growth and the relationship is positive as the development of transportation, industry, and power generation, which are back bone of the economy, increase carbon emissions. This is consistent with the findings of Menyah & Wolde-Rufael (2010) who found that carbon emissions increase economic growth but finding of this study is inconsistent with the priori expectations. The largest source of carbon emissions comes from burning coal. At world level, United States, China, Russia, Germany, and the United Kingdom, in that order, are the nations that emit the most carbon dioxide (United State Environmental Protection Agency, 2022). As well, the United States, China, Japan, Germany, and the United Kingdom are the top five nations by GDP in 2022 World Bank (2022), which implies the existence of positive relationship between carbon emissions and economic growth internationally. When we come to our country, Ethiopia is the third largest CO_2 emitter in East Africa and at the same time Ethiopia has emerged as one of the fastest-growing economies in Africa in the early twenty-first century. The country is witnessing rapid urbanization and industrialization along with the growing economy which requires higher energy consumption with high levels of CO_2 emissions (Taka et al., 2020). This explains why this study's findings about the relationship between carbon emissions and economic growth are favorable.

As a result, we may draw the conclusion that increased carbon emissions are a sign of industrial production and rising urbanization, both of which are key drivers of economic expansion. Most often, nations that do best in terms of economic growth are the top carbon polluters.

In addition income equality has statistically significant negative long run impact on the Ethiopian economic growth at 5 percent significance level. The result shows that a one percent increase in a country's level of income equality is related with 0.539 percent decline in economic growth on average citrus paribus.

The findings of this research are consistent with the founding of (Bourguignon, 1981), (Kaldor, 1955) and (Lewis, 1954). Aghion et al. (1999) summarizes three points why inequality has been seen to have a positive effect on growth. The first argument is the hypothesis of marginal propensity to save of the rich people is greater than that of the poor people. When the investment rate is positively related to the savings rate, and investment and growth are positively correlated, more unequal economies are grow faster. Second, in the separate investment and large sunk costs, the concentration of wealth is an important for the creation of new activities. The third argument is that the trade-off between equity and efficiency through incentives to workers. If output depends on the work effort of agents and an equal distribution of wages might discourage them from making any additional effort and thus reduce the efficiency of the production system. Correspondingly Galor (2000) suggested that the relationship between income inequality and growth depends on the stage of economic development or industrialization. During the initial stages of economic development, physical capital accumulation is a major engine of economic growth. High initial income inequality stimulates high aggregate savings that, results in increase physical capital accumulation. Physical capital then stimulates the process of economic expansion. Therefore, income inequality increases economic growth by channeling resources towards individuals with a higher propensity to save. At later stages of economic growth, human capital accumulation replaces the accumulation of physical capital as the major engine of growth, due to capital-skill complementarities. During the economic process, the increased availability of physical capital raises the return on investment in human capital.

Generally income inequality is good for economic growth; first, due to the existences of greater marginal propensity to save of the rich people than the poor income inequality stimulates high aggregate savings. Second, due to the existences of separate investment and large sunk costs. Thirdly due to the presences of trade-off between equity and efficiency income inequality is boost economic growth.

Table 4.8: Long run Estimation Result using the ARDL selected based on AIC when HCI is Dependent Variable

Dependent Variable: HCI

Variables	Coefficients	S. E	T-ratio	P-value
L_3.HCI	-0.8326974	1.294114	-0.64	0.544
LnRGDP	0.2463945	0.0816603	3.02	0.023**
GGCF	0.0001863	0.0000809	2.30	0.061*
LnODA	0.0136451	0.0176662	0.77	0.469
GTO	0.0003187	0.0001816	1.75	0.130
PF	-0.0216332	0.0061563	-3.51	0.013**
lnCO2	0.0249035	0.0269117	0.93	0.390
GINL	-0.00263	0.0009537	-2.76	0.033**
Constant	-1.296333	0.2670753	-4.85	0.003***
F stast = 528.55		R-squared = 0.9996		
Prob > F = 0.0000		Adj R-squared = 0.9977		

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

Source: Own Calculation using Stata14, 2023

The long run estimated model presented as follow with figures including the coefficient and standard error

HCI = -1.296 + 0.246lnRGDP + 0.002GGCF - 0.022PF - 0.003GINL

(0.267) (0.082) (0.000) (0.006) (0.001)

The long-run coefficients of real GDP, growth in gross capital formation, political freedom and growth in income equality are a way of thinking with theory and are also statistically significant that contribute to human capital during the study period.

Real GDP has positive and statistically significant long run impact on the human capital at 5 percent significance level. As a result a one percent increase in real GDP has resulted in 0.246 unit increases in the level of human capital on average citrus paribus in the long run.

The findings of this research are consistent with the theory, the priori expectation and the founding of (Bareke, et al., 2021), (Mohamed & Anis, 2019), (Amassoma & Ephraim, 2016), (Tang, 2011) and (Amiria & Gerdtham, 2013). A stable macroeconomic environment as represented by economic growth exerts a positive influence on HCD since a sustained increase in national income translates to an improvement in per capita income as a result, there are lots of chances for capacity building and training or high rates of economic growth increase wealth and income per capita, enabling a nation to generate more revenue to support

human capital development programs (Shuaibu & Oladayo, 2016). According to research by Chevalier (2011), parents' income has the greatest impact on educational expenditure, and as per capita income rises, parents increase their investment in their children's education. As a result, this investment has a favorable impact on the development of human capital. Furthermore economic growth has a strong effect on human capital outcomes, both through private expenditures and government programs. Thus, higher incomes facilitate the achievement of other crucial human development objectives; it also has an indirect effect on human development (Jajri & Ismai, 2012). In a growing economy, companies take on additional borrowing from banks to expand production due to higher consumer demand. The loan proceeds are usually used for large purchases of assets such as manufacturing plants and equipment. The added production also leads to higher wages and increased employment as more workers are needed for the increase in consumer demand for a company's products. As companies look to hire workers to help with the increase in sales, it leads to new job openings in various types of employment. However, if the labor market becomes too tight, due to an expanding economy, companies are forced to train workers for the skillsets needed since there aren't enough available skilled workers, which is helpful for the development of human capital. So consumer spending and business investment play a prominent role in determining the level of training and development of workers. The process of educating a workforce is a type of investment in human capital (Nickolas, 2021).

Gross capital formation has positive and statistically significant long run impact on the human capital at 10 percent significance level. As a result a one unit increase in the growth rate of gross capital formation has resulted in 0.002 unit increases in the level of human capital on average citrus paribus in the long run.

The findings of this research are consistent with the priori expectation and the founding of (Mehrara & Musai, 2013). Gross fixed capital formation includes land improvements; plant, machinery, and equipment purchases; and the construction of roads, railways, schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings, which are very crucial to human capital development. Significant technology has been widely embodied in capital assets like plants and machines that aid in a country's technological advancement which enhance human capital. As people's enhanced capacities absorb technical developments, investments in education, skills, hospitals, machinery, and plants deliver human capital development. Moreover investments on fixed assets in the health sector

include hospital buildings, ambulances and medical imaging machines; medical equipment; transport equipment and ICT equipment and telecommunications are basic for health service development.

Usually, during the economic process, the increased availability of physical capital raises the return on investment in human capital. So gross capital formation is indispensable for the development of education (skills) and health service, which is major component of human capital development.

Political freedom has statistically significant negative long run impact on the human capital at 5 percent significance level. The result shows that when the level of political freedom increase by one unit the level of human capital decreases by 0.022 unit on average citrus paribus in the long run. The findings of this research are consistent with the expectation as political freedom index produces annual scores representing the levels of political rights and civil liberties in each state and territory, on a scale from 1 (most free) to 7 (least free).

Previous studies including Baum & Lake (2003), Feng (2003) and Ross (2006) report a positive significant impact of some proxy for democracy on various human capital indicators. There are a number of reasons why democratic societies could possess superior human capital over authoritarian ones. First of all, democracies will invest more in education. In line with this Brown & Hunter (2004) find a strong correlation between Latin American democracy and human capital creation. The second argument is that authoritarian governments may be threatened by an educated populace (Feng, 2003). Finally, greater government attention will be paid to education issues in democracies since failure to do so may result in politicians being removed from office (Ross, 2006). Regime's stability is the second political component. If the political climate is stable and hence more certain, it is probable that people and governments will be more inclined to invest in human capital. At the same time, political unrest can impair a nation's educational system. For instance, internal conflict and human capital have a considerable inverse connection, according to (Katona, 1980) and (Francis, 2007). Likewise, Maloney (2002) argues that the endemic political instability in Latin America may have been one of the major reasons why countries in the region have low levels of human capital. Cross-country variations in human capital may also be related to the efficiency of the government. A strong court system, for instance, is necessary for research and development to secure patents. Similarly, widespread corruption and an ineffective administration might distort the distribution of the education budget.

According to the theoretical model of Veira & Teixeira (2006), corruption lowers educational levels because a corrupt nation is less effective. Bhattacharyya (2009) reports a positive relationship between the rule of law indicator of the international country risk guide and the schooling data of (Barro & Lee, 2001).

From the previous explanation we can conclude that; stable, democratic and hence more certain political climate and also efficient government with strong court system initiate the people and governments to invest more in human capital and promotes human capital development.

Income equality has statistically significant negative long run impact on the human capital at 5 percent significance level. The result shows that a one unit increase in the growth rate of income equality is related with 0.003 unit declines in the level of human capital on average citrus paribus in the long run.

During the initial stages of economic development, physical capital accumulation is a major engine of economic growth. High initial income inequality stimulates high aggregate savings due to high marginal propensity to save for the rich, which result in increased physical capital accumulation. Physical capital then stimulates the process of economic development. Therefore, income inequality channels resources towards individuals with a higher propensity to save. At later stages of economic development, human capital accumulation replaces the accumulation of physical capital as the major engine of growth, due to capital-skill complementarities. So during the economic process, the increased availability of physical capital raises the return on investment in human capital (Galor, 2000).

As income inequality channels resources towards individuals with a higher propensity to save it stimulates high aggregate savings which raises investment in human capital. Therefore results of this study revealed that income equality is not decent for human capital developments.

4.2.4 Short Run Error Correction Model

After the growth and human capital equation's long run coefficients have been accepted, the short run Error Correction Model (ECM) is estimated. ECM denotes the rate of change necessary to bring the dynamic model back to equilibrium. It is one lag period residual

obtained from the estimated dynamic long run model. The coefficient of error correction term describes the rate at which variables converge to equilibrium.

Table 4.9: Error Correction Representation for the selected ARDL Model when RGDP is Dependent Variable

Dependent variable: lnRGDP

Variables	Coefficients	S. E	T-ratio	P-value
Adj.	-0.57916	0.1243783	-4.66	0.001***
ΔL_3.lnRGDP	-0.2468043	0. 1160918	-2.13	0.055
ΔlnGCF	-0.0218834	0.0335654	-0.65	0.527
ΔGEMP	0.008694	0.0049265	1.76	0.103
ΔHCI	-12.54185	2.969268	-4.22	0.001***
ΔlnTO	0.0754939	0.0290793	2.60	0.023**
ΔlnPF	-0.1080381	0.0733325	-1.47	0.166
ΔlnCO2	-0.1999158	0.0477973	-4.18	0.001***
ΔlnINL	0.5397703	0.2002771	2.70	0.019 **
Constant	1.751094	0.7347254	2.38	0.035**
R-squared = 0.9729				
Adj R-squared = 0.9187				

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

Source: Own Calculation using Stata14, 2023

The error correction coefficient, estimated at -0.579 is highly significant and has the correct negative sign. This shows that there is a high speed of adjustment to equilibrium. The highly significant error correction term (i.e. 57.9%) further confirms the existence of a stable long run relationship. It shows high speed of adjustment 57.9% per year towards long-run equilibrium. Therefore for adjustment 1.727 year is required. It means one year nine month and four day is required for adjustment.

The short-run coefficients of human capital index and carbon emission show negative significant impact while income equality and trade openness revealed positive significant impact on real GDP in the short run.

Human capital has statistically significant short run impact on the Ethiopian economic growth at 1 percent significance level. In the short run, when the level of the human capital rises by one unit, real GDP falls by 12.542 percent on average citrus paribus.

In the short run the human capital investment (investment in education) leads to increase in unemployment as jobs are not available for the newly-educated labor force in Ethiopia. On the other hand the increase in unemployment results in decline of real GDP growth. In addition to this in developing countries like Ethiopia investment in human capital and physical capital compete for limited resource, to increase human capital investment reducing investment in physical capital is obligatory. So the reductions of investments in physical capital retard economic growth.

From the result of the study we can conclude that the negative impact of human capital investment on economic growth is through its effect on increasing unemployment and reductions of investments in physical capital.

Openness has statistically significant positive short run impact on the Ethiopian economic growth at 5 percent significance level. A one percent improvement in a country's level of exposure to international trade increases its economic growth by 0.075 percent on average citrus paribus in the short run.

The results of this study's investigation into the short-term benefits of openness to Ethiopia's economic development are in line with the priori predictions and findings of Bedasa & Alemu (2017), and Debel (2004) which discovered a strong correlation between trade liberalization and economic growth. More open nations are better positioned to take advantage of market possibilities by diversifying and differentiating their products, by efficiently allocating resources, by promoting the transmission of knowledge and technology through the direct import of high-tech items (Almeida & Fernandes, 2008). Trade makes it easier to connect to the sources of innovation and increases the benefits from foreign direct investment. Trade openness also enlarges the market, enabling economies to better reap the potential advantages of increasing returns to scale and economies of specialization (Alesina et al., 2000). Moreover Rajan & Zingales (2003) note that under the strain of international competition, trade liberalization can also compel governments to commit to reform initiatives, thus boosting economic growth.

This consensus is predicated on the idea that trade fosters economic incentives that raise productivity through two dynamics: first, it reduces resource misallocation in the short term, and second, it allows the transfer of technical advancement over the long run. Therefore,

trade liberalization has frequently been put into practice in developing nations with the hope of boosting GDP.

Carbon emission has shown statistically significant negative short run impact on the Ethiopian economic growth at 1 percent significance level. A one percent increase in a country's level of carbon emission is associated with 0.199 percent decline in economic growth on average citrus paribus in the short run.

The findings of this research are consistent with the founding of (Mohamed & Anis, 2019) and (Afolayan et al., 2020). Carbon dioxide emission is the major source of global climate change (WB, 2010). Global warming, rainfall fluctuations, disease, decreased agricultural production, melt of ice, countries flooded, increased locusts reproduction, animal death, and migration are major indicators of climate change, which retards economic growth. Increasing climatic variability, manifesting itself as more frequent and erratic weather extremes, or weather shocks, will likely make poor households even more vulnerable. This, in turn, could exacerbate the incidence, severity, and persistence of poverty in Ethiopia as our country is developing countries.

Because agriculture in Ethiopia is predominantly rain-fed and the economy is dependent on primary commodities, any irregularities in weather and climate conditions may have adverse growth and welfare implications. As this irregularity is caused by carbon dioxide emission, its impact on economic growth of Ethiopia is adverse.

Income equality has positive and statistically significant short run impact on the Ethiopian economic growth at 5 percent significance level. The result shows that a one percent increase in a country's level of income equality is related with 0.539 percent increase in economic growth on average citrus paribus in the short run.

The findings of this research are consistent with findings of (Aghion et al., 1999), (Galor & Zeira, 1993) and (Galor & Zang, 1997). In line with this study, different academics have hypothesized that income disparity is detrimental to economic progress. Different pathways can be used by income disparity to negatively affect growth. Credit market imperfections are the first channel (Aghion et al., 1999) and (Galor & Zeira, 1993). Inequality lowers borrowers' motivation and investment prospects due to the imperfections in the loan market, which leads to macroeconomic instability. In general, an unfair income distribution under the initial circumstances will endure and be passed down to future generations when people have

uneven borrowing options. Since human capital is the foundation of economic growth, which is studied particularly via the investments made in human capital, it is inevitable that economic growth will be adversely affected by income inequality due to lower investment in human capital. Additionally, we may talk about it from the perspective of sociopolitical instability. The fundamental tenet is that social unrest will initially rise in response to rising economic disparity. Investment is harmed by this situation's rise in coups, revolutions, and violent actions, as well as by the threat it poses to people's property rights and to political unrest more generally. Economic growth will be hampered if investments decline as a result of deterioration in social peace and stability (Alesina & Perotti, 1996). It is also claimed that income inequality determines fertility rates and indirectly affects human capital investment and economic growth negatively. Economic development is predicted to slow in nations with high fertility rates due to declining capital per capita. Education level explains how income disparity and the fertility rate are related. While low-income families have more children and a lower investment in education, the opposite will happen for affluent families. As a result, it is claimed that rising birth rates in nations with significant wealth disparity will slow economic growth (Galor & Zang, 1997).

Generally, Income disparity is detrimental to economic progress of Ethiopia in the short run as the credit market is imperfect and as it leads to sociopolitical instability and low income families with high fertility rates.

Table 4.10: Error correction representation for the selected ARDL model when HCI is dependent variable

Dependent variable: HCI

Variables	**Coefficients**	**S. E**	**T-ratio**	**P-value**
Adj.	-0.9977577	0.2348258	-4.25	0.005***
ΔL_3.HCI	0.8326974	1.294114	0.64	0.544
ΔlnRGDP	-0.2463945	0.0816603	-3.02	0.023**
ΔGGCF	-0.0001863	0.0000809	-2.30	0.061*
ΔlnODA	-0.0136451	0.0176662	-1.75	0.130
ΔGTO	-0.0003187	0.0001816	2.60	0.023**
ΔPF	0.0216332	0.0061563	3.51	0.013**
ΔlnCO2	-0.0249035	0.0269117	-0.93	0.390
ΔGINL	0.00263	0.0009537	2.76	0.033**
Constant	-1.296333	0.2670753	-4.85	0.003***
R-squared = 0.9420				
Adj R-squared = 0.6520				

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

Source: Own Calculation using Stata14, 2023

The error correction coefficient, estimated at -0.998 is highly significant and has the correct negative sign. This shows that there is a high speed of adjustment to equilibrium. The highly significant error correction term further confirms the existence of a stable long run relationship. It shows very high speed of adjustment 99.8% per year towards long-run equilibrium. Therefore for adjustment 1.002 year is required. It means almost one year is required for adjustment.

Opposing to the long run result, the short-run coefficients of real GDP and growth in gross capital formations are negative and political freedom and growth in income equality have positive coefficient. But both in the long run and short run real GDP, growth in gross capital formations, political freedom and growth in income equality are statistically significant.

Real GDP has negative and statistically significant short run impact on the human capital at 5 percent significance level. As a result a one percent increase in real GDP has resulted in 0.246 unit decreases in the level of human capital on average citrus paribus in the short run.

Here we need to consider the role of institutional quality on human capital development. In Ethiopia institutional quality is low which retard human capital development even if there is economic growth. In addition to this during the initial stages of economic development, physical capital accumulation considered as a major engine of economic growth and in developing countries like Ethiopia investment on human capital and physical capital compete for limited resource, to increase investment in physical capital reducing human capital investment is obligatory. So the reductions of investments in human capital retard human capital development even if there is economic growth (Galor, 2000).

Therefore economic growth does not necessarily led to human capital development due to the existence of other unfavorable conditions like bad institution, government selection of priority area of investment and other.

Gross capital formation has negative and statistically significant short run impact on the human capital at 10 percent significance level. As a result a one unit increase in the growth

rate of Gross capital formation has resulted in 0.002 unit decreases in the level of human capital on average citrus paribus in the short run.

During the initial stages of economic development, physical capital accumulation considered as a major engine of economic growth and in developing countries like Ethiopia investment on human capital and physical capital compete for limited resource, to increase investment in physical capital reducing human capital investment is obligatory. So the reductions of investments in human capital retard human capital development (Galor, 2000).

Also Political freedom has statistically significant positive short run impact on the human capital at 5 percent significance level. The result shows that when the level of political freedom increases by one unit the level of human capital increases by 0.022 unit on average citrus paribus in the short run. Political freedom index produces annual scores representing the levels of political rights and civil liberties in each state and territory, on a scale from 1 (most free) to 7 (least free).

More freedom in politics without appropriate institutions is challenging for human capital development of Ethiopia. In some cases, democracy allows none visionary politicians to seed heterogeneities among the societies in the form of ethics, languages, casts, regionalism and religions. It grows as a tree and leads to conflicts or wars; finally it retards and deteriorates human capital development (Santhirasegaram, 2007), which is currently realized in Ethiopia.

Furthermore income equality has statistically significant positive short run impact on the human capital at 5 percent significance level. The result shows that a one unit increase in the growth rate of income equality is related with 0.003 unit increases in the level of human capital on average citrus paribus in the short run.

The finding of this research is consistent with the priory expectation. In the face of credit restrictions, a more equitable distribution of income has encouraged investment in human capital. Inequality is detrimental to human capital development in the environment of imperfect capital markets (Aghion et al., 1999). Investments will be reliant on a person's own income and assets if there is no functioning credit market. Because of this, the poor might not make any or enough investments to build their human capital. Poor people may find it challenging to start businesses, pay for insurance, or educate their children due to imperfect financial markets. These obstacles restrict the country from realizing its full economic potential, which might have been realized if wealth was distributed more evenly.

Additionally, we may talk about it from the perspective of sociopolitical instability. The fundamental tenet is that social unrest will initially rise in response to rising economic disparity. Investment is harmed and mortality rise by this political unrest. Human capital development will be hampered if investments decline and mortality rise as a result of deterioration in social peace and stability (Alesina & Perotti, 1996).

From the result of the study we can conclude that equal distribution of income is an engine of human capital development by promoting investments in human capital and by safeguarding social peace and stability.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1. Conclusions

The main objective of the study was to analyze the nexus between human capital formation and economic growth in Ethiopia using real GDP, as a proxy for economic growth and human capital index as proxy to human capital. To determine the nexus between human capital and economic growth, the study has used the ARDL approach to co-integration and the error correction model (ECM). Human capital occupies a central role in modern thinking about growth. As a result there are a number of studies which have examined the nexus between investment in HCD and economic growth in many countries around the world by using different methods of analysis at different time by using different indicator of HC and economic growth. From the different arguments advanced by the studies, one can safely conclude that there is no general agreement among researchers on this issue. This study looks at political freedoms, income equality and carbon emissions, which are unconsidered in the past studies. In addition rather than using the traditional measures of HC this study employs the human capital index which is considered a superior measure in capturing multidimensional facets of HC.

All the variables except income equality are non-stationary at level while they are stationary after taking their first difference and growth form of all the variables are stationary at level. The positive long-run coefficients of lag of real GDP, human capital index, trade openness, and negative long-run coefficients of income equality are a way of thinking with theory and are also statistically significant but carbon emission revealed unexpected positive significant impact on real GDP in the long run. Opposing to the long run result, the short-run coefficients of human capital index, trade openness and carbon emission show negative significant impact on real GDP while income equality revealed positive significant impact on real GDP in the short run. The error correction coefficient, estimated at -0.579 is highly significant and has the correct negative sign. This shows that there is a high speed of adjustment to equilibrium. The highly significant error correction term further confirms the existence of a stable long run relationship. It shows high speed of adjustment 57.92% per year towards long-run

equilibrium. Therefore for adjustment 1.727 year is required. It means one year nine month and four day is required for adjustment.

The empirical result also showed that the long-run coefficients of real GDP and growth in gross capital formation with positive impact, whereas political freedom and growth in income equality with negative impact are a way of thinking with theory and are also statistically significant that contribute to human capital during the study period. Opposing to the long run result, the short-run coefficients of real GDP and growth in gross capital formations are negative and political freedom and growth in income equality have positive coefficient. The error correction coefficient, estimated at -0.998 is highly significant and has the correct negative sign. This shows that there is a high speed of adjustment to equilibrium. The highly significant error correction term further confirms the existence of a stable long run relationship. It shows very high speed of adjustment 99.8% per year towards long-run equilibrium. It means almost one year is required for adjustment.

ARDL bound co-integration test result proves that there is higher F-statistic or F-statistic is higher than the upper bond and lower bond values. This implies that the null hypothesis of no long-run relationship is rejected; rather accept the alternative hypothesis (there is long-run relationship) therefore, there is relationship among the variables in long run. The granger causality test reveals that human capital granger causes real GDP and real GDP also granger causes human capital.

5.2. Recommendations

This study's suggests the following recommendations. First, the government should concentrate on HCD, such as education (quantity and quality by addressing the problem of relevance) and health, as these are the main drivers of economic growth. In the absence of quality components and an appropriate regulatory environment in other sectors of the economy to sustain a functioning modern economy, just increasing educational opportunities may provide little to nothing in the way of economic growth. The government should also continue to take the lead in building an atmosphere that encourages the private sector to make stronger investments in health and education. More active and healthier private sector involvement in the fields of education and health can advance the development of human capital in Ethiopia. Such actions have a significant influence on human productivity, which increases national output per person. In other words, long-term production will grow as more

people become educated and healthier. So the ministry of health and education should take their part. Furthermore policymakers and the government should prioritize securing additional resources (allocating a sizeable budget) and structures that are necessary and suitable for better education and the enhanced delivery of fundamental health services. In addition to building new institutional capability, such initiatives should enhance and transform the current institutional structures in Ethiopia's health and education sectors, which are responsible for producing skilled labor. Special agencies should be created with the mandate to enhance human capital's skills and capacities and to identify and create a pool of associates for the aim of building capacity at a reasonable cost.

Second, the government and/or ministry of commerce and ministry of finance and economic cooperation (MOFEC) should develop and implement any measures that might increase the degree to which the nation is open to global economic integration, such as minimizing trade restrictions (tariffs and quotas). The third is that governments need to encourage industrial development and rapid urbanization, as carbon emission show positive impact on economic growth. Strong city planning should be part of the ministry of planning and development.

The government should increase expenditure on social and economic infrastructure to promote physical capital formation in order to improve the efficiency of the labor force, increase productivity, and, therefore, sustainably grow. Additionally, the government should guarantee freedom from oppression or coercion, avoid situations that would make it difficult for a person to live their life freely and fulfill conditions that would make it easier for them to do so, or prevent conditions of compulsion in a community. Additionally, the government must provide the foundation and take appropriate measures to prevent internal restrictions on political speech, civil liberties, and human rights.

The current study investigates the nexus between economic growth and human capital. This study recommends that upcoming studies should consider features that may affect human capital and economic growth, such as rules of economic regulation (monitoring and fiscal policy) and social unity, which are not addressed here.

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APPENDIX

A1, Granger causality Wald tests for lnRGDP equation

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
dlnRGDP	dlnGCF	.70453	3	0.872
dlnRGDP	GEMP	2.5937	3	0.459
dlnRGDP	dHCI	15.252	3	0.002
dlnRGDP	dlnTO	20.553	3	0.000
dlnRGDP	dlnPF	6.1953	3	0.102
dlnRGDP	dlnCO2	20.569	3	0.000
dlnRGDP	lnINL	16.414	3	0.001
dlnRGDP	ALL	78.68	21	0.000
dlnGCF	dlnRGDP	7.0773	3	0.069
dlnGCF	GEMP	4.2782	3	0.233
dlnGCF	dHCI	11.445	3	0.010
dlnGCF	dlnTO	6.6223	3	0.085
dlnGCF	dlnPF	2.734	3	0.434
dlnGCF	dlnCO2	9.9251	3	0.019
dlnGCF	lnINL	2.1182	3	0.548
dlnGCF	ALL	99.524	21	0.000
GEMP	dlnRGDP	7.668	3	0.053
GEMP	dlnGCF	11.955	3	0.008
GEMP	dHCI	2.3326	3	0.506
GEMP	dlnTO	41.705	3	0.000
GEMP	dlnPF	4.5527	3	0.208
GEMP	dlnCO2	21.401	3	0.000
GEMP	lnINL	7.7227	3	0.052
GEMP	ALL	66.97	21	0.000
dHCI	dlnRGDP	9.4422	3	0.024
dHCI	dlnGCF	15.144	3	0.002
dHCI	GEMP	12.277	3	0.006
dHCI	dlnTO	16.647	3	0.001
dHCI	dlnPF	2.702	3	0.440
dHCI	dlnCO2	6.9701	3	0.073
dHCI	lnINL	4.0129	3	0.260
dHCI	ALL	35.506	21	0.025
dlnTO	dlnRGDP	4.6495	3	0.199
dlnTO	dlnGCF	6.4962	3	0.090
dlnTO	GEMP	9.6539	3	0.022
dlnTO	dHCI	5.6592	3	0.129
dlnTO	dlnPF	9.8615	3	0.020
dlnTO	dlnCO2	7.0606	3	0.070
dlnTO	lnINL	5.5896	3	0.133
dlnTO	ALL	29.909	21	0.094
dlnPF	dlnRGDP	6.376	3	0.095
dlnPF	dlnGCF	5.4024	3	0.145
dlnPF	GEMP	4.0079	3	0.261
dlnPF	dHCI	5.2582	3	0.154
dlnPF	dlnTO	6.2252	3	0.101
dlnPF	dlnCO2	1.9016	3	0.593
dlnPF	lnINL	18.436	3	0.000
dlnPF	ALL	57.221	21	0.000
dlnCO2	dlnRGDP	20.905	3	0.000
dlnCO2	dlnGCF	9.04	3	0.029
dlnCO2	GEMP	2.4454	3	0.485
dlnCO2	dHCI	7.7749	3	0.051
dlnCO2	dlnTO	60.013	3	0.000
dlnCO2	dlnPF	10.479	3	0.015
dlnCO2	lnINL	12.026	3	0.007
dlnCO2	ALL	194.51	21	0.000
lnINL	dlnRGDP	25.354	3	0.000
lnINL	dlnGCF	17.079	3	0.001
lnINL	GEMP	22.145	3	0.000
lnINL	dHCI	21.363	3	0.000
lnINL	dlnTO	13.998	3	0.003
lnINL	dlnPF	59.931	3	0.000
lnINL	dlnCO2	5.4294	3	0.143
lnINL	ALL	274.72	21	0.000

A2, Granger causality Wald tests for HCI equation

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
dHCI	dlnRGDP	93.006	4	0.000
dHCI	GGCF	324.71	4	0.000
dHCI	dlnODA	97.211	4	0.000
dHCI	GTO	46.391	4	0.000
dHCI	dPF	149.34	4	0.000
dHCI	dlnCO2	41.906	4	0.000
dHCI	GINL	168.47	4	0.000
dHCI	ALL	1035.3	28	0.000
dlnRGDP	dHCI	431.2	4	0.000
dlnRGDP	GGCF	52.124	4	0.000
dlnRGDP	dlnODA	581.41	4	0.000
dlnRGDP	GTO	1038.2	4	0.000
dlnRGDP	dPF	220.2	4	0.000
dlnRGDP	dlnCO2	296.33	4	0.000
dlnRGDP	GINL	183.09	4	0.000
dlnRGDP	ALL	4097.5	28	0.000
GGCF	dHCI	188.48	4	0.000
GGCF	dlnRGDP	60.144	4	0.000
GGCF	dlnODA	19.882	4	0.001
GGCF	GTO	19.375	4	0.001
GGCF	dPF	48.035	4	0.000
GGCF	dlnCO2	89.627	4	0.000
GGCF	GINL	112.08	4	0.000
GGCF	ALL	826.42	28	0.000
dlnODA	dHCI	99.165	4	0.000
dlnODA	dlnRGDP	24.763	4	0.000
dlnODA	GGCF	64.332	4	0.000
dlnODA	GTO	108.62	4	0.000
dlnODA	dPF	126.53	4	0.000
dlnODA	dlnCO2	116.51	4	0.000
dlnODA	GINL	88.919	4	0.000
dlnODA	ALL	566.1	28	0.000
GTO	dHCI	44.28	4	0.000
GTO	dlnRGDP	51.471	4	0.000
GTO	GGCF	38.475	4	0.000
GTO	dlnODA	35.187	4	0.000
GTO	dPF	82.654	4	0.000
GTO	dlnCO2	23.094	4	0.000
GTO	GINL	28.284	4	0.000
GTO	ALL	278.66	28	0.000
dPF	dHCI	596.2	4	0.000
dPF	dlnRGDP	502.5	4	0.000
dPF	GGCF	394.61	4	0.000
dPF	dlnODA	531.06	4	0.000
dPF	GTO	664.12	4	0.000
dPF	dlnCO2	636.78	4	0.000
dPF	GINL	788.03	4	0.000
dPF	ALL	3073.1	28	0.000
dlnCO2	dHCI	134.31	4	0.000
dlnCO2	dlnRGDP	463.74	4	0.000
dlnCO2	GGCF	157.64	4	0.000
dlnCO2	dlnODA	270.02	4	0.000
dlnCO2	GTO	1349.8	4	0.000
dlnCO2	dPF	491.18	4	0.000
dlnCO2	GINL	385.1	4	0.000
dlnCO2	ALL	5070	28	0.000
GINL	dHCI	38.091	4	0.000
GINL	dlnRGDP	106.84	4	0.000
GINL	GGCF	48.906	4	0.000
GINL	dlnODA	153.31	4	0.000
GINL	GTO	83.833	4	0.000
GINL	dPF	159.3	4	0.000
GINL	dlnCO2	39.288	4	0.000
GINL	ALL	980.51	28	0.000

.

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
dHCI	dlnRGDP	93.006	4	0.000
dHCI	GGCF	324.71	4	0.000
dHCI	dlnODA	97.211	4	0.000
dHCI	GTO	46.391	4	0.000
dHCI	dPF	149.34	4	0.000
dHCI	dlnCO2	41.906	4	0.000
dHCI	GINL	168.47	4	0.000
dHCI	ALL	1035.3	28	0.000
dlnRGDP	dHCI	431.2	4	0.000
dlnRGDP	GGCF	52.124	4	0.000
dlnRGDP	dlnODA	581.41	4	0.000
dlnRGDP	GTO	1038.2	4	0.000
dlnRGDP	dPF	220.2	4	0.000
dlnRGDP	dlnCO2	296.33	4	0.000
dlnRGDP	GINL	183.09	4	0.000
dlnRGDP	ALL	4097.5	28	0.000
GGCF	dHCI	188.48	4	0.000
GGCF	dlnRGDP	60.144	4	0.000
GGCF	dlnODA	19.882	4	0.001
GGCF	GTO	19.375	4	0.001
GGCF	dPF	48.035	4	0.000
GGCF	dlnCO2	89.627	4	0.000
GGCF	GINL	112.08	4	0.000
GGCF	ALL	826.42	28	0.000
dlnODA	dHCI	99.165	4	0.000
dlnODA	dlnRGDP	24.763	4	0.000
dlnODA	GGCF	64.332	4	0.000
dlnODA	GTO	108.62	4	0.000
dlnODA	dPF	126.53	4	0.000
dlnODA	dlnCO2	116.51	4	0.000
dlnODA	GINL	88.919	4	0.000
dlnODA	ALL	566.1	28	0.000
GTO	dHCI	44.28	4	0.000
GTO	dlnRGDP	51.471	4	0.000
GTO	GGCF	38.475	4	0.000
GTO	dlnODA	35.187	4	0.000
GTO	dPF	82.654	4	0.000
GTO	dlnCO2	23.094	4	0.000
GTO	GINL	28.284	4	0.000
GTO	ALL	278.66	28	0.000
dPF	dHCI	596.2	4	0.000
dPF	dlnRGDP	502.5	4	0.000
dPF	GGCF	394.61	4	0.000
dPF	dlnODA	531.06	4	0.000
dPF	GTO	664.12	4	0.000
dPF	dlnCO2	636.78	4	0.000
dPF	GINL	788.03	4	0.000
dPF	ALL	3073.1	28	0.000
dlnCO2	dHCI	134.31	4	0.000
dlnCO2	dlnRGDP	463.74	4	0.000
dlnCO2	GGCF	157.64	4	0.000
dlnCO2	dlnODA	270.02	4	0.000
dlnCO2	GTO	1349.8	4	0.000
dlnCO2	dPF	491.18	4	0.000
dlnCO2	GINL	385.1	4	0.000
dlnCO2	ALL	5070	28	0.000
GINL	dHCI	38.091	4	0.000
GINL	dlnRGDP	106.84	4	0.000
GINL	GGCF	48.906	4	0.000
GINL	dlnODA	153.31	4	0.000
GINL	GTO	83.833	4	0.000
GINL	dPF	159.3	4	0.000
GINL	dlnCO2	39.288	4	0.000
GINL	ALL	980.51	28	0.000

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Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
dHCI	dlnRGDP	93.006	4	0.000
dHCI	GGCF	324.71	4	0.000
dHCI	dlnODA	97.211	4	0.000
dHCI	GTO	46.391	4	0.000
dHCI	dPF	149.34	4	0.000
dHCI	dlnCO2	41.906	4	0.000
dHCI	GINL	168.47	4	0.000
dHCI	ALL	1035.3	28	0.000
dlnRGDP	dHCI	431.2	4	0.000
dlnRGDP	GGCF	52.124	4	0.000
dlnRGDP	dlnODA	581.41	4	0.000
dlnRGDP	GTO	1038.2	4	0.000
dlnRGDP	dPF	220.2	4	0.000
dlnRGDP	dlnCO2	296.33	4	0.000
dlnRGDP	GINL	183.09	4	0.000
dlnRGDP	ALL	4097.5	28	0.000
GGCF	dHCI	188.48	4	0.000
GGCF	dlnRGDP	60.144	4	0.000
GGCF	dlnODA	19.882	4	0.001
GGCF	GTO	19.375	4	0.001
GGCF	dPF	48.035	4	0.000
GGCF	dlnCO2	89.627	4	0.000
GGCF	GINL	112.08	4	0.000
GGCF	ALL	826.42	28	0.000
dlnODA	dHCI	99.165	4	0.000
dlnODA	dlnRGDP	24.763	4	0.000
dlnODA	GGCF	64.332	4	0.000
dlnODA	GTO	108.62	4	0.000
dlnODA	dPF	126.53	4	0.000
dlnODA	dlnCO2	116.51	4	0.000
dlnODA	GINL	88.919	4	0.000
dlnODA	ALL	566.1	28	0.000
GTO	dHCI	44.28	4	0.000
GTO	dlnRGDP	51.471	4	0.000
GTO	GGCF	38.475	4	0.000
GTO	dlnODA	35.187	4	0.000
GTO	dPF	82.654	4	0.000
GTO	dlnCO2	23.094	4	0.000
GTO	GINL	28.284	4	0.000
GTO	ALL	278.66	28	0.000
dPF	dHCI	596.2	4	0.000
dPF	dlnRGDP	502.5	4	0.000
dPF	GGCF	394.61	4	0.000
dPF	dlnODA	531.06	4	0.000
dPF	GTO	664.12	4	0.000
dPF	dlnCO2	636.78	4	0.000
dPF	GINL	788.03	4	0.000
dPF	ALL	3073.1	28	0.000
dlnCO2	dHCI	134.31	4	0.000
dlnCO2	dlnRGDP	463.74	4	0.000
dlnCO2	GGCF	157.64	4	0.000
dlnCO2	dlnODA	270.02	4	0.000
dlnCO2	GTO	1349.8	4	0.000
dlnCO2	dPF	491.18	4	0.000
dlnCO2	GINL	385.1	4	0.000
dlnCO2	ALL	5070	28	0.000
GINL	dHCI	38.091	4	0.000
GINL	dlnRGDP	106.84	4	0.000
GINL	GGCF	48.906	4	0.000
GINL	dlnODA	153.31	4	0.000
GINL	GTO	83.833	4	0.000
GINL	dPF	159.3	4	0.000
GINL	dlnCO2	39.288	4	0.000
GINL	ALL	980.51	28	0.000

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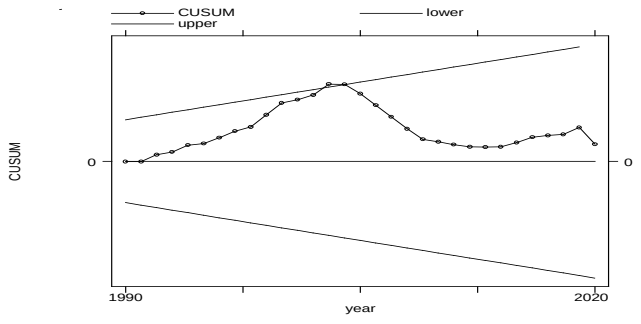
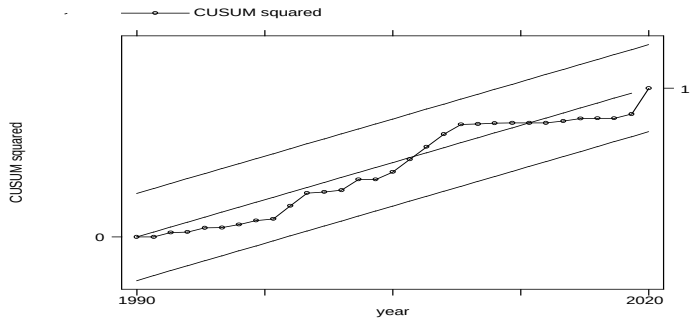
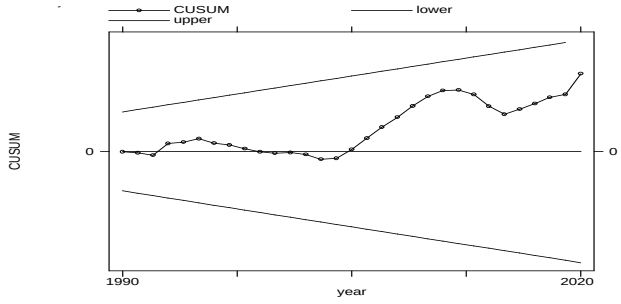
Equation	Excluded	chi2	df	Prob > chi2
HCI	lnRGDP	1.362	2	0.506
HCI	GGCF	3.7443	2	0.154
HCI	lnODA	.7261	2	0.696
HCI	GTO	1.8499	2	0.397
HCI	PF	.65258	2	0.722
HCI	lnCO2	1.0966	2	0.578
HCI	GINL	.4543	2	0.797
HCI	ALL	11.593	14	0.639
lnRGDP	HCI	4.683	2	0.096
lnRGDP	GGCF	1.217	2	0.544
lnRGDP	lnODA	8.5641	2	0.014
lnRGDP	GTO	3.009	2	0.222
lnRGDP	PF	1.2486	2	0.536
lnRGDP	lnCO2	3.144	2	0.208
lnRGDP	GINL	1.4875	2	0.475
lnRGDP	ALL	27.053	14	0.019
GGCF	HCI	2.3792	2	0.304
GGCF	lnRGDP	.26741	2	0.875
GGCF	lnODA	.4253	2	0.808
GGCF	GTO	2.3413	2	0.310
GGCF	PF	2.3078	2	0.315
GGCF	lnCO2	1.5735	2	0.455
GGCF	GINL	1.7464	2	0.418
GGCF	ALL	19.765	14	0.138
lnODA	HCI	8.0181	2	0.018
lnODA	lnRGDP	.74081	2	0.690
lnODA	GGCF	3.0791	2	0.214
lnODA	GTO	1.3287	2	0.515
lnODA	PF	1.3894	2	0.499
lnODA	lnCO2	.1547	2	0.926
lnODA	GINL	15.477	2	0.000
lnODA	ALL	62.374	14	0.000
GTO	HCI	12.421	2	0.002
GTO	lnRGDP	1.4197	2	0.492
GTO	GGCF	.00877	2	0.996
GTO	lnODA	4.7918	2	0.091
GTO	PF	10.707	2	0.005
GTO	lnCO2	2.8849	2	0.236
GTO	GINL	7.5892	2	0.022
GTO	ALL	34.447	14	0.002
PF	HCI	9.2496	2	0.010
PF	lnRGDP	19.704	2	0.000
PF	GGCF	2.1751	2	0.337
PF	lnODA	4.3119	2	0.116
PF	GTO	.07047	2	0.965
PF	lnCO2	4.7487	2	0.093
PF	GINL	3.5652	2	0.168
PF	ALL	26.056	14	0.025
lnCO2	HCI	4.9773	2	0.083
lnCO2	lnRGDP	2.9214	2	0.232
lnCO2	GGCF	1.3469	2	0.510
lnCO2	lnODA	12.351	2	0.002
lnCO2	GTO	12.458	2	0.002
lnCO2	PF	2.3938	2	0.302
lnCO2	GINL	2.4818	2	0.289
lnCO2	ALL	51.978	14	0.000
GINL	HCI	3.705	2	0.157
GINL	lnRGDP	7.2408	2	0.027
GINL	GGCF	.55627	2	0.757
GINL	lnODA	15.312	2	0.000
GINL	GTO	5.8771	2	0.053
GINL	PF	23.757	2	0.000
GINL	lnCO2	20.556	2	0.000
GINL	ALL	67.679	14	0.000

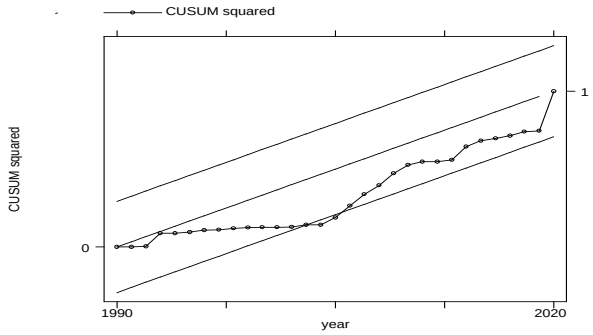
B1, stability test when HCI is dependent variable





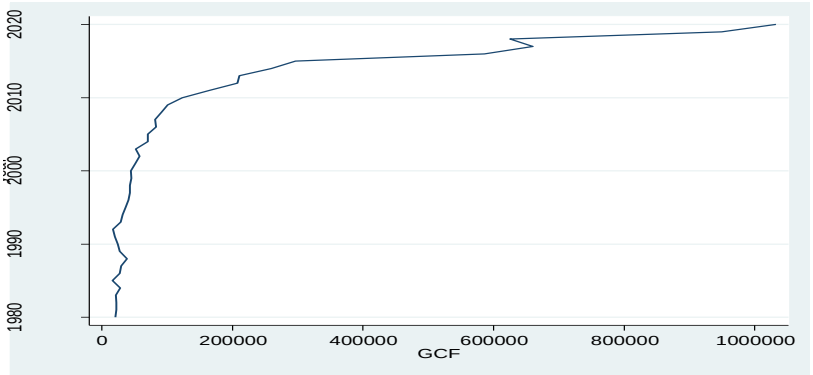
B2, stability when lnRGDP is dependent variable



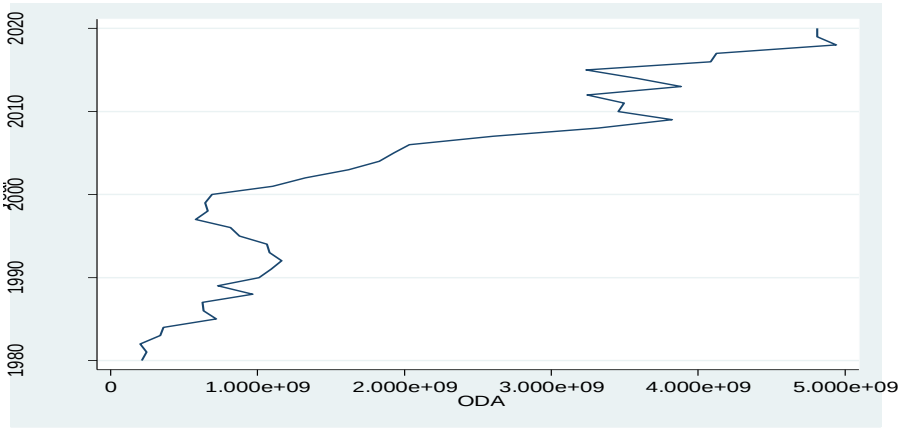


C1, Trends of control variables

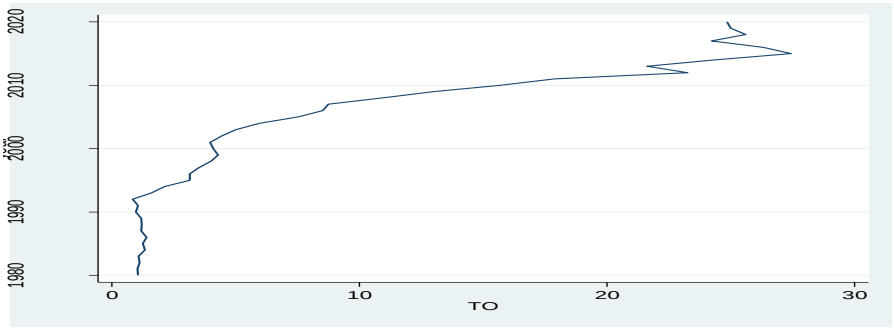
1, Trends of gross capital formation 1980-2020



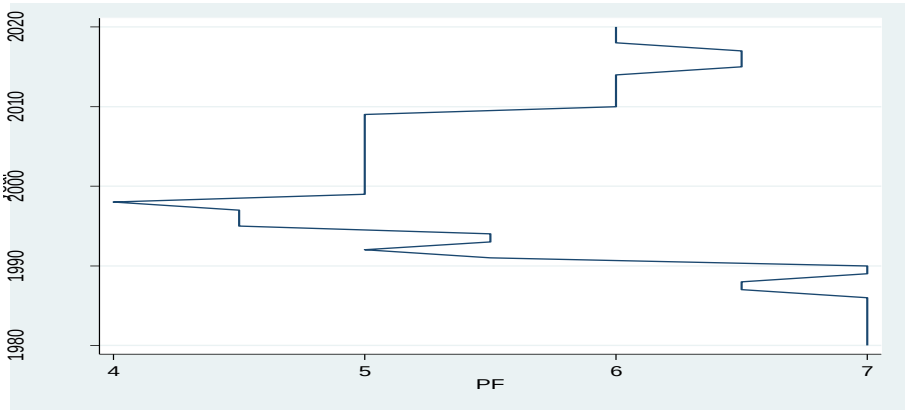
2, Trends of official development assistance 1980-2020



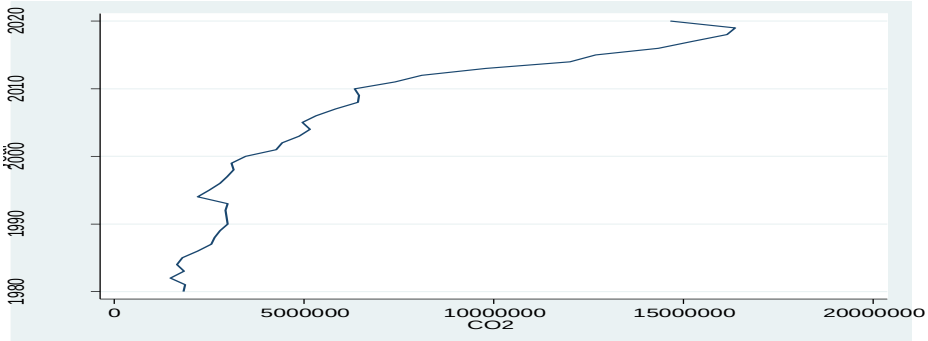
3, Trends of trade openness 1980-2020



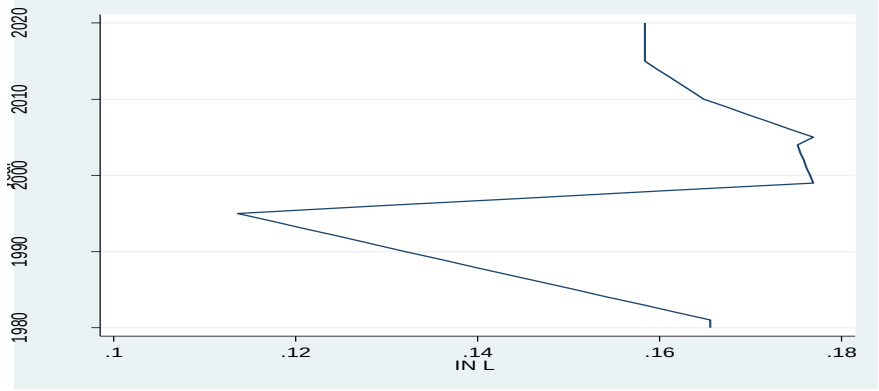
4, Trends of political freedom 1980-2020



5, Trends of carbon emission 1980-2020



6, Trends of income equality 1980-2020



7, Trends of employment 1980-2020