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ADDIS ABABA UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

SCHOOL OF COMMERCE

THE IMPACT OF POPULATION GROWTH ON ETHIOPIAN ECONOMIC GROWTH

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**A Thesis Submitted in partial fulfillment of the requirements for the Degree
of Master of Science in Development Economics**

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STATEMENT OF DECLARATION

I, Asamerew Dejenie, hereby declare that this master thesis entitled “The Impact of Population Growth on Ethiopian Economic Growth” is my original work. I have conducted the study independently with the support and guidance of my Advisor Birhanu Denu (PhD). Any academic or other source used in this research have been properly cited and acknowledged. I would, also, like to give my assurance that this research report has not been submitted for the purpose of obtaining a degree or diploma to this or any other university.

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This is to recognize/certify that this master's thesis titled "the impact of population growth on Ethiopian economic growth" submitted by Asamerew Dejenie is his own authentic and original work, which he has submitted for examination with my approval as the university advisor.

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This is to certify that the thesis conducted by Asamerew Dejenie entitled “The Impact of Population Growth on Ethiopian Economic Growth” and submitted in partial fulfillment of the requirements for the degree of Master of Science in Development Economics complies with the University's regulations and satisfies the acceptable requirements for originality and quality.

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List of Acronyms and Abbreviations

AEA	American Economic Association
AGR	Agricultural Growth Rate
ARDL	Autoregressive Distributed Lag
CSA	Central Statistical Authority
ECM	Error Correction Model
EDHS	Ethiopian Demographic and Health Survey
EEA	Ethiopian Economic Association
GDP	Gross Domestic Product
HCI	Human Capital Index
IMF	International Monetary Fund
LDCs	Least Developed Countries
MoFED	Ministry of Finance and Economic Development
OLS	Ordinary Least Squares
OPPN	Trade Openness
SR	Saving rate
SSA	Sub Saharan Africa
UN	United Nations
UR	Unemployment Rate
USAID	United States Agency for International Development
VAR	Vector Autoregressive

Table of Contents

ACKNOWLEDGEMENT	I
LIST OF ACRONYMS AND ABBREVIATIONS	II
ABSTRACT	7
TABLE OF CONTENTS	III
LIST OF TABLES	V
LIST OF FIGURES	VI
CHAPTER ONE	7
1. INTRODUCTION	8
1.1 Background	8
1.2 Statement of the problem	10
1.3 Research Objective.....	13
1.4 Research Question.....	13
1.5 Research Hypothesis.....	13
1.6 Significance of the study	14
1.7 The Scope and Limitation of the Study.....	14
1.8 Organization of the Thesis	15
CHAPTER TWO	16
2. LITERATURE REVIEW	16
2.1. Theoretical Literatures	16
2.1.1 Pessimistic Views on Population Growth	18
2.1.2 Optimistic Views on Population Growth.....	25
2.2 Empirical Literature	31
CHAPTER THREE	40

3. RESEARCH METHODOLOGY	40
3.1. Methods of Data Analysis	40
3.2. Data Type and Source	43
3.3. Description of Variables.....	44
CHAPTER FOUR.....	45
4. DATA ANALYSIS AND ESTIMATION OF RESULTS	Error! Bookmark not defined.
4.1. Descriptive Analysis	45
4.1.1. Analysis of the socioeconomic circumstances of the country	48
4.1.2. Trends of population in Ethiopia	49
4.1.3. Population Distribution.....	51
4.1.4. Population and Macro Economy	55
4.2 Econometric Analysis	57
4.2.1. Unit Root Test	57
4.3. Vector Error Correction Model and Result of Co-Integration Test.....	59
4.4. Co-integration.....	66
4.5. Multi Collinearity	71
CHAPTER FIVE	73
5. SUMMARY AND POLICY IMPLICATION.....	73
5.1 Summary	73
5.2. Policy Implication	74
REFERENCES	76
APPENDIX.....	80

List of Tables

Table 4.1 Summary table of descriptive statistics	46
Table 4.2 trends in house hold size of Ethiopia By residence and region	51
Table 4.3. Labels and trends in regional distribution of population and percentage shares	52
Table 4.4. Trend of Population Growth Rate	53
Table 4.5. Results of Unit Root Test	58
Table 4.6 Johnson Co-integration result	68
Table 4.7. Jarque-Bera test of normality	69
Table 4.8 LM autocorrelation test	71
Table 4.9. Result of multi linearity test	72

List of Figures

Fig. 4.1 Eigenvalue stability condition	47
Fig. 4.2 Population Growth (Annual %) – Ethiopia from 1961 – 2020	47
Fig. 4.3. Trends of population in Ethiopia	50

Abstract

This study empirically investigates the impact of population growth on the economic performance of Ethiopia for the period 1991-2021. Demographic transition enables in creating policy environment that considers maximum advantage of the nation's demographic potential. VECM model was used to investigate the relationship between the population growth and economic performance of the country. The result of the model shows that the impact of population is negative and significant and the problem associated with huge population growth is the flood of the newly workforce, its management and providing different facilities even basic needs become a challenge for the government and policy makers. To tackle this issue, this study incorporated unemployment rate and agricultural growth rate to the model so as to investigate the impact of population growth directly and indirectly on economic growth in Ethiopia. The result of the study shows that population growth has negatively and significantly contributed to economic development contrary to agriculture. Saving rate, trade openness and human capital are also positive and significant factors to economic growth in Ethiopia. Hence, the government is advised to effectively and efficiently utilize the abundant labor force and work hard to eradicate the prevailing high level of unemployment.

Key words: Population growth, unemployment, economic growth, VECM, Ethiopia.

CHAPTER ONE

1. INTRODUCTION

1.1 Background

Ethiopia is the second and the twelfth most populous country in Africa and the world respectively. This data of how many people live in Ethiopia is based on the most recent United Nations estimation, and makes Ethiopia the fourteenth most populous nation in the world. The most recent census conducted in Ethiopia found an official population of 73.7 million. (World Population Review, 2022).

In countries like Ethiopia, where considerable efforts are being made to eradicate poverty, it is vital to have a continuous follow ups and measurement of demographic and socio economic changes so that the extent of the impacts of the interventions and the challenges can be measured and future direction can be identified. This is, however, possible if and only if the necessary information is available on indicators for the changes to be measured. Data comprising the demographic, socio economic and environmental facts play decisive role for development as it clearly shows the status of harmonization among population, development and environment. (National Planning Commission, 2013)

Continuous and sustainable development has become a phenomenon in virtually many of the developing nations resulting from many factors. Rapidly increasing population is one among many reasons putting a serious danger to sustainable development in most of the developing countries. Population is an asset only if it is well-managed, but it becomes a real threat if there is no equal development or increase in the means of livelihood. Rapid population growth is associated to the state of overpopulation in terms of existing means and resources (Netsanet, 1997).

Meanwhile, sustainable economic development on one side refers to the way how people use the available finite natural and nonrenewable resources without harming it. Similarly, sustainable

development implies the process of development that also meets the needs of the present without compromising the ability of the future generation to meet their own needs. It simply means the development of the present generation will benefit without compromising the existing resources for the future generation.

The rate of population growth in Sub Saharan Africa is extraordinarily rapid. The only region, nowadays, that does not experience a fall in population growth rate is Africa in general and Sub Saharan Africa in particular. The rapid population growth in SSA (Sub Saharan Africa), in which Ethiopia is one, has a significant impact on social, political and economic circumstances. The rapid population growth combined with low level of economic progress, causes serious problems (Hassen, 2004).

The relationship between population growth and economic performance is highly complex and controversial. This is one for different and conflicting results from different studies. “Population growth brings us closer to explaining sustained economic growth. In the steady state with population growth, capital per worker and output per worker are constant. Because the number of workers is growing, however, total capital and total output must also be growing. Hence, although population growth cannot explain sustained growth in the standard of living (because output per worker is constant in the steady state), it can help explain sustained growth in total output. Second, population growth gives us another explanation for why some countries are rich and others are poor” (Mankiw, 2009).

Rapid population growth is one among other reasons for rising of the population on the search for livelihood, and migration has been a major factor of rapid population growth in urban areas in less developed countries. Lee (1969), Todaro (1976), and Goldscheider (1983) emphasized the attraction of the urban industrialized sector for urban bound migration. However for the urban pull to be functional, the population in the rural area must be conducive to migrate. Population growth could affect several variables like economic inequality, investment level, unemployment level population's age structure, availability of labor force and international migration level. Results of studies conducted by different scholars and organizations shows that the rise in number of people have both short and long-run relationship with country's economic performance level. Whereas, some studies found inverse association or connection between the

two such that an increase in population would negatively affect economy of nations and vice versa.

Contrary to this, Amjad Ali, Amjad Amin and Sher Ali (2013) identified the existence of positive relationship between human population growth and economic performance such that positive and significant contribution of population growth to economic growth was founded but unemployment rate negatively affects it (Middle East Journal of Scientific Research, 2013).

Though not much studied in Ethiopia, the link between these two variables has been done extensively in the rest of the world. As can be seen vividly, the population of Ethiopia is rapidly growing over time but has not been taken as a serious and threatening concern by governing body or authorized officials.

According to the result of the third census carried out in the country in 2007, the total population of the country was estimated at 73.3 million and some seven years later the total population of Ethiopia was estimated to be around 94 million of which 83% of the people lives in the rural Ethiopia while the remaining 17% was in urban areas (Ethiopian Demographic and Health Survey; 2011). Based on the United Nations' latest projections, the current total population of Ethiopia is about 119,395,441. The population clock of Ethiopia shows one birth every nine seconds, one death every forty three seconds and one net migrant every one hundred eleven minutes which means the country is experiencing a net addition or gain of one person every eleven seconds (World Population Prospect, Jan 7, 2022)

1.2 Statement of the problem

Ethiopia is facing recurrent drought and food shortage, the recent one being since the 1970s. Often, lack of rainfall is blamed for the drought and thus the resulting sufferings including starvation. Although rainfall inadequacy was always blamed for this problem, the real reason behind such drought and widespread starvation for the last few decades was population growth (Daniel 2006). With growing population, environmental degradation in the form of finding arable land, fire wood, housing construction, food and race for water and grazing areas.

Burning of forests, fossil fuels and unsustainable use of other natural resources could be mentioned as factors for the occurrence of drought and hence food insecurity in Ethiopia.

In addition to the recurrent droughts which happened in the nation, the quick growth of the population and the linked land in specific and environmental degradation in general has followed in a serious food shortage over the past thirty or more years. Hence, since the early 1960's Ethiopia has failed to maintain the food needs of the rapidly growing population. Technical analysis conducted by the World Bank (1990) has revealed that the population vs resource balance for Ethiopia is 0.5, which signifies that the nation could provide with less than half of its current population, at internationally agreed standard levels of nutrition, on a continuous basis.

These defect of food production and starvation lead to malnutrition especially among the lower age groups of the population. Malnutrition is highly associated with the level of morbidity and mortality. According to the Ethiopian Demographic and Health Survey (2000), among children below the age five in Ethiopia, fifty one percent are underfed or malnourished and twenty six percent are highly or severely starved (CSA, 2001).

The population growth in rural areas leads to a reduction in the size of land available for farming which in turn reduces per capita income. A number of theoretical and empirical studies have shown that the size of land holding is one of the main constraints for achieving food security in Ethiopia (Geremew,2011) ~ the impact of the population on the economy, therefore, is important indeed.

A number of questions guided the inquiry. Does population growth enhance or inhibit the opportunities of the country's citizens? Does the answer depend on the stage of our development? Given that Ethiopia's population is getting higher and higher in number, what are the possible effects of this increase on economic growth?

Population growth affects economic growth and, as long as each person contributes something, those effects generally are positively correlated. As long as their marginal product is positive additional people mean additional output. It should usually hold true since this is not a very restrictive condition. However, the existence of a positive marginal product is not a very

appropriate test of the desirability of population growth! Perhaps, a better one is to ask whether population growth positively affects the average citizen (N.G.Mankiw, 2010).

When population growth declines however, as it is now happening in developed countries, the ratio of workers to retirees' declines as well. Some studies by economists suggest that the labor market implications of declining population growth will be significant (Butz et al. 1982). Therefore, this rising population of Ethiopia must extensively to be studied; due to its serious impacts the economic growth of our nation (Ethiopia). However, there is no enough empirically done researches about population-growth controversies for the case of Ethiopia. Therefore, this paper aimed to come up with an empirical study of the effect of population on the economic growth of Ethiopia (i.e. a low-income country associated with a rapidly growing economy but also a rapidly increasing population and the huge supply of labor force.)

An understanding of such an issue would provide a reliable input for formulating development policies. Consequently, the paper tried to find or investigate the link between population dynamics and economic growth in Ethiopia. Defining more clearly, the study tries to answer the following questions: Does population growth guides to economic prosperity in Ethiopia? What is the direction of relationship between population and economic growth in Ethiopia? Is there any causality between the two variables in Ethiopia?

Thus, it is the main focus of this paper is to asses some of the effects of population growth on the economy of Ethiopia. Implicitly, if population growth tends to reduce average income then, why not the country has a strong motivation to spend money on population control and effect strong measures on households who give births above a certain legal limit to reduce population pressure? On the other hand there are positive effects of population growth such as providing consumer demand, bringing economic scale, making available for labor supply at lower cost and population is a source of innovation and technological progress.

1.3 Research Objective

The main objective of the study is to examine for the relationship between population and economic growth in Ethiopia.

The specific objectives of the study include:

- To examine how population growth affects the economic growth in Ethiopia
- To look into the pattern of the economy and population growth
- To identify major problems arising from population pressure
- To asses some socio economic factors that contribute to rapid population growth in Ethiopia

1.4 Research Question

The research question associated in this study is the examination of causal relationship between population growth and economic growth in Ethiopia. That is;

- what is the direction of relationship between population growth and the growth of economic Output?

1.5 Research Hypothesis

Research hypothesis is a statement of expectation or prediction that will be proved or disproved lately by the ongoing research. In simple terms, hypothesis is what one supposes or proposes for the question s/he raised standing from the related literatures that has been studied before. The following hypothesis is formulated in accordance with the objective of the study. The hypothesis of the study focuses on the existing theories that are related to the determinants of economic growth of countries over the years. Those theories on the literature lead someone to set

expectations about the relationship of the determinants of economic growth and real GDP per-capita income.

Hence, the hypothesis of the study looks like the following

H0: $B_2=B_3=\dots=B_n = 0$ (i.e. indicating all slope coefficients are simultaneously zero)

H1: $B_2 \neq B_3 \neq \dots B_n \neq 0$ (i.e. Otherwise) (Where, $n=1, 2, 3 \dots 6$)

H₀, the null hypothesis indicates that the coefficients or effect of the independent variables are all equal to zero, implying that the effect is not different from zero.

H₁, the alternative hypothesis indicates that the coefficients are different from zero; indicating that the independent variables affect the dependent variable (Real GDP Per Capita Growth Rate).

1.6 Significance of the study

The paper deals with the instability of the economy caused by human number in Ethiopia. Despite the fact that population is increasing at a faster rate and the government is reacting not to the best of its effort for demographic and economic problems, the economy has to be considered and hence undertaking investigation of the relationship between the population and the economy is invaluable indeed. After examining the link, the study is assumed to provide a clear view of the area under study for policy makers. It is also expected to give some indication for the researchers that have interest on the issue to deal with.

1.7 The Scope and Limitation of the Study

There is a bidirectional relationship between economic and population growth. In other words, population growth can have effect on the economy and at the same time it can also be affected by the performance of the economy. Additionally, since there are many factors that affect the two variables (population and economy), the relationship is very complex and difficult to analyze with limited knowledge and information, most of which is from secondary sources.

The study based on primary sources of data at the national level is very difficult due to financial and time constraints. Thus, the paper is limited to point out the main factors and consequences of

the relationship among variables going to be studied. Again, it is hard to come with up to date and reliable time series data. It is also difficult to get full time data from neither of the sources (organizations, agencies etc...) that provide the data.

However, the effect of the limitations on the reliability of the findings can be minimized (or even be eliminated) by using relative best available alternatives in the due process of the research. All in all, the study tried its best to effectively utilize the available data, time and resources; and employs appropriate techniques in order to come up with reliable findings, given the limitations listed above.

1.8 Organization of the Thesis

The paper is composed of five chapters. The first chapter discusses an introduction of the title and to clear up the research question that is going to be circumspectly addressed in the study. The second one deals with the theoretical framework. It, mainly focuses on the exiting theoretical literature and empirical works connected to the topic. The third chapter shows the data source and explains the methodology used for the whole analysis. The fourth chapter deals with the results and discusses. Lastly, the fifth chapter summarizes remarks and valuable policy implications.

CHAPTER TWO

2. LITERATURE REVIEW

2.1. Theoretical Literatures

It is clear that developed countries have low rates of population growth while less developed countries have high rates of population. This means that population growth is closely related to economic growth. On the other hand, labor shortages will slow the rate of economic growth in industrialized countries, but in developing countries like Ethiopia high birth rate may stress the limited nonrenewable resources (Todaro and Smith, 2003).

Governments in western and other industrialized nations like Japan and United States of America are challenged to create effective immigration policies and programs to increase the birth rate, while countries with weaker economies pursue public health policies to reduce population growth. Globally, smaller population presents multiple benefits from an ecological perspective, but some economies are challenged by low birth rates and are redirecting their need for unskilled labor to countries with higher populations and lower wage demands (Tewodros, 2005).

Generally, world population lives in different circumstances, some live in a better condition (they have enough to eat, are literate, and have good health conditions) but others live in low level of living, which can be manifested quantitatively and qualitatively in the form of low income, inadequate housing, poor health and limited or no access to education, high infant mortality, low life and work expectancy etc....

We all agree that less developed countries live in the second kind of life. The main reason for this is that these countries are characterized by high population as well as greater dependency burden (Todaro; 1990s).

Countries with large share of population are said to have a high dependency ratio (the ratio of non-working age population to working age population), which depresses per capita income by requiring the output of a given number of producers to be shared among a large number of consumers (Tsega; 2005).

Humans like members of all populations of plants and animals, are in competition with one another for earth's resources. The global human population is growing at rate of around 1.2 percent per year and as it does the computations for resources increase.

One of these resources is food. In high income countries food supply is relatively secure. But as demand for food increases, supplies come under greater pressure. In the future will we be able to produce enough food to support the ever increasing human population? While these seem like a twenty-first century problem, it is actually a question that has concerned economists for hundreds of years (and farmers since the first day of agriculture).

In many parts of the world, rapid human population growth is contributing to damage the environment and that this often, has adverse consequences for local food production. Furthermore, no one doubts that there will be major increase in global food demand in the next few decades largely because of population growth. This is indicated by current considerable challenges to humanity (Dyson; 1996).

But on contrary to this, large and growing population has been looked upon as the only solid foundation of national strength and wealth, a necessary condition or even cause of technological progress, the impelling force that has raised man from his primitive state and pushed him forward on the road to civilization (Ibid).

Arguments on the direction of relationship between human population growth and economic performance of a certain nation dated back to the work of the famous British demographer

known as Thomas Robert Malthus (1798). Almost since then scholars and researchers divided in to two dimensions on the role of population on the performance of one's economy.

The two opposite aspects of the problem of population numbers are related in turn man's dual role. People are both producers and consumers, so it is understandable that at one time population growth should have been regarded primarily as an addition to man power and productive capacity, at other times as an increase in the number of mouths to be feed.

As a result, there are so many issues on population growth in relation to economic factors. In early times, even when population pressure was not a serious problem, there were some written articles and different views on population growth. Among these views we have pessimistic and optimistic views on population growth to deal with.

2.1.1 Pessimistic Views on Population Growth

The pessimistic views on population growth are that they think that a population which has a high growth rate will put a strain on resources. They believe that there will not be enough resources to be able to supply the large population.

Population pessimism remains associated 'mainly' with Thomas Robert Malthus, who warned in 1798 that humans would tend to multiply their numbers while resources available for their wake up were limited, resulting in subsistence crisis. This failed to happen in the 19th and 20th centuries as both global population and living standards rose at an increasing rate, though some countries suffered periodic famine as has happened in the past centuries. The rate of world population increase is now falling, but it is likely to take a century for growth to end.

Pessimists today fear that this slowdown will be too little and too late to prevent catastrophic ecological resource crises while optimists hope that reduced fertility and technological advancement will allow a 'soft landing' and avert disaster.

The proponents of this view argue that it is extremely important, however realize that the population problem is much more than the problem of food. It has wider ramification that make it a general development problem. A high rate of population not only has an adverse effect on

improvement in food supply but also intensifies the constraint on the development of savings, foreign exchange and human resource (Meier; 1995).

Ancient Chinese writers and early Greek philosophers stand somewhat on the pessimistic view. The discussion in UN publication (UN, 1973) is summarized in the following two paragraphs. Although little attempts were made to adjust population number to resources, the Chinese writers (the contumacious school of thought) advocated population control by considering effects like food insufficiency. They proposed costly marriage ceremonies to reduce marriage rates, war, checks on population growth and premature marriage, as it is associated with infant mortality.

The early Greek philosophers (mainly Aristotle and Plato) had some concepts of “optimum population”. The optimum population was seen as the number matching the available resource and infrastructure. Aristotle held the view that there should be balance between resources and population size to live comfortably and liberally. And Plato proposed colonization and birth control by large family life for overpopulation (Hassan; 2004).

In general, the advocates of population pessimism “commonly” look and try to show the negative sides of population growth that forward threats on the welfare of world’s society as follows;

1. Due to the increase in population, consumption increases which will decrease GNP/GDP and imports will increase and exports fall down. Budget deficit is the then result and the prices mount high
2. Misuse or over use natural resources. Due to the increase in population, man to land ratio decreases. As land is inelastic, one cannot increase the amount or supply of it
3. Raw material or primary goods are used or processed either directly or indirectly which produce finished goods and also yield residues some of it is recycled and some is disposed to nature which affects it negatively. So when more and more people depend on land there are more chances of damage accruing to ecosystem
4. Effect on PCI; if the population growth does not much the labor force ,there is a negative effect on PCI

5. Population growth and standard of living ;as increase in population leads to more consumption ,or there are more mouths to be fed which affects the standard of living
6. Population and agriculture ; the pressure on land increases and increase disguised unemployment
7. Population and employment ; unemployment increase due to the increase in population
8. Population and social infrastructure ; which can be equivalently explained as follows :
When there are more patients in a certain hospital ,pressure increases as one doctor has attend more and more of them; the same is true for other fields
9. An increase in population can also decrease capital formation capacity of a given country
10. The increase in population results in brain drain
11. Population increase negatively affects the environment as urban slums increase etc

Classical theory of population

The fundamental argument of the classical theory of population is that, huge population growth causes a parallel increase in demand for food which can be met either by guiding new land under cultivation or by intensifying the cultivation of already logged-in land. However, cultivation of additional land (extensive margin of cultivation) has prospects for overcoming the effects of population pressure, because the marginal product of labor is bound to decline as land at the margin is associated with low fertility as compared to land already populated. In addition, production at the intensive margin (already available land) is subjected to the law of diminishing returns. Consequently, food production will always tend to grow less rapidly than population (Dejene et al; 2001).

A. Malthus' Population Theory

Reverend Thomas Robert Malthus (1766_1834) was an English cleric and scholar, influential in the fields of political economy and demography who wrote an essay outlining his response to the problem of the population increase. His work entitled an essay on the principle of population observed that sooner or later population will be checked by famine and disease, leading to what is known as the Malthusian Catastrophe. He wrote this in opposition to the popular views of the 18th century Europe that saw society as improving and in principle as perfectible.

He thought that the dangerous of population growth preclude progress towards a 'Utopian' society. "The power of population is indefinitely greater than the power in the earth to produce subsistence for man.

By the year 1798, T.R. Malthus, the prior-up economic-demographer, came with his notable essay on the principle of population, as it affects the coming improvement of society. The major argument of the essay had the form of an open attack and opposition against those who thought in "perfectibility of man and society ". That is against those who believed in what Malthus called "the possible existence of society, all the members of which, should live in ease, happiness and comparative leisure ; and feel no anxiety about supplying the means of subsistence for themselves and families."

Malthus was not the first intellectual to treat himself with the problem of population. There had been discussions and open talks about its growth, desirability, and effects. But he knitted the scattered ideas in to a full subject and was the first to write a treatise on population (Bhatia; 1978, as quoted by Shawll; 2006).

Malthus' theory was based on the belief that the population would grow geometrically (1,2,4,8,16,32,...) where as food production would grow linearly (1,2,3,4,5...) much more slowly. At the time when he was writing, the Industrial revolution had not yet arrived, and without developments such as pesticides and fertilizers the amount of food that could be produced per acre of land was much smaller than it is today.

That law of our nature, which makes food necessary to human beings, must keep the effects of those two unbalance powers equal. This implies as strong and constantly operating check on population from the difficulty of subsistence. This difficulty must fall somewhere, and must necessarily be severely felt by a large proportion of mankind (Mark et al; 1971).

In ecological words, Malthus was declaring that the human population was at risk of outgrowing its carrying capacity (the number of individuals that can be supported by a specific habitat). There are examples of this happening to particular populations of animals and insects, such as the reindeer on St.Mttew Island.

Malthus reasoned that this disastrous result could only be rejected if the population stopped growing. He identified two types of “checks” that could stop population growth: a negative check that would cause a drop in the birth rate (for example: increased use of contraceptives) and a positive check that would increase the death rate (for example: disease or war). These checks, he argued, were more likely to take effect as the population got closer to its carrying capacity, either because governments would take steps to stop the population getting any bigger or because of raised competition and hardship within the population. This, Malthus’ thought, was what would save us from large scale starvation (Big picture education.com). Opposite to this, the population has not stopped growing. Since Malthus’ lifetime the number of humans on the universe has continued to increase, and in 2011 the world population reached 7 billion. According to Malthus’ theory, this should not have been possible.

Malthus did not agree with the sights of optimists like Godwin that either the population growth would be counterbalanced by a corresponding increase in means of subsistence, or reason would prevail leading to a check of population growth. He instead took the position that there was something like natural law, which forced the increase in population at a rate faster than the increase in food supply. He said “sex instinct is a powerful instinct in human beings” unless checked by moral restraint; it leads human beings to a high rate of population such a rate of procreation increases population in exponential progression (Lecture notes, History of economic thought vol 1).

Malthus, having identified poverty as the cause of population growth and increased population leads to a state of poverty, he recommended that the state should not recognize the right of the poor to receive support and it should abolish the poor laws (laws relating to the relief and care of the poor) because their tendency is to increase population without increasing the food for their own support.

He was strangely echoing Adam Smith’s contention that poor women give birth to a large number of children, while a pampered fine lady is often incapable of bearing any, and is generally limited by two or three.

Thus supply of additional means of subsistence induced large families and population only in the poorer families. (IBID) furthermore he said the poor should not be entitled to claim relief as a right. And not only had the poor any right to relief, but they must also be punished for their poverty.

He said;

“ a man who is borne in to a world already posed, if he cannot get subsistence from his parents on whom he has a just claim, and if the society don't want his labor, has no claim of right to the smallest part of food and shelter has no business to be where he is. At a native's mighty feast there is no free cover for him. She tells him to go, and will quickly execute her own orders, if he don't work up on the compassion of her guests. If these guests get up and make room for him, other intruders immediately appear demanding the same favor.

The guests learn too late their error, in counter acting those strict orders to all intruders, issued by the great mistress of the feast, who wishing that all guests should have plenty, and knowing that she couldn't provide for unlimited numbers, humanly refused to admit fresh comers when her table was already full”(Marx et al; 1971).

Malthus thought that if the human continued to grow, food production would not be able to keep up with the demand and there would not be enough food to go around. The result, he warned, would be a terrible famine that would kill many people!

In the 1970s the new Malthusians, formulated their argument on the basis of Malthus's logistic population equation(it is an equation saying that population increases exponentially and subsistence increases linearly).and they argue that poor nation will never be able to rise much above their subsistence level of per capita income unless they initiate preventive(birth control on their population growth).In the absence of their preventive checks, Malthusians positive checks (starvation, disease, wars) on population will inevitably provide the restraining forces (Colander; 2002).

Over the 250 years since Malthus published his essay, advances in technology and innovations in farming methods have allowed food production to grow quickly enough that we can now, in the theory at least, provide sufficient food for the world's 7 billion inhabitants.

He was certainly aware of differences in technology and (to a lesser extent conscious of the many existing varieties of social and economic organization. But he assumed technology...or "the state of arts" in his archaic phrase... to be constant. This was more than logical gambit; it is apparent that he foresaw few significant changes in the means and methods of production, especially with respect to food and fiber.

He appears to be assumed the continued use of the minimally sophisticated agricultural techniques of his own time. The scientifically controlled use of seed and breeds, culminating in the "green revolution," were obviously beyond his kin. The really fatal flaw in his argument, then, was his insistence up on treating technology and social organization as literal constants. In fact, they are potentially variable and any satisfactory theory of population must recognize their possible role in significantly modifying and extending the environment.

B. John Stuart Mill

J.S.Mill was one of the classical economists who agree with the population theories of Malthus (Muluken; 2003). Mill was conscious of the evil effects of a rapid increase in population. He looked the problem both in terms of economic consequences and social and moral generation.

He was aware of the problems of rapid population and means of subsistence and precedes his hypothesis as: "while a man how is intemperate in drink is discountenanced and despised by all who profess to be moral people, in is one of the chief grounds made use of in appears to be benevolent that the applicant has a large family and is un able to maintain them".

Mill hypothesized the above and presented himself as great advocate of population control from the stand points of having a large family was as bad as being a habitual drunkard. Unfortunately, the church and the social leadership did not condemn large families or advocate a restraint on the birth.

Jhingan (1997) also explains this ideal by his view on population growth and its consequences in terms of natural resource allocation, provision of public services and future consumption. Use of new land, housing power, water transport and others are explained by him as: “The consequences of population growth on the development of less developed countries are not the same because the conditions prevailing in these countries are quite different from those of developed economies”. These economies are poor, capital scarce and labor abundant population growth adversely affect their economic development in the following ways:

First, faster population growth makes the choice more scarce between higher consumption and investment in the future. Economic development depends up on investment. In less developed countries the resource available for investment is limited. Therefore, rapid population growth retards investment, needed for higher future consumption.

Second, rapid population growth tends to over use the country’s natural resources. This is the case when the majority of the people are dependent on agricultural holdings become smaller and un-remunerative to cultivate (Jhingan; 1988).

John Stuart Mill believed that maximum world population had been attained. He talks about the extermination of species and lake of solitude that would result from increased population growth.

2.1.2 Optimistic Views on Population Growth

The optimistic side of the population controversy was strongly set forth by Simon Gray in the happiness of states (1815). The growth of the number of people, he believed, leads to grater production and grater health.

Equilibrium is maintained between population and subsistence, for consumption regulates the demand; and the demand regulates supply.

Similarly, other optimists also believe that population, whatever the ratio increases, carries in itself the means of finding sufficient food. Its rise provides it with an extra number of hands.

And population does not in fact increase beyond the means of subsistence (Hutchison; 1967 p98). A counter argument against Malthus’ thesis on population issues was, also, made by

K.Marx and F.Engles who tried to disassociate poverty from population growth stating that people were poor because the economy and the society were organized in such a way that they did not have the opportunity to be anything but poor.

They have underlined that under a fair and just social organization in which technology; a factor disregarded or treated as static by Malthus, was designed and used for the benefit of all people, unlimited population growth accommodated at a healthy and comfortable standard of living (National Office of Population; 2003).

Anti-Malthusians and other optimists argue Malthus theories violate the situation of developed nations who all aspects of production are diversified and their economic development maintaining their population growth and some developed nations are about under replacement population growth trends. But in developing countries like the Ethiopia, the theories of Malthus do suit currently to trend of population growth and means of subsistence.

Among other writers in his book, principles of population and production (1816), highly criticized the Malthusian theory and he says during alternative progress of population and subsistence in the earliest and most advanced stage of society. A previous increase of people is necessary to stimulate the community to a further production of food consequently to the health advancement of a country in the career of strength and prosperity. It results from this proportion that the excess of population just beyond the cause of most of the miseries of human life, in fact the cause of all public happiness, industry and poverty (Tsega; 2003).

There are also other theorists who believe that great wealth and large number of men, as being a ruler's source of strength. Scholars who support this view contended that population growth is not a problem, rather it is an asset. The general convention that a large and growing population is beneficial was based on certain assumptions. Some of these include:

- ❖ There is no need to fear that with large numbers of people some will be unable to find employment. Because the more the people the more is the work and business, and the more wealth and happiness
- ❖ The power and wealth of a state are rooted in the number of people (particularly this was mercantilist's argument)

- ❖ Large population enables a country to utilize its resources endowment in a more efficient manner by making available sufficient labor forces
- ❖ Population increase the per capita benefits of investment in transport, communication, and market, and rural areas in irrigation, agricultural extension services and provision of social services specially health and education
- ❖ Urges to adopt a technological progress through which an increase in productivity of labor can be augmented
- ❖ The land was naturally fruit full, resources could be much farther exploited, and scientific studies could add greatly to the national well-being. And GOD has given every land in the world its own resources to support its inhabitants

a) Greek's Views

The history of formal recorded population through begins with the Greeks of the classical period. They regard a numerous population as source of national power and military strength.

Aristotle, one of the great Greek philosophers, said that "...he who had three children should be excused the night watch, and that he who had four should no pay taxes" (Hutchson; 1967). Athens also seems to have sought to promote the marriage and child bearing of its citizens as a matter of practical politics.

The spirit of every Grecian government was generally adverse to the increase of population. For Xenophon, another great Greek philosopher, population is not a burden rather it is an asset, which enables to have high production and high quality products. But Plato did not share the optimistic view of the Greek philosophers; instead he argued that, an ideal state should keep a close watch on the number of its citizens. So there should be neither too few nor too many.

The appropriate number of citizens was set at 5040, and the production was to be held constant at this figure, either by encouragement of procreation or by application of certain unspecified checks. According to Plato, if numbers should fall of despite measures favorable to increase, strangers might be admitted to citizenship as a last resort. But if numbers increased above the appointed level despite controls, emigration of the colonies was suggested.

b) Boserup's View

Ester Boserup, a Danish agricultural economist, is distinguished by two intellectual achievements: a seminal theory of population to rival Malthus in importance, and pioneering work on the role of women in human development. Turning to her population theory, she provides a hopeful option to Malthus.

Ok, hence the population is coming to the point when the food supply is reaching depletion, Thomas Robert Malthus says, the extra people have to die. Boserup says that you just have to upgrade the productivity of food supply. Under pressure of numbers, with more mouths to feed, people put more labor and more intense effort in to feeding themselves, and find ways to get more food production out of the land. They cultivate the land more intensively, they add extra manure, extra fertilizer, extra water, and improve their crops. They invest their way out of the Malthusian crisis.

Indeed, the Malthusian trap may even drive the development of technology. As chairman Mau mentioned, every mouth coexists with a pair of hands. Boserup's argument is basically that we would never out-strip our food supply, as technology will always continue to improve to keep up with demand; she regarded that as population increases more pressure is placed on the existing agricultural system, which encourages invention of new technologies.

Boserup emphasizes that human population growth density stimulates technological changes that increase the productivity of land. She regarded as the growth of population as the autonomous factor making a steady intensification in agriculture, which in turn brings a host of economic and institutional changes in its train (Tsega; 2007 :).

Boserup developed her ideas in connection with traditional farming systems in South East Asia, but her ideas have been applied to global agricultural patterns. In her work 'the conditions of agricultural growth: the economics of agrarian change under population pressure' (1965), Boserup challenged Malthus' conclusions that the size of human population is limited by the amount of food it can produce. Boserup recommended that food production can, and will, rise to match the demands of the population.

Drawing on her knowledge of farming in the developing world, where population were growing rapidly, Boserup argued that the threat of starvation and the challenge of feeding more mouths motivates people to improve their farming methods and invent new technologies in order to produce more food.

Boserup identified this switch as 'agricultural intensification', for example, a farmer who has four fields to generate food for his family might grow crops in one of his three of his fields, but leave the fourth field vacuum as the ground is crisp and his crop will not grow there accordingly. However, if the farmer has two more children, the pressure to produce more food might derive him to build irrigation canals to bring water to the fourth field or to buy a unique kind of seed that could grow in drier fields. He would change the way he farms to make sure that has enough food to support a larger family.

Boserups' model postulated that (although in the short run there may be diminishing returns to agricultural labors). In the long run, however, the aggregate agricultural production function will shift upwards in response to population pressure.

- a. Thus, she explicitly rejects the classical notion of a continuous agricultural production function and proposes a discontinuous production function suggesting dynamism of pre-industrial agriculture to the extent that technological progress concerned (Ibid).
- b. The effect of population growth technical progress can in turn be divided in to two parts. First, population growth may spur technical progress out of the pressure created by high population density. This is the "demand driven" view explored by Boserup 1981.
- c. Second, population growth creates a larger pool of potential innovators and therefore a larger stock of idea and innovations that can be put to economic use. This is the supply driven view taken by Simon (1997) and Kuznets (1960), (Ray, Development Economics).
- d. latest theories and agreements also propose that the issue of population and development is becoming a bothering one.

- e. The international Conference on Population and Development (ICPD) held in Cairo in 1994 emphasized the need to integrate population issues in to economic and development strategies with the assumption that this will both speed up the pace of sustainable development and poverty minimization and contribute to the attainment of population targets and an improved standard of life of the population. The conference further stressed the need to integrate population concerns in to:
 - f. Development strategies, planning, decision making and resources allocation at all levels and in all regions, with the goal of achieving the wants, and promoting the quality of life, of present and the coming generations;
 - g. All dimensions of development planning in order to improve social fairness and to abolish poverty through sustained and continuous economic growth in the context of sustainable development.

The conference emphasized the need to integrate population issues in to the formulation, implementation, monitoring and evaluation of all policies and programs relating to sustainable development at international, regional, national and local levels. It has also been noted that development strategies must realistically reflect both the short, medium and long-term implications of, and consequences for, population dynamics as well as patterns of production and consumption [ICPD, 1994]. Concluding from the outcomes of the Conference, population issues are becoming a global agenda requiring the global community to act in an effective way.

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A counter argument against Malthus' thesis on population issues was, also, made by K.Marx and F.Engles who tried to disassociate poverty from population growth stating that people were poor

because the economy and the society were organized in such a way that they did not have the opportunity to be anything but poor.

They have underlined that under a fair and just social organization in which technology; a factor disregarded or treated as static by Malthus, was designed and used for the benefit of all people, unlimited population growth accommodated at a healthy and comfortable standard of living (National Office of Population).

Summing-up, here is the summary of main arguments for and against the possible consequences of rapid population growth will cause serious challenges on development efforts. From this there are three general lines of argument postulating that population is not a cause for concern. The first one focuses on terms like underdevelopment, resource depletion, population distribution and subordination of women as real problems rather population of a certain country. The second line of argument falsifying the significance of population growth as a main development challenge is the view of frequently talked the danger of population growth as a deliberately contrived false issue. This is based on the notion that developed nations over concern on the population of developing ones is just to maintain international status quo and to impede the development of least developed countries.

The third and last line of argument is the belief of taking population as a desirable situation or phenomenon. This views population as a positive factor of development by explaining the possible merits of it like providing sufficient and low cost labor supply, large consumer demand to generate desirable economies of scale in production to achieve higher levels of output in nations.

2.2. Empirical Review

A neoclassical growth model like Solow in 1956, takes the population as exogenous independent on economic dynamics following arithmetic line of expansion. Solow (1956) assumes a constant population growth and signifies how economic growth is influenced by population growth. Population growth, he thought, rises labor force supply and thus increases output per-worker growth rate in one hand, population growth reduces physical capital per worker; that finally diminishes productivity and output per-worker growth.

In this case, changes in population growth rates influence the economic growth of the nation, and it would be determining for economic development. In recent years, various economists and researchers are interested by the population growth relationship of least developing nations.

Addisu(2020) examined the nexus between population and economic growth of Ethiopia using time series data spanning over a period of 1981 to 2018. Accordingly, the study revealed that population and economic growth have meaningful long run relationship as he confirmed by the bound test co-integration approach. He also confirmed from the Auto Regressive Distributed Lag (ARDL) model estimate that, population seemed to have negative and significant impact on economic growth of the country both in the long and short run. Similarly, growth in GDP could be viewed as a factor having both significant and positive long run effect on the population of the country.

In 2015, Dauda and Aziakpono examined the possible effects of population dynamics on economic growth of West African states of which they collected the data from 1970 to 2011. For their purpose they used fixed effects and random effects estimation mechanisms and they found that a rise in population, fertility and labor force could improve economic growth of West Africans.

In contrast, the growth of those nations under study were assumed to be lowered by the increase in infant mortality. However, empirical several studies have found a combination of negative and positive findings has been seen in these studies. Jorge et al. (2016) examined the motion of interaction between population growth and economic growth in Mexico. By employing a structural break co-integration and time series data for the period 1960-2014, their study founded the presence of a long-run relationship between population and economic growth in Mexico. Moreover, their study assured that, there is two-directioal of causality between population and economic growth in Mexico. Temitope et al. (2013) examined the effect of population dynamics such as mortality and fertility, on the economic growth of thirty five Sub Saharan African Countries.

Using the 5 average data starting from 1970 to 2005, pooled ordinary least squares and the dynamic panel data analysis, their study results revealed that, total fertility rate and life expectancy at birth had a negative and a positive effects on economic growth, as put in respective order thereof.

In 2001, John Thornton studied on ‘population growth and economic’: the long-run evidence from Latin America and concluded the following; does not observe long run relationship between per capita GDP and population growth and hence population growth neither causes per capita GDP nor is caused by it.

An empirical study by Kidane Alemu at Dilla University in 2020 found the prevalence of strong and positive relationship both in the short and long run between the two variables i.e. population and economic growth. He examined the occurrence or link within per capita growth and population growth for the period 1980 -2018 using ARDL (Autoregressive Distributed Lag) model.

Eli and Amade (2015) by employing descriptive statistics and regression analysis on data collected from 1980 to 2010, investigated the impact of population growth on the economic growth of the Nigeria. They found appearance or occurrence of a positive relationship between economic growth and export growth, population, and fertility, while negative links were found between economic growth and, life expectancy as well as crude death rate. Emmanuel (2015), investigated the correspondence between population growth and economic growth in Ghana with empirical investigation. By applying time-series data spanning from the period 1980 to 2013, Bounds test method co-integration and Granger – causality test, the study resulted negative relationship between population and economic growth in the short-run and, one directional causality in the long-run between the two variables. Additionally, it showed that population density and labor force affect positively, meanwhile the unemployment rate inversely affects economic growth over a long period of time.

By employing the Vector Auto Regression (VAR) estimation method for an annual time series data ranging from the period 1963 to 2009, Thuku et al., (2013) scrutinizing the relationship between population growth and economic growth in neighboring country, Kenya. Consequently,

their study found that the population has a positive influence on economic growth, and consequently helps the development of the country.

Dao (2012), by using Least Square Estimation on linearly multivariate regression and using data on forty-three nations, examined population and economic growth in developing countries. The result revealed that Gross Domestic Product per-capita, linearly, and negatively depends on population growth, but fertility rate and urban growth were found to be statistically insignificant interaction with planned family planning and significant socio-economic structural changes.

However, there a scanty empirical study conducted on a similar issue for the case of Ethiopia. Terefe (2018) investigated the relationships between economic development and population indicators in Ethiopia. By using time series techniques and descriptive analysis, the study showed that the growth of GDP negatively interacts with population growth, total fertility rate, child mortality rate, infant mortality rate and unemployment. Besides, economic growth positively interacts with primary and secondary school enrolments, technical and vocational education and training, undergraduate studies, and health. Nonetheless, his analysis lacks econometric models— making inference between population and development impossible. Generally, from the above studies, it is concluded that population-growth nexus lead to a mixed result.

Stephan Klasen and David Lawson (2007) investigated the impact of population growth on economic growth and poverty reduction Uganda using both macro and micro econometric methods, employing panel data. They find both strong empirical evidences and theoretical considerations which suggested population growth in Uganda exerts considerable break on per capita income growth prospects.

The examination additionally showed that population growth significantly contributes to low achievement of poverty reduction efforts made and also associated with households with large family are persistently poor and moving to poverty.

Using time series data spanning from 1975 to 2008 and Auto Regressive Distributed Lag approach of co-integration as well as regression analysis Sher Ali, Amjad Ali and Amjad Amin (2013) examined the impact of population growth on economic development in Pakistan. The

result of the model shows that the impact of population is positive and significant but the problem related with large population rise is the flood of newly produced work force, its management and providing various facilities like even fundamental needs become a challenging for government authorities and policy makers to handle.

Unemployment

Unemployment is a universal problem that can be found both in developing and developed nations though it is much higher in least developed countries as one can expect. There are many problems that can follow from the problem of unemployment among those creating economic problems and triggering social insecurity are two to mention. Unemployment is a term to identify those group of population who are not doing work but actively searching for job under a specified age group. Several reasons be forwarded for the occurrence of unemployment. Inflated population growth rate, non-function of the industrial sector, low wage, instability in economic, social and state security, discrimination and other reasons can cause unemployment in a certain nation (Debraj Ray, 1998).

The relationship between economic growth and unemployment has been studied by many researchers, academicians and concerned organizations. Among many, controlling the level of unemployment in a certain nation is the one major function of national banks which in turn could have huge returns in stabilizing the social, political, economic and other conditions. The macroeconomic problem of unemployment affects the people severely both psychologically and in standard of living. The result of the study which examined the correlation between economic growth, investment, unemployment and population growth in Ethiopia from 2000 – 2019 revealed that unemployment were in opposite direction to economic growth, investment, total population and working-age population but positively correlated. (TibletsNguse, Maria Fekete,-Farkas, ZoltanZeman, BetgiluOshora 2020) SzentIstván University – Hungary.

AbiySerawitu,(2020) found that real gross domestic product and unemployment have negative relation and also pointed out that urban unemployment particularly in Addis Ababa and Dire Dawa is becoming the major challenge since 2009.

Human Capital

Economic theories usually suggest the importance of human capital in attaining economic growth and many empirical examinations confirm this linkage for many countries in the world. Human capital plays a special role in a number of models of endogenous economic growth. In Romer (1990), human capital is the main input to the research sector, which generates the new products or ideas that emphasize or pick out technological advancement. Hence, nations with higher beginning asset of human capital experience a more rapid rate of introduction of new goods and thereby tend to grow faster.

According to Sianesi and Van Reenen (2003) the two main macro approaches are the Augmented Solow model and the new growth theories.

The Augmented version extends the basic framework to allow human capital as an extra input to enter the production function. Particularly Mankiw (1992) showed that traditional growth theory can accommodate human capital and provide a reasonable approximation for empirical analysis. At the economy wide level, it may also take in to account human capital externalities.

The empirical methodology, regarding the income model, is based on human capital augmented growth model of Mankiw (1992) with essential modifications for time series data.

This model assumes human capital as an exogenous factor of production. According to Griliches (1997), the main and possibly the only approach to test the productivity of schooling directly is to include it as a separate variable in an estimated production function. It is, therefore, represented in a Cobb Douglas production with constant returns to scale.

$$Y_t = k_t H K_t (A_t L_t)^{1-\alpha-\beta}$$

Where Y_t represents output, A is the level of technology. K , L and H are physical capital, labor and human capital respectively.

The predominant empirical literature on economic growth generally employs the cross sectional data. Though it is believed that differences may actually exist across countries, these studies assumed the existence of identical aggregate production function for all the countries under

study. Thus, the application of time series frame work helps to better understand the specific historical development in perspective (Netsanet, 1997).

All of the talents, education, skills and abilities that human workers acquire and the value that bring to the market place is what we call human capital. A nation's literacy rate impacts human capital-the share or percentage of the population that can write and read. Countries that invest in education, health and training of their people will have more and huge valuable workforce that is capable of producing more goods and services. People that have training, education and health are more likely to contribute to advancements in technological innovation that in turn can lead to finding better uses of natural resources and producing more goods for the country.

Both empirical and theoretical investigations on the contribution of human capital in enhancing economic growth produced solid and meaningful reasons for the variable to be taken carefully as a major determinant while conducting researches. Differences in quality of human capital (and may be sometimes quantity) in the world makes differences in standard of living that we are witnessing these days. The knowledge and skills that workers acquire through training, formal education, seminars and others can progressively improve one's profession that have positive effects on his or her job performance.

TewodrosZerihun (2014) studied the existence of causality between human capital and economic growth in Ethiopia and found the existence of long-run stable relationship between the two variables. KidanemariamGidey (2015) analyzed the impact of human capital on the economic performance of Ethiopia using the ARDL approach to co-integration and the result of his research showed the existence of stable long-run relationship between real GDP per capita and government expenditure, gross capital formation, labor force, education human capital, and health human capital which are consistent with the endogenous growth theories.

Trade Openness

Economists and other scholars usually advocate the importance of international trade that enable nations and consumers to have goods and services which are not found in their own location which accelerates economic growth.

In economic growth models, there is no precise relation between rate of economic growth and trade. In the early economic growth models like Harrod-Domar, where capital is considered as the sole factor of production trade liberalization measures has positive growth effects (Srinivansan, 1999). EleanyaKlau (2013), empirically tasted the relationship between trade openness and economic growth in Nigeria using ordinary least squares (OLS) technique for time series data and the finding of the study shows the prevalence of positive relationship between openness and economic growth. Moreover, the researcher added that 5% level of economic growth could be obtained for a unit increase in degree of trade openness in Nigeria.

YayaKeho (2017), investigated the impact of trade openness on economic growth of Cote d'Ivoire and observed a mixed of inconclusive results which might be a result of omission in variable that could be included in the mode.

The results from Autoregressive Distributed bound test to co-integration and Granger causality tests showed the existence of positive relationship between trade openness and economic growth both in the short and long-run in Ivory Cost.

Saving

The correlation between saving and economic performance has been the subject of many researchers for many years. Increasing the level of national saving and investment is a mechanism of rising nations' economic growth (Michael P.Todaro, 12thed 2014). Macroeconomic balance is the fundamental reason why all economic models we all deal are created. For the economic growth to be positive, investment should exceed the depreciation amount of capital that must be replaced and hence allow the next period's cycle to rehabilitate or recur on a larger scale. The reason why the growth rate of a given economy is highly dependent on saving and hence investment is this vicious circle bonded nature of variables or facts listed above.

Agriculture

Agriculture is an important factor in explaining the economy of many countries in the world- particularly in least developing nations of which Ethiopia is one. Before considering how to bring development, one should seriously know about the nature of agriculture without which one may encounter difficulties to understand the possible steps required to bring development in agriculture and how those switches will affect the people involved.

The invaluableness of this sector was defined by many researchers and agro-economists at different times. Gunnar Myrdal, as cited by Michael P. Todaro, said about this fundamental sector that the battle for long-term economic development will be won or lost in the agricultural division of the economy.

Agriculture is the main activity in Ethiopia, where about 84% of the country's population engaged in various agricultural activities and generates its income for household consumption to sustain its livelihood. Additionally, the nation generates the largest share of its foreign currency earnings from the export of this sector's products abroad and now the sector contributes about 42 percent to the nation's gross domestic product, and above all, the sector is believed to be the main source of capital to be accumulated for the process of establishing the future industrialized nation, which again indicates the predominant role played by this sector to bring about sustainable economic development for the country in the years to come (CSA 2020).

In spite of the fact that agricultural development lonely is unable to eradicate hunger and malnutrition, it is an obligatory, necessary and priority element. Protecting rural activity systems is a determining factor. This will occur either by securing land access — in particular for women and young people; by controlling and minimizing agricultural risks; by diversifying agricultural activity systems and sources of income (uplifting rural “multipurpose”); or by enhancing the structuring and directive of markets (New Partnership for Africa's Development- NEPAD, 2021). Hence, a science based on agricultural development model can thus be taken here as an important multi-dimensional model for today's disaster in agricultural sector for our nation, Ethiopia.

CHAPTER THREE

3. RESEARCH METHODOLOGY

3.1. Methods of Data Analysis

The study analyzes the long-run and short-run relationship between the dependent and independent variables during the period 1991 to 2021. Tiwari (2011) maintains that before conducting static and dynamic analysis certain pre-estimations like unit root and co-integration are required because without them conclusions drawn from this study may not be valid.

The paper also construed as a combination of a VAR model and a vector error correction model (VECM). A VEC model is a special form of the VAR for order of Integration I (1) variables which are co-integrated (Griffiths et al. 2008).

Specifically this VAR methodology enables us to estimate the correlation between the growth rate of real GDP, national saving, population growth rate, agricultural growth rate and other variables included in the model.

Regarding the objectives of the study, the available literature provides a number of differentiated or distinct conceptual rationales for the inclusion of human capital and population growth rate in the models of economic growth. For example, the Solow growth model shows that a nation's population growth rate is the long-run determinant of standard of living; the lower level of output per worker is the result of the higher rate of population growth. The predominant empirical literature on economic growth generally employs the cross sectional data. Though it is believed that differences may actually exist across countries, these studies assumed the existence of identical aggregate production function for all the countries under study. Thus, the application of time series frame work helps to better understand the specific historical development in perspective

In this study, different techniques of analysis like simple descriptive analysis and advanced econometric techniques are employed. Percentages, averages, variances, graphical representations and other methods are typical examples of methods categorized under simple descriptive analysis.

The empirical approach on this paper would be based on vector autoregressive approach (VAR) and vector error correction model (VECM). A VECM model is a special form of the VAR for order of integration $I(1)$ variables which are co-integrated (Griffiths et al. 2008.)

Particularly, this VAR methodology enables to estimate the correlation between rates of population growth, per capita growth, unemployment, saving, agricultural growth and human resource development. VAR is a method of time series analysis that assumes any structural association among the economic variables under examination. Pre estimation mechanisms like unit root and co-integration tests are needed prior to drawing conclusions because without those one may conclude wrongly (Tiwari 2011).

Assay of both descriptive statistics and econometric model were used to look over the collected data. The descriptive statistics was used to summarize trends of different variables through graphs.

The study was applied econometric models to estimate the coefficients of variables. It uses co-integration method and Error Correction Model to show the influence of major macroeconomic and demographic factors on economic growth. The commonly augmented Dickey-Fuller (ADF) unit root tests for determining the variables' orders of integration was applied.

The use of structural vector autoregressive was needed just because of the possibility to model the response over time of any variable in a set to either an own disturbance or a disturbance to any different variable in a system of equations (Stock and Watson, 2001).

A structural vector autoregressive was used to inspect or observe the relationship among a set of economic variables and ascertain the dynamic effect of stochastic disturbances on the system of variables during the study. Thus the model can be specified as follows,

Real GDP growth = f (population, unemployment, human capital development, Trade Openness, saving, government expenditure)

$$\text{YRGDPGR}_t = \alpha + \beta_1 \text{RGDPGR}_{t-1} + \beta_2 \text{PGR} + \beta_3 \text{HCI} + \beta_4 \text{Opn} + \beta_5 \text{SR} + \beta_6 \text{AGR} + \epsilon_i$$

Where,

RGDPGR = Real GDP per capita growth

PGR = population growth rate

Ur = unemployment rate

HCI = Human Capital Index

Opn = Trade openness

SR= Rate of saving

AGR = Agricultural growth rate

ϵ_i = white noise error term

An increase in population growth rate could supply huge labor force to the economy which leads to economic prosperity but at the same time it brings a rise in level of unemployment. Human resources development is critical because it is an investment in one's employees that will finally result in a stronger and more fruitful labor force.

Agriculture is the sector in which Ethiopia's economy largely depends on. This sector accounts for 80% of the country's export and 40% of total GDP (USAID, 2021). The nearly half GDP contribution of agriculture in the economy makes it a well-deserving variable and the inclusion of it in a certain mathematical model of agrarian nations in analyzing the economic growth must not thus be phenomenal or surprising.

When an organization develops their employees, they are strengthening their assets and making these employees even more valuable a development in human resource together with a rise in labor supply confirms economic growth. Investment is very principal in a nation's economic development: It's the main source of employment creation and the main reason of economic growth. Investment increase involves Gross Domestic Product (GDP) and National Revenue increase. Investment induces the economic prosperity and welfare improvement in general.

Whereas, saving is another important component to the economic progress of a country because of its relation to investment. If there is to be an increase in productive wealth, some individuals must be willing to abstain from consuming their entire income.

3.2. Data Type and Source

The study utilized secondary data comprising of time series observations over the period 1991-2021. Following the coming to power of new government and consequent economic reforms in Ethiopia in 1991, the researcher decided this year as the starting time to consider in this time series study. These data were obtained from published reports and online databases of the Central Statistical Authority (CSA) and the Ministry of Finance and Economic Development (MoFED) of Ethiopia; the World Bank; World Population Prospects and World Fertility Policies of the United Nations (UN); World Development Report of the United Nations Development Programme (UNDP); the State of World Population of the United Nations Population Fund (UNFPA); National Bank of Ethiopia (NBE), The Economist, International Monetary Fund

(IMF), American Economic Association (AEA), Ethiopian Economic Association (EEA), and other data sources relevant for the study.

3.3. Description of Variables

GDP per capita(Y): is the summation of total value added by every resident living in the country plus product taxes minus subsidies which are not included in the valuation of output divided by mid-year population (WB).

Population Growth Rate (g): measures how fast the number or size of population is changing (the average yearly rate of change of population size during a specified period) (WB, 2019).

Unemployment Rate (Ur): is defined as that proportion of labor force which currently have no job but could do.

Human Capital (HC): is the addition of value by professional education, training and other ways that could help one to upgrade on certain circumstances.

Trade Openness (Opn): also known as business statistics is the ration of gross tangible investments to value added.

Saving Rate (S): the amount usually given as a percentage of tax less personal income (Y_d) that an individual save. Saving rate shows the average time preference of groups or the rate of time preference for an individual (Asefa, 2021).

Agricultural Growth Rate (Agg): a percentage change in the value of agricultural output usually in annual basis.

CHAPTER FOUR

4. RESULTS AND DISCUSSION

4.1. Descriptive Statistics and Results

Descriptive analysis is an analysis of the collected data so as to describe, show or summarize in a meaningful way. Descriptive analysis is essential for;

- Parametric and non-parametric tests
- Both quantitative and qualitative research
- Identifying whether the sample is normally distributed
- Knowing whether there outliers in the data and also provides information on
- ✓ Measures of central tendency –mean, median and mode
- ✓ Measures of dispersion – range, variance and standard deviation
- ✓ Measures of normality – kurtosis (measure of degree of sharpness) and skewness (measure of degree of asymmetry).

Variable	RGDPGR	PGR	HCI	Ur	Oppn	SR	AGR
Mean	6.85	2.94	1.21	2.81	3.26	5.54	4.85
Sta. Dev	5.68	0.30	0.19	0.50	1.96	2.18	6.06
Min	-8.90	2.53	0.33	2.25	0.19	3	-10.48
Max	13.36	3.66	1.45	3.71	6.76	10	16.96
Variance	32.36	0.09	0.04	0.26	3.88	4.79	36.72
Skewness	1.34	-1.517	-1.02	0.68	-0.23	0.58	-0.43
Kurtosis	6.61	6.64	7.91	3.92	2.61	3.44	4.11
Obsns	31	31	31	31	31	31	31

Table 4.1 Summary table of descriptive statistics

As noted above, the mean of an observation is the average of a data set calculated by summing all the numbers in the data set and then divide the sum by the number of values in the set.

From the above table, we can see that real gross domestic product growth rate has the highest average value for the period under study with a value of 6.85 followed by saving rate with a value of 5.5.

On the other hand, human capital index has recorded the lowest value of arithmetic mean among others included in the model. Agricultural growth rate is the other variable with the highest value of standard deviation with an amount of 6.06 – while human capital index is with the lowest magnitude of standard deviation i.e. 0.19. This value of standard deviation shows that the growth rate of the country's back bone sector remained inconsistent throughout the period of time covered this paper. While, human capital index has the smallest variability from the mean (0.19) this could be resulted from lack of education to the majority, mal nutrition, health centers and other fundamental supplies that might retard the index of human capital.

The minimum value in a row of a certain variable indicates the smallest observed growth rate of that variable ~ while the maximum shows the highest growth rate of the subsistence sector.

The figure below shows the eigenvalue stability condition suggesting that all the VAR model satisfies the stability condition because all the eigenvalues are inside the circle.

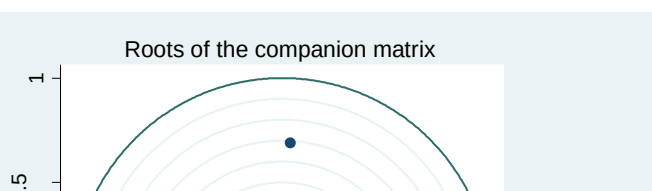


Fig. 4.1 Eigenvalue stability condition

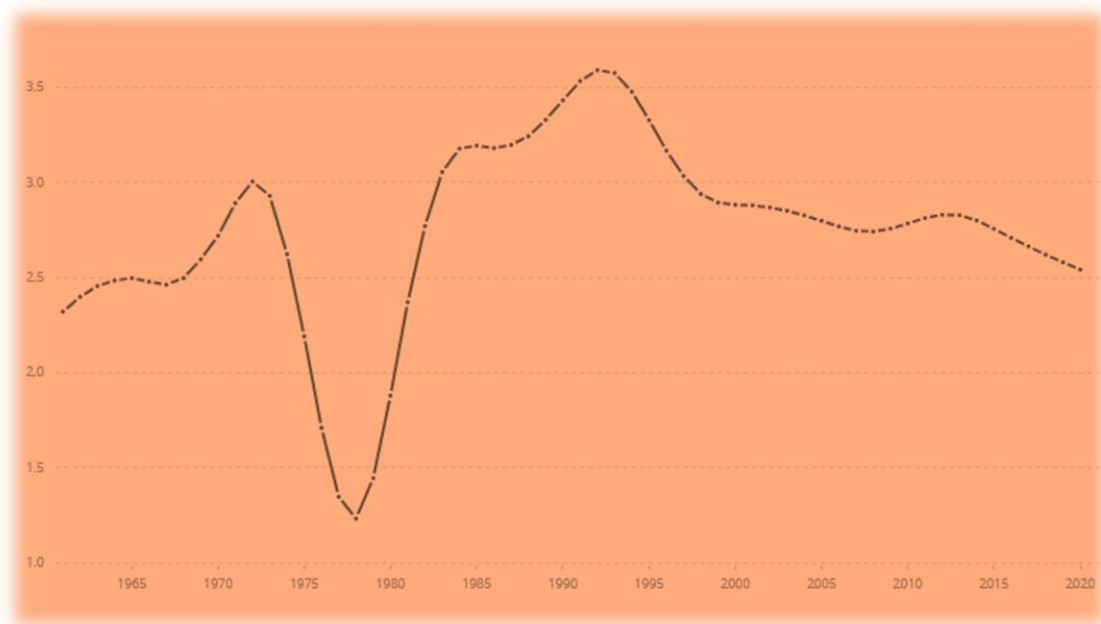


Fig. 4.2 Population Growth (Annual %) – Ethiopia from 1961 – 2020

Source, the World Bank Report, April 27, 2022

The figure above exhibits that the trend of Ethiopia's population gradually increases even though there seems a decline in annual growth rate. This is because of the existence of population momentum which explains efforts to control population growth cannot be changed significantly overnight, an in-built momentum means that tomorrow's parents have already been born. In 1991, only ten nations in the world had a population growth rate of above Ethiopia (3.53) while

after 30 years in 2020, more than twenty five countries registered a population growth rate of Ethiopia's (i.e. 2.54). The majority of these nations experiencing larger figure of growth rate in population are located in Sub Saharan Africa with Equatorial Guinea the highest leading by 3.41 percent and others like Zambia, Burundi, Tanzania, Somalia and others whose economy at the same time is categorized in the bracket of least developed nations (LDCs).

4.1.1. Analysis of the socioeconomic circumstances of the country

A. Population. Never before in history have there been so many people on the country as right now. Our numbers have skyrocketed from less than 35.14 million in 1980 to over 53 million in 1994 and continued to raise up to 73 million in 2007, more than 85 million in 2013 and to over 120 million in 2021.

The countries population increased fourfold in the last four decades, so what can we expect for the next decades? And what does population growth mean for our future? Will there be mass migration, overcrowded slums and megacities covering the nation? Diseases and pollution? Chaos and violence over energy, water and food? And societies focused only on sustaining themselves. Will population growth destroy our way of life? As a consequence of rapid population growth, one can give apocalyptic prophecy of the disadvantaged poor would procreate endlessly and overrun the relatively developed or improved cities and towns. The problem of overpopulation start its miseries on the nation and even be worsen by the permanent nature of high birth rates and the resulting population explosion.

The Demographic Transition

The demographic transition model shows the change in population of a certain nation over time. It also tries to study how birth and death rates affect the total number of population of countries.

The term demographic transition can also be defined as the process by which fertility rates gradually decline towards replacement levels (Todaro, 2014). This concept tries to explain why all the contemporary developed nations passed through all the three stages of modern population history. Stage①; this stage is characterized by low growth, high birth rate, high death rate, no industrialization

Stage②; stage 2 began when high incomes, healthier diets, better public health methods and other progressions together with modernization led to a significant decline in mortality and the consequence of raised life expectancy at birth from forty to sixty years of age. However, the decline in rate of deaths was not instantly went with a decline in fertility rate. Consequently, there existed a sharp increase in population growth due to a growth of divergence between declining death rates and raising birth rates when compared with the previous stage of demographic transition. This stage marked the onset of demographic transition; i.e. the transition of population from slow or nearly stagnantly-growing population to first highly rising numbers and then to declining one.

Stage③ is the final stage in which the outcome of development and modernization caused the downfall of fertility and in the long run this decline in birth rate converged with the falling death rates which in turn results little or no population change.

The prevailing population bomb threatens the country's peace and makes the battle of fighting against poverty lost or nearly lost. The basic point is that we have finite resources and at the same time we cannot have infinite number of population growth. Population growth outstrips food supply. The population of Ethiopia is characterized by one of the fast growing population in the world. The size of Ethiopian population was 42 million in 1984.

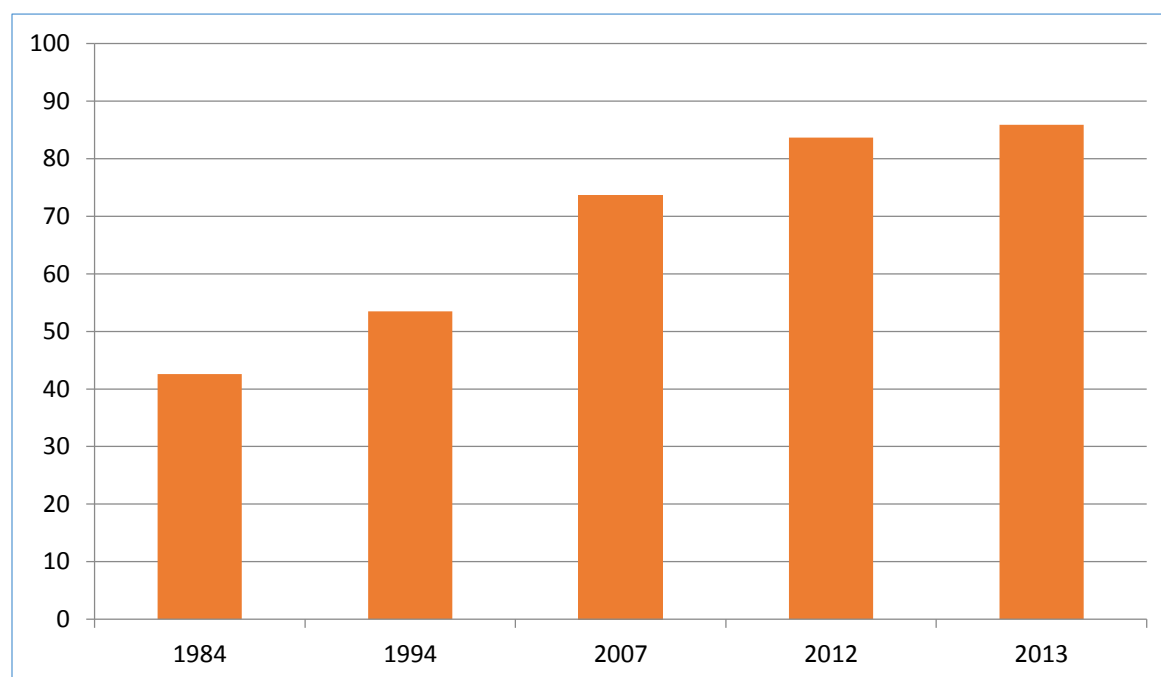
This figure increased to 53.5 million in 1994 and further to 73.7 million in 2007. The country's population size was 83.7 million in 2012 and 85.89 million in 2013 as projected by the Central Statistical Authority (CSA) based on the 2012 Inter Censual Population Survey (ICPS).

4.1.2. Trends of population in Ethiopia

The population of Ethiopia is characterized by one of the fast growing population in the world. The size of Ethiopian population was 42 million in 1984. This figure increased to 53.5 million in 1994 and further to 73.7 million in 2007. The country's population size was 83.7 million in 2012 and 85.89 million in 2013 as projected by the Central Statistical Authority (CSA) based on the 2012 Inter Censual Population Survey (ICPS). The data shows that the country's population is growing fast implying that more cares are required in properly handling this huge demographic

resource for national development and protecting its uninvited consequences ahead of their occurrence.

Fig. 4.3. Trends of population in Ethiopia



Source CSA: 1984, 1994, and 2007 census reports and the 2012 Inter-censual population survey projection.

Another important issue related to population size is household size. A household is one or more persons who occupy a single housing unit. It consists of unrelated persons or persons related by birth, marriage or adoption.

Average household size is the average number of members of the household. In Ethiopia, the average household size was 4.8(4.8 in rural and 4.6 in urban) in 1994. In 2007, the household size of the country slightly decreased to 4.7(4.9 in rural and 3.8 in urban).

In regions, the average household size ranged from the highest (6.5) in Somali region to the lowest (3.9) in Harari in 2007(table4.2). SNNP and Gambella were regions with increased household size in 2007 since 1994 while the rest of the regions show decline in average household size.

Tigray, Oromiya and Benshangul-Gumuz regions have shown no change in household size during the period under discussion.

Table 4.2 trends in house hold size of Ethiopia By residence and region

Residence/ region	House hold size		Changes (members per family) 2007-2012
	1994	2007	
Ethiopia	4.8	4.7	_0.1
Urban	4.6	3.8	_0.8
Rural	4.8	4.9	0.1
Tigray	4.3	4.3	0
Afar	5.7	5.6	_0.1
Amhara	4.5	4.3	_0.2
Oromiya	4.8	4.8	0
Somali	6.6	6.5	_0.1
Beni-gumz	4.5	4.5	0
SNNP	4.7	4.8	0.1
Gambella	4.5	4.6	0.1
Harari	4.3	3.9	_0.4
Addis Ababa	5.1	4.1	_1
Dire Dawa	4.7	4.4	_0.3

Source; CSA the 1994 and 2007 reports of population and housing census of Ethiopia.

4.1.3. Population Distribution

Population distribution refers to the patterns of settlement and dispersal of population over space within a country or region. The geographic distribution of population has critical roles over the demand for services and type and rate of resource utilization as well as on the type of economic activities in an area.

The distribution of Ethiopian population has concentrated in the highlands. Nearly, half of the population lives at altitude of 2200meters above sea's level or higher, while only 11% lives at altitude below 1400 meters. The remaining 40% of the population lives between 1400 2200 meters altitude.

Table 4.3. Labels and trends in regional distribution of population and percentage shares

Residence/region	1994		2007		2013		Average %age share
	Population size	%age share	Population size	%age share	Population size	%age share	
Ethiopia	53,477,265	100	73,750,932	100	85,889,000	100	100
Tigray	3,136,267	5.9	4,316,988	5.9	4,866,000	5.7	5.83
Afar	1,060,573	2.0	1,390,273	1.9	1,634,000	1.9	1.93
Amhara	13,834,297	25.9	17,221,976	23.4	19,626,000	22.9	24.06
Oromiya	18,732,525	35.0	26,993,933	36.6	31,948,000	37.2	36.26
Somali	3,198,514	6.0	4,445,219	6.0	5,165,000	6.0	6.0
Beni-Gumuz	460,459	0.9	784,345	1.1	947,000	1.1	1.035
SNNP	10,377,028	19.4	14,929,548	20.2	17,403,000	20.3	19.96
Gambella	181,862	0.3	307,096	0.4	383,000	0.4	0.36
Harari	131,139	0.2	183,415	0.2	220,000	0.3	0.23
Addis Ababa	2,112,737	4.0	2,739,551	3.7	3,170,000	3.6	3.76
Dire Dawa	251,864	0.5	341,839	0.5	415,000	0.5	0.5

Source: CSA, 1994 and 2007 population and housing survey of Ethiopia, and ICPS 2012.

The percentage share of regions' population from the national total population showed that the biggest region constitutes the highest share in both censuses periods-1994 and 2007. Accordingly, Oromiya region account 35% and 36.6% of the total population of the country respectively.

On the contrary the lowest share in those census periods, 1994 and 2007 were observed in Harari (0.2 percent of the total population in both census years).

The data shows that the country's population is growing fast implying that more cares are required in properly handling this huge demographic resource for national development and protecting its uninvited consequences ahead of their occurrence.

Table 4.4. Trend of Population Growth Rate

Ethiopia Population by Historical					
Year	Total Population	Growth Rate	Density	Total Population Rank	Density Rank
1955	19,947,292	1.93%	19.9473	25	138
1960	22,151,278	2.12%	22.1513	25	136
1965	25,013,626	2.46%	25.0136	25	139
1970	28,415,077	2.58%	28.4151	26	138
1975	32,566,854	2.27%	32.5669	26	138
1980	35,141,712	1.53%	35.1417	26	139
1985	40,652,141	2.96%	40.6521	24	139
1990	47,887,865	3.33%	47.8879	23	137
1995	57,047,908	3.56%	57.0479	22	132
2000	66,224,804	3.03%	66.2248	16	124
2005	76,346,311	2.89%	76.3463	15	119
2010	87,639,964	2.8%	87.64	14	115
2015	100,835,458	2.84%	100.8355	13	109
2017	106,399,924	2.7%	106.3999	12	104
2018	109,224,414	2.66%	109.2244	12	101
2019	112,078,73	2.61%	112.0787	12	100
2020	114,963,588	2.57%	114.9636	12	98
2021	117,876,227	2.61%	117.8762	12	98
2022	120,812,698	2.57%	120.8127	12	96

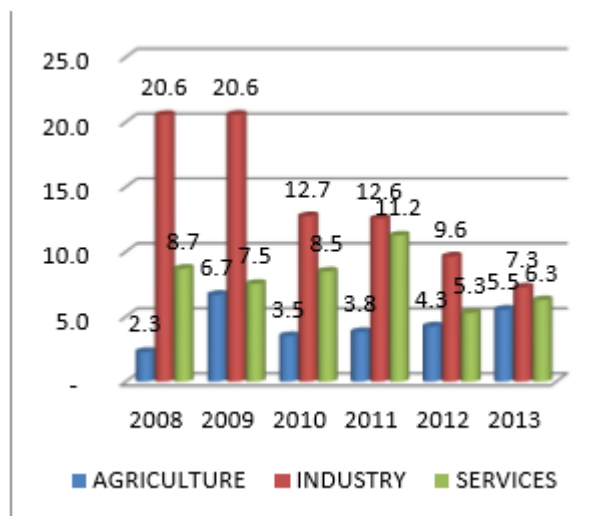
Source, World Population Review, 2022

The above table shows the trend of increasing Ethiopia's rising at an average growth rate of 2.65 percent annually starting from 1955 as shown in the above table. The highest growth rate in population of the country was recorded in 1995 with 3.56% and there observed a relative fall of this figure to 3.03 in the millennium. It is projected ,UN 2022, that the population of the country to be over 200 million by the year 2050 which is a terrifying number given that the economic counterpart is going not parallel so as to cope with. The growth rate in population being less than

offset by growth rate of GDP, the Ethiopian economy has almost been unchanged or remaining stagnant for the past four decades.

The economy of Ethiopia is a subsistence economy implying it is mainly dependent on agriculture, which in turn is not independent of nature specifically rain fall. It is in this sector that over 85 percent of the population rely on and accounts for the major share of GDP of the nation. The contribution of the other sectors like service and industry is not even half of the total GDP when summed up together. It is only 12% from the industry sector and the remaining is the share that come from service sector. Gills, et al, (1992) put the contradiction of circumstances between least developed nations like Ethiopia and the US where only 3 percent of the population lives in the sector of agriculture and in fact that amount can actually feed the whole world

Fig. 4.4 Growth rates of real GDP by major sectors of the economy



Source, Ministry of Planning and Development National Accounts Statistics for 2013 E.C

The wholes sale, retail trade, manufacturing, construction and financial sub sectors have shown lower improvement than the 2012 EC effecting due to various logics or reasons. To sum up, the economy has comparative healthier performance than the year 2012 E.C when seen at different manmade and natural problems faced in 2013 E.C.

4.1.4. Population and Macro Economy

Gross Domestic Product (GDP) and per-capita GDO Gross Domestic Product and per capita GDP are among the commonly used indicators of economic development with respect to national population. The Ethiopian economy is among the fastest growing economies of the continent in the past eight successive years. The total GDP of the country was 94.4 billion birr in 2005 which has increased to 159.2 billion in 2010 and further raised to 559.6 billion birr in 2023 with 11.5, 11.4 and 9.7 percent annual growth rate, respectively. The economy is agriculture dominated economy with a rapidly growing service sector from year to year. Agriculture was taking 47.1 percent of the national GDP in 2005. This share declined to 41.1 in 2010 and further to 42.9 percent in 2013 while the service sector was sharing increasingly higher proportion of the national GDP contribution with 40.4, 46.6 and 45.2 percent in 2005, 2010 and 2013, respectively.

The per capita GDP, the ratio of total GDP to the total population of the country, is showing improvements from time to time though it is among the low per capita level groups of the global economy. The average per capita GDP of an Ethiopian citizen was 1,172 birr (132.6 USD) in 2000. This has grown to 1,441 birr (216.6 USD) in 2005 and further to 10,051.5 birr (550 USD) in 2013 with 8.07 and 10.4 percent annual growth rates in 2005, 2010 and 2013, respectively (MoFED).

Trends of Economic Performance of Ethiopia

Ethiopia is one, among many, of the least advanced countries in the world in general and in Africa in particular. The growth rate in gross domestic product being more than offset by the growth rate of the population, the economy of the nation had almost been slow-moving for four decades before the millennium. That is the economy and the population of the nation were growing at a rate of 2.6 per annum for the period 1960-1999 which clearly shows the stagnation of per capita income.

The economy of the nation is a subsistence economy in the sense that it is agricultural dependent economy which in turn is dependent on nature. Being vulnerable to the fragility of nature, this sector of which the majority proportion of the population is living and accounting the highest

share of the nation's GDP can't even feed the country. The remaining small shares are to the service sector and to the industry one. It is possible to conclude that the highest share of the agricultural sector in parallel with poor performance of the economy is simply the reflection of the poor performance of the highest sharing sector in the economy i.e. agriculture. It is normal to observe the tremendous decline in agricultural output and the consequent gross domestic product of the country every time the nature turns bad since the nature of our economy's foundation.

The overall economic performance of Ethiopia mainly depends on the conditions that occur in the agriculture sector which accounts for the majority of the GDP of the nation. The World Bank in 1996 reports that no country in the Sub Saharan Africa and only two other nations in the world procure larger share of gross domestic product from agricultural sector than Ethiopia.

Agriculture is usually referred to as the back bone of the country's economy which means it has the power to determine the growth of all other sectors and finally the national economy. Evidence shows that although it is not the culprit behind economic stagnation, rapid population growth lowers per capita income growth in most least developed nations like Ethiopia, stagnation, rapid population growth lowers per capita income growth in most least developed countries, especially those that are already poor, dependent on agriculture, and experiencing pressures on land and natural resources.

With over 115 million population (2020) Ethiopia is the most populous country in Africa next to Nigeria, and in spite of that it is the fastest growing economy in the region of Sub Saharan Africa with growth rate of 6.3 in 2020/21 (WB,2021). For the past fifteen to twenty years, Ethiopia is among the fastest growing economies in the world with average growth rate of 9.5%. Following the outbreak of corona virus globally, the country's real gross domestic product growth slowed down in 2019/21 and further in 2020/21 with growth in services and industry reduced to single digits. Contrarily, agriculture sector where the majority of the population are engaged was not affected by the pandemic and the contribution of this sector moderately improved in 2020/21 when compared to the previous fiscal year.

The relative consistent economic growth in Ethiopia for around a period of decade and half emanate positive movement in efforts of poverty reduction in both rural and urban areas. There is

a decreasing trend in the share of population that live below the national poverty line from around 30% in 2011 to 24 in 2016 and there are also indicators of improvement in human development overtime. However, outcomes are moderate when seen to other nations that show fast growth, and more importantly inequality has raised in recent years. (WB, Apr, 2022).

4.2 Model Results

Majority of economic time series have a common likelihood or tendency of growing over time. In many cases, time series processes appear to be correlated simply because they all are tending over time for seasons related to unobservable factors. Ignoring this fact may lead one falsely conclude that changes in one variable are caused by other variables (Wooldridge,2003).This is so because in most of the time series data estimation may be found spurious, i.e. there may exist false causation simply due to some common trend in time. When regressing a time series variable on other time series variables, R-Squared may be found to be very high without meaningful relations. If the time series are not stationary, there emerges spurious regression. In addition, time series models are used for forecasting. But, its usefulness be conditional on the stationary of time series variables.

A markovian or stochastic process is known as stationary if and only if the mean and the variance are fixed regardless of the time considered. Stationary test make sure that there will no existence of spurious relation which is often found in non-stationary time series variables. If the data is non stationary, forecasting the result to the other time period may not have practical significance (Gujarati, 2004).

Mostly, macro-economic time series variables are non-stationary at level. Thus, the problem of non stationarity of these variables can be solved by differencing of them (Lecture note, 2014).

4.2.1. Unit Root Test

It is mandatory to examine that all variables are stationary in times of estimating time series models, and is conducted on each variable to find the order of integration. Stationarity is when a given variable has constant mean, variance and covariance over time, thus estimation based on variables which are not stationary may lead to spurious regression. If a time series variable is non

stationary, one can study its behavior only for the time period under consideration. Additionally, it is difficult to generalize to the future time periods standing from non-stationary series. White noise is a special type of stationary time series with zero mean, zero autocorrelation and constant variance.

Unit root test tests whether a time series variable is non stationary using auto regressive model. A popular test that is valid in considerable size of samples is the augmented Dickey-Fuller test, with the null hypothesis proposing that variables are non-stationary against the alternative hypothesis; the variables are stationary or have no unit root. The implication of unit root in macro-economic data, at least, potentially profound of a structural variable, such a real output, is truly $I(1)$, then shock to it will have a permanent effect.

It confirmed, and the observation would mandate some rather serious reconsideration of the analysis of macroeconomic policy (W.H.Green; Cited in Eyayu; 2014). Augmented Dickey-Fuller (ADF) test is useful to know whether or not there exists a unit of time series data is stationary at level, it is integrated of order zero $I(0)$, which means that it is not spurious. If the data is not stationary at level, we have to make differences (first, second...) until it becomes stationary. If non-stationary time series data becomes stationary after taking a difference, it is said to be a difference stationary.

Table 4.5. Results of Unit Root Test

Variables	Test Statistics	1% critical value	5% Critical Value	10% Critical Value	Stationary	P-Values
Y	-6.15	-3.72	-2.98	-2.62	I(1)	0.0000

G	-6.26	-3.72	-2.98	-2.62	I(1)	0.0000
HCI	-7.24	-3.72	-2.98	-2.62	I(1)	0.0000
Ur	-4.22	-3.72	-2.98	-2.62	I(1)	0.0006
Opn	-3.74	-3.72	-2.98	-2.62	I(1)	0.0035
S	-4.97	-3.72	-2.98	-2.62	I(1)	0.0000
Agg	-7.68	-3.72	-2.98	-2.62	I(1)	0.0000

From the above table, it can be observed that the p- values of all variables are less than 5% which leads the researcher to reject the null hypothesis (each variable has a unit root). *The closer the p-value to zero, the stronger is the evidence against the null hypothesis.* The outcome of the test shows that all variables are stationary of order one I(1).

The result of unit root test from the above table shows that the critical values (in absolute terms) at all levels of significance (i.e. at 1%, 5% and 10%) for all variables are smaller than the calculated t-values, and hence the non-stationary assumption of the null hypothesis cannot be accepted.

4.3. Vector Error Correction Model and Result of Co-Integration Test

Co-integration refers to the possible stationarity of two or more time series variables in combination in spite of the fact that they are non-stationary individually. By two variables or more variables are co-integrated, one mean that there is equilibrium or a long-run relationship between them. As shown in chapter three, the econometric model is a function the following variables; these are population growth rate, human capital index, agricultural growth rate, rate of saving, unemployment rate and trade openness....such that;

$$YRGDPGR_t = \alpha + \beta_1 RGDPGR_{t-1} + \beta_2 PGR + \beta_3 HCI + \beta_4 Opn + \beta_5 SR + \beta_6 AGR + \epsilon_t \dots \text{Eq.(1)}$$

While, VECM model is constructed to examine both the long and short run dynamics of the co-integrated series. This model is only used if and only if variables are co-integrated and the co-integrating term is known as the Error Correction Term. The model of restricted VAR (VECM) can also be characterized by the endogenousness of variables which are included in the system and is a system with a vector of two or more variables.

From the above equation (i.e. eqn.1) for simplicity purpose let Y_t represent RGDPGR and Y_{t-1} is the lag value of it.

Hence,

The Vector Error Correction Model (VECM) looks like;

$$\Delta Y_t = \alpha + \sum_{i=1}^n \alpha_i \Delta Y_{t-i} + \sum_{i=1}^n \beta_i \Delta PGR_{t-i} + \sum_{i=1}^n \gamma_i \Delta Ur_{t-i} + \sum_{i=1}^n \delta_i \Delta HCI_{t-i} + \sum_{i=1}^n \eta_i \Delta Opnt_{t-i} + \sum_{i=1}^n \zeta_i \Delta Srt_{t-i} + \sum_{i=1}^n \kappa_i \Delta Aggt_{t-i} + \lambda ECT_{t-1} + \mu_t \dots \dots \dots \text{Eqn. (2)}$$

Cointegrating equations

Equation	parms	chi2	p>chi2
-ce1	6	656.1494	0.0000

Identification: beta is exactly identified

Johansen normalization restriction imposed

betacoef.	Std. Err.	z	p> z	[95%conf. Interval]
-ce1				
RGDPGR	1	• •	• • •	
PGR	10.16	2.60 3.90	0.000 5.05	15.26
HCI	-77.76	3.84-20.26	0.000 -85.28	-70.23
Ur	10.66	2.69	3.96 0.000	5.377 15.93
Oppn	-7.57	0.66-11.43	0.000-8.87	-6.27
SR	-10.18	0.56-17.95	0.000 -11.30	-9.07
AGR	-11.37	0.90-12.620.000	-13.14 -9.60	
-cons	204.68			

Source, own computation from stata; the long run equation often called Johansen normalization restriction, on which the restriction here is placed on RGDPGR (Y_t).

The above table is the long run equation from where the error correction term is generated. Real GDP growth rate is positioned as the dependent variable and the most important concept here is that, the signs of the coefficients will be reversed in the long run.

As expected, the long run regression results show the existence of positive relationship between the predictors and the dependent variable (RGDPGR). Contrary to the ex-ante anticipation of the effect of the variable Ur on real GDPGR, it was found to have negative relationship with the RGDP, and it is significant.

All the variables are statistically significant with the notable level of concern. From the above we can say that population growth rate and rate of unemployment can affect (negatively) the growth of RGDP, together with noteworthiness.

Theoretical and empirical evidences show that human capital can enhance economic growth as one of the most determining factors. The outcome of this study also supports the findings of past studies by giving more credit to human capital. This is because human capital development is concerned with developing human capabilities and using them productively (Netsanet; 1997).

For a long time it has been meant the preparation and supply of middle and high level man power in adequate quality and quantity for the modern and formal occupations. As formerly expected the result shows a positive effect of human capital index on economic growth, the value of which in absolute terms is also significant. The result shows, on average, an increase in human capital increases RGDPGR, ceteris paribus. Similarly, trade openness ($Oppn$) has a positive and significant impact on economic growth. The absolute impact of international trade on economic growth is huge and is a motivating factor to participate more in the market globally.

In the long run, population growth rate and unemployment rate have negative effects, while the remaining variables included in the model like; human capital index, trade openness, rate of

saving and agricultural growth rate have positive effects on the target variable (i.e. RGDPGR). Additionally, from the above table the p-values can prove us that the variables are statistically significant at 1% level which means that those coefficients are statistically relevant to predict movements or changes in Y_t . To sum-up, the table above can also provide an information of the *symmetric* effect of unemployment rate and population growth rate on the growth rate of the response variable and *asymmetric* outcome with the rest ones in the long-run, on average, ceteris paribus.

Hence, the universally agreed error correction term equation follows here,

$ECT_{t-1} = Y_{t-1} - \beta X_{t-1} - \phi R_{t-1}$ general co-integrating equation.

$ECT_{t-1} = 204.682 + Y_{t-1} + 10.157PGR_{t-1} - 77.758HCI_{t-1} + 10.658UR_{t-1} - 7.570OPPN_{t-1} - 10.189SR_{t-1} - 11.375AGG_{t-1}$Eqn. (3)

The problem of poverty will be exacerbated following a high rate of population growth (Debraj Ray, 1998). Rapid population growth decreases the per capita ratio of a certain nation especially those that are already poor, agricultural dependent countries and those experiencing degrading natural resources and land (Todaro and Smith, 2015). The result from the long run equation shows the existence of negative and significant impact of the population growth rate and this is in line with economic-demographic theories and prior expectations as well as a bulk of empirical findings. Likewise, unemployment rate has negative effect on the growth rate of the country's economy to the worthy of attention (significant level). *Unemployment* has its own cost to the society. The economic cost of unemployment is the amount of output that could have been produced had the unemployed people been employed. In short the amount of the foregone output is the economic cost of unemployment. Unemployment is among the macroeconomic problems that influence or affect the population severely and mostly. For the majority of the people,

psychological disorder and reduced standard of living are consequences that can come as a result of job losing (Mankiw, 2001).

Moreover, it is also possible to visualize the occurrence of positive and significant impacts of the remaining variables included in the model. Agricultural growth rate is one of the variables which are off in a positive correlation along with the movement of economic performance of Ethiopia for the period under study. The decisive role played by the agricultural sector can best be expressed by the famous quote of Gunnar Myrdal as follows; ‘it is in the agricultural sector that the battle for long run economic development will be won or lost’. Apparently, human capital index (HCI) promotes the functioning of the nation’s economy. The theory of human capital postulates that humans could raise their productive ability via sizeable and substantial education as well as through skill trainings. The conventional viewpoint in labor economics takes human capital as the collection of abilities or behaviors that raise worker’s productivity. *The Becker view; production process is directly affected by human capital. More briefly, human capital raises labor’s productivity in all dimensions. In this view there is a notion in which one can think of human capital as representable peripheral or one-dimensional object like skills and knowledge which in turn is part of the production process (Cited in Acemoglu).*

	Coef.	Std. Err.	z	p> z	[95% conf. Interval	
D__RGDPGR						
_ce1						
L1.	-0.02	0.027	-0.91	0.363	-0.078	0.028
RGDPGR						
LD.	-0.16	0.199	-0.82	0.411	-0.555	0.227
PGR						
LD.	2.86	1.571	1.82	0.069	-0.219	5.940
HCI						
LD.	-2.88	2.280	-1.26	0.206	-7.354	1.585
Ur						
LD.	-1.27	1.388	-0.92	0.360	-3.991	1.450

Oppn

LD.	-0.84	1.131	-0.75	0.454	-3.065	1.371
SR						
LD.	0.26	0.327	0.81	0.418	-0.376	0.906
AGR						
LD.	-0.65	0.515	-1.26	0.206	-1.660	0.358
_cons	0.17	0.492	0.35	0.726	-0.794	1.136

Source, own stata computation

The statistical formulation of real GDP growth rate as target variable can be constructed by taking relevant information from the above figure which is obtained from stata computation as follows,

$$\Delta Y_t = 0.17 - 0.16Y_{t-1} + 2.86PGR_{t-1} - 2.88HCl_{t-1} - 1.27Urt_{t-1} - 0.85Oppnt_{t-1} + 0.26SR_{t-1} - 0.65Aggt_{t-1} - 0.025ECT_{t-1} \dots \dots \dots \text{Eqn. (4)}.$$

The adjustment term (-0.025) from equation four is the coefficient of the error correction term can suggest that the previous period's errors or deviation of the dependent variable from the long run equilibrium (due to movements in the explanatory variables) are corrected for with in the current year at a convergence speed of 2.5%.

The Error Correction Model (ECM) developed by Engle and Granger is a means of reconciling the short-run behavior of an economic variable with its long-run behavior (Gujarati,2003). Co-integration tests analyze variables of non-stationary time series-in other words this test allows us to estimate the long-run equilibrium and parameters in systems of unit root.

In economics, the dependence of one variable say X1 on another variable X2, is rarely instantaneous. Very often, X1 responds to X2 with a lapse of time such a lapse of time is said to be 'lag'. We can observe that too many lags may lead to loss of degrees of freedom, may cause the problem of multi-collinearity, serial correlation in error terms and also may result in the problem of model misspecification.

The result of test of Johnson Co-integration is very watchful to the number of lags involved for the explanatory variables while estimating of the vector autoregressive model. This demands the establishment of maximum lag order before the co-integration test. The maximum lag order is determined with FPE, LR, AIC, SIC and HQ where, FPE, LR, AIC, SIC and HQ are to mean Final Prediction Error, Likelihood Ratio Test Statistics, Akaike Information System, Schwarz Information Criterion and Hannan Quinn Information Criterion respectively. The result of finding for the maximum possible lag shows that lag two is the best optimal lag for the researcher to choose for the model.

As shown below from the table 4.6, evidence from the statistical result proves that the model's optimal lag is of two. Choosing the model that gives the lowest values of this criteria by rule of thumb is the easiest way to determine the maximum lag length while dealing with the problem.

Selection-order criteria

Sample: 1999 - 2021

Number of obs = 23

Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-189.39				0.061	17.07	17.16	17.42
1	-66.89	245	49	0.000	0.000	10.68	11.38	13.45
2	41.54	216.88	49	0.000	3.5e-06	5.51	6.82	10.70
3	2596.50	5109.9	49	0.000	7.7e-96*	-212.39	-210.47	-204.78
4	5026.91	4860.8	49	0.000	●	-423.12	-421.12	-415.17
5	5023.54	-6.7395	49	●	●	-422.82	-420.83	-414.88
6	5023.20	-0.66887	49	●	●	-422.8	-420.80	-414.85
7	5062.90	79.386	49	0.004	●	-426.25	-424.25	-418.30
8	5165.46	205.12*	49	0.000	●	-435.17*	-433.171*	-427.222*

Endogenous: RGD PGR HCI UR OPPN SR AGR

Exogenous: _cons

Source, Stata output

4.4. Co-integration

The concept of co-integration was developed and articulated by Engle and Granger in 1981 and addresses the issue of homogenizing long run equilibrium with short run dynamics. It also means that a condition of long run symmetry or equilibrium associationship among variables that don't flow too distant over time. In a time series multivariable case, regression is ok if and only if the order of integration of all independent variables are all greater than the order of integration of the explained variable the two variables are integrated of the same order.

After performing stationary test, there are three possible outcomes; these are

1. Series are integrated of order zero $I(0)$, that is stationarity at level which does not want differencing.
2. Series are integrated of order one $I(1)$, that is stationarity at first difference
3. Series are integrated of different orders~ that is having a combination of order one and order two series.

Here, the researcher is interested to focus only on the second scenario. In this framework or setting it is assumed that variables are stationary at first difference, that is, they are $I(1)$ series (integrated of order one). As a result, co-integration test is important to set up long-run relationship among the variables. That is, one can assume a long run relationship in the model exists despite the fact that the series are drifting apart or trending either upward or downward.

In the literature, there are two co-integration tests for time series observations for integrated of order one ($I(1)$). They are the Engle-Granger co-integration test and the Johnson co-integration test. For the purpose of the research, the researcher used the Johnson co-integration test. The null hypothesis of the Johnson co-integration test says that there is no co-integrating equation while the alternative hypothesis says that the null is not true.

That is,

Ho: no co-integrating equation

H₁: not Ho

Co-integration test should be performed on the level form of the variable and not on their first difference and it is also possible to use the log transformation of the raw variables.

The decision criteria here says that reject the null hypothesis if the value of the trace and max statistics > 5% critical value otherwise fail to reject the null hypothesis.

Test for Co-integration

In order to confirm the long run connection or link between the explanatory and explained variables, test for stationarity has been done on the residual term in an identical hypothesis demarcated earlier. If the error term has unit root, the variables at both sides of the equality sign (the dependent one and the independents) cannot be said co-integrated; co-integrated otherwise.

Johansen tests for cointegration

Trend: constant

Number of obs = 29

Sample: 1993 - 2021

Lags = 2

maximum

rank	parms	LL	eigenvalue	trace statistics	5% critical value
0	56	-157.92	●	204.21	124.24
1	69	-106.31	0.97	100.97	94.14
2	80	-81.21	0.82	50.77	68.52
3	89	-70.07	0.53	28.51	47.21
4	96	-62.29	0.41	12.94	29.68
5	101	-58.56	0.22	5.48	15.41
6	104	-55.91	0.16	0.17	3.76
7	105	-55..82	0.00		

maximum					
rank	parms	LL	eigenvalue	max statistics	5% critical value
0	56	-157.92	•	103.23	45.28
1	69	-106.31	0.97	50.20	39.37
2	80	81.21	0.82	22.26	33.46
3	89	-70.07	0.53	15.56	27.16
4	96	-62.29	0.41	7.46	20.97
5	101	-58.56	0.22	5.30	14.07
6	104	-55.91	0.16	0.17	3.76
7	105	-55.82	0.00		

Table 4.6 Johnson Co-integration result

The Assumption of Homoscedasticity:-The variance of the errors must be constant; this assumption is called homoscedasticity assumption. If the errors or the residuals have no a constant variance, they are said to be heteroscedastic. In this test the null hypothesis is that there is no evidence for the presence of heteroskedasticity (homoscedasticity does exist) and the alternative hypothesis says that there is evidence for the existence of heteroskedasticity. Therefore, if this hypothesis is rejected it is said to be the variance of the errors are no longer fixed or the assumption of homoscedasticity is violated, (Gujarati, 2009).

Normality Test

The study used JarqueBera (BJ) normality test to check normality. In addition p-value and value of kurtosis used to detect whether normality exists or not. The researcher has also used kurtosis value to test for non -normality and from the literature the normal distribution had a kurtosis value of 3. A normal distribution is not skewed and has a coefficient of kurtosis of 3. For the residuals to be normally distribute jarqueBera value should not be significant (Gujirati, 2009).For testing the normality assumptions, graphical methods, such as histograms and normality plots, can be conducted to provide a visual inspection of the normal distribution of a data set prior to further interpretation of the regression analysis.

Histograms can provide important information about the shape of a distribution. If most of the scores are gathered around the middle of the continuum and a gradual, symmetric decrease of frequency on either side of the center score occurs, it is considered a normal distribution. However, if the scores are not symmetric and are spread out away from the majority it is considered skewed (Gujarati, 2009:504)

If the tail (a small number of the distribution) is spread out to the right, it is considered positively skewed, and if the tail is spread out to the left, it is considered negatively skewed. Kurtosis is the shape of any or lack of peaks within a distribution. The distribution is regarded as normal when the value of kurtosis is 3 and skewness is 0. (Gujarati, 2009:132).
Ho: The residuals are normally distributed:

H1: The residuals are not normally distributed:

Table 4.7. Jarque-Bera test of normality

<i>Equation</i>	Chi2	df	prob>chi2
D-GDPGR	24.562	2	0.00000
D-PGR	285.069	2	0.00000
D-HCI	34.335	2	0.00000
D-UR	3.306	2	0.19152
D-Oppn	0.451	2	0.79822
D-SR	1.892	2	0.38833
D-AGR	2.405	2	0.30042
<i>ALL</i>	<i>95.019</i>	<i>14</i>	<i>0.00000</i>

The overall result shows that the error terms are normally distributed.

Autocorrelation

The term autocorrelation may be defined as the correlation between members of series of observations ordered in time (as in time series data) or space (as in cross-sectional data). The classical linear regression model assumes that such autocorrelation (spatial correlation) does not

exist in the disturbance, we have autocorrelation-symbolically, $E(e_i, e_j) = 0$ for all $i \neq j$. However if there is such dependence, we have autocorrelation. I.e. $E(e_i, e_j) \neq 0$ for all $i \neq j$.

Although, it is a common practice to treat the terms autocorrelation and serial correlation synonymously the term autocorrelation is defined as ‘‘lag correlation of a given series with itself, lagged by a number of time unit, ‘where as the term serial correlation may be defined as ‘‘lag correlation between two different series.’’(Lecture Notes, 2014, Econometrics; Vol I.

The correlation between u_t and u_{t-k} is called autocorrelation of order K. The correlation between u_t and u_{t-1} is the first order correlation and usually denoted by ρ_1 . The correlation between u_t and u_{t-2} is called the second order autocorrelation and denoted by ρ_2 and so on. There are $(n-1)$ such autocorrelation if we have ‘‘n’’ observations. However, we cannot hope to estimate all of this from our data. Hence, we often assume that these $(n-1)$ autocorrelation can be represented in the term of one or two parameters (Madalla, 2002)

Results of Autocorrelation Test

Autocorrelation test refers to the existence of serial correlation or linear relationship among the successive values of error terms entering the regression model. In the presence of autocorrelation, OLS estimators are linear and unbiased but they do not have a minimum variance which is very important criteria for estimators to be BLUE.

The existence of autocorrelation also leads to inappropriate standard error and wrong statistical inference. The underlying vector autoregressive model was then estimated and appropriate tests were conducted to determine its stability. The following table shows the result of the Lagrangian Multiplier test which strongly rejected the null hypothesis of the existence of serial correlation.

Lagrange-multiplier test

LAG	Chi2	dfprob>chi2	
1	54.6987	49	0.26713

2	70.5157	49	0.02367
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Ho: no autocorrelation at lag order

Table 4.8 LM autocorrelation test

From the above table we can observe that there is no serial correlation due to the fact that the probability value is greater than the 10% level of significance.

4.5. Multi Collinearity

Multi-co linearity is a phenomenon that may be observed in multiple linear regressions. It results in,

- i. high estimates of standard errors (small t-ratios) and a high R-squared
- ii. a wide confidence intervals for parameter estimates,

Basically, there are two reasons for the occurrence of the problem of multi-co linearity in a given model. These are; either the existence of little variation in explanatory variables or high correlation among these variables. For the K-variable $x_1, x_2, \dots, x_k$ (where $x_i=1$ for all observations to allow for the intercept term) an exact linear relationship is said to be exist if the following condition is fulfilled.

$$\lambda_1 x_1 + \lambda_2 x_2 + \dots + \lambda_k x_k = 0 \quad (\text{Gujarati, 1991})$$

The following correlation matrix table shows the results of correlation test.

	PGR	HCI	Ur	Oppn	SR	AGR
PGR	1.000					
HCI	-0.1940	1.000				
Ur	0.3632	-0.5472	1.000			
Oppn	-0.7990	0.3112	-0.5756	1.000		
SR	0.3727	-0.2446	0.4201	-0.1963	1.000	
AGR	-0.1826	0.1169	-0.3395	0.1782	-0.0369	1.000

Table 4.9. Result of multi linearity test

The correlation matrix presented above shows that, there is positive correlation between population growth rate and unemployment rate. There is also strong and negative correlation among trade openness and population growth rate as opposed to the correlation between rate of saving and unemployment rate where we can observe positive correlation among the two explanatory variables. Furthermore, the above figure shows the existence of negative correlation between the variables of population growth rate and the rate of agricultural growth in Ethiopia for the period under consideration. But, the occurrence of multi-co linearity in a given model cannot prove the validity (invalidity) of the specified model and if it exists “do nothing” (Gujarati, 1991).

Regression Analysis

The relationship between the target variable and the remaining independent variables are regressed using a software called Stata. The dependent variable is the growth rate of real gross domestic product and the explanatory variables are agricultural growth rate, Rate of saving, unemployment rate, the index of human capital, population growth rate and trade openness.

CHAPTER FIVE

5. SUMMARY AND POLICY IMPLICATION

5.1 Summary

The main objective of this study was to examine the link between population growth rate and economic growth in Ethiopia for the period indicated. It is to assess the existence of bi-directional causality between the two variables. The economic front is described as one in which there is low total output resulting in one of the lowest per capita income in the world of slightly more than 100 US dollar. The stagnating economy fails to show any meaningful improvement for decades, with'' frequent visitations of drought resulting in famine which claimed lives of millions of citizens.''

High unemployment rate along with rapid population growth and skyrocketing level of inflation ('*Stagpulation* '??) are the major painful realities characterizing Ethiopia's prevailing situations.

The population of Ethiopia is one of the fast growing in the world with average annual rate of around 2.7. The ever-galloping population size has grave impact on economic growth. The study tried to examine the effects of certain variables on economic growth. The model used for the purpose incorporated exogenous factors like population growth rate, unemployment rate, trade openness, agricultural growth rate, rate of saving and human capital index. With regard to population growth rate, the outcome indicates that the growth rate of real GDP is retarded by a significant and vivid level.

5.2. Policy Implication

With the regression result showing negative effect of population growth rate and unemployment rate on the long run economic growth (RGDP) of Ethiopia, government policies should focus and give more emphasis to improve these variables. The government should encourage to curb the full pledge dependence of the economy on the sector of agriculture which, not surprisingly, contributes hugely by having and implementing appropriate policies that encourage citizens and create favorable situation for investment and expand other sectors like service and industry. Controlling fertility rates must also be a moderate one taking into consideration the future situation of the country in the demographic transition, the food demand and the other economic levels.

The government should encourage to curb the full pledge dependence of the economy on the sector of agriculture. Implementing appropriate policies that encourage citizens and create favorable situation for investment and expand other sectors like service and industry. Agricultural pessimism should also be abolished

Due to the fact that the number of population and its distribution across the country play irreplaceable role social, political and economic dimensions, it is necessary to conduct census as it the source for almost any economic related movements or budgetary allocations. Population number is vital for political power and budget allocation among regions in the country.

Judging from the result of the study and the data collected from different sources, the agricultural sector contributes the very significant proportion of the country's economy. Hence, it is vital to focus on this sector to transform and subsidize so as to help the gross economic performance. Rural dwellers could borrow and invest in agriculture if the formal credit sector with secured insurance widely expanded thoroughly. As this subsistence sector is the backbone of our economy, it should also be helped by certain collaborating and joint working organizations like micro-finance institutions which can provide loans and facilities without high value collateral as Grameen Bank of Bangladesh ~ a bank which makes small scale loans to groups of people instead of individuals without collateral.

With regard to human capital index, educational expenditure should increase the level of human capital development as its effect in achieving and maintaining sustainable growth is of critical. Investment on school building, teachers training and educational facilities will have a high return.

The study has also found a negative relationship between trade openness and output growth simply real gross domestic product growth. The result of the empirical investigation never contradicts with most other works which implies the country is benefiting. The result may hide to imply that the country is exporting raw materials (intermediate goods) which can be used for the production of finished goods had we been able to use it. Finally, it is recommended that the government should invest towards mass involvement in international trade and human capital development for the achievement of economic growth, both of which are important variables.

In general it is very vital for the government or any other concerned body related to policy to think about solid and well-functioning institutions and property rights. The role of property rights will be paramount for the well performance of a certain economy. It is a fact that people will be motivated to innovate if there exists property rights. It is simply because property rights are defined in terms of having components of exclusiveness, transferability, inheritability, and enforcement mechanisms. Well-enforced property rights bring incentives for peoples to get involved in economic activities such as innovation, trade and investment. It is also possible to propose that legal or formal administration for enhancing and facilitating land markets that enable land to shift towards the highest and best use of it. Here are possible policy implications from this thesis;

- Need to re-emphasize strategies & policies aimed at structural agricultural transformation.
- Need to reduce the VULNERABILITY of small-scale farmers and consumers to high, volatile prices while increasing the RESILIENCE to shocks.
- Call for the redefinition of industrial policy to avoid a blueprint approach, where this is a set of predefined state-interventions.

- A review of the educational systems inherited from the west with a view to making them relevant to present day realities whereby fresh graduates may be encouraged to embrace agriculture. This will turn the increase in population in Africa into an advantage.
- Expansion of family planning programs all over the nation
- Concerned bodies should devote efforts to really develop the human capital like formal education, trainings, seminars etc...
- Need for well-enforced Property rights that bring incentives for peoples to get involved in economic activities such as innovation, trade and investment.

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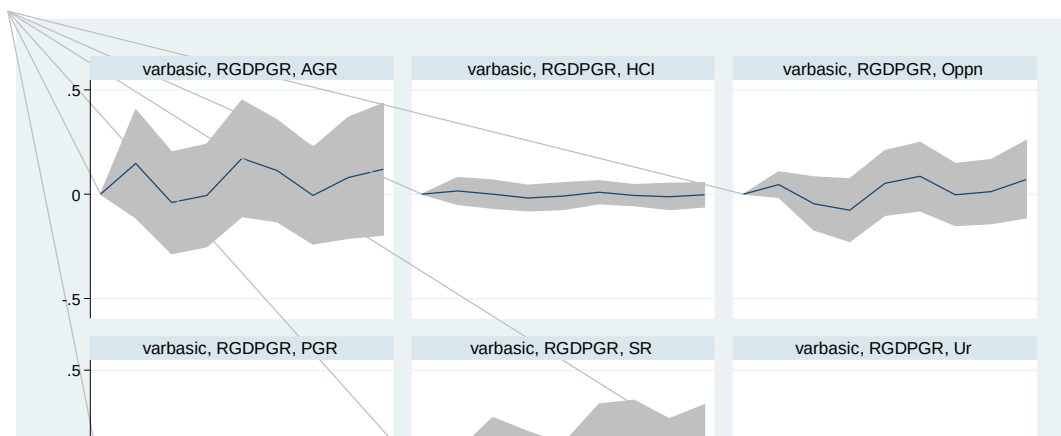
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APPENDIX

Impulse Response



Stationarity test

. tsset Year time variable: Year, 1991 to 2021

. dfuller RGDPGR

Dickey-Fuller test for unit root Number of obs = 30

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10% Critical	
Statistic	Value	Value	Value	
Z(t)	-2.437	-3.716	-2.986	-2.624

MacKinnon approximate p-value for Z(t) = 0.1317

. dfuller d.RGDPGR

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

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10% Critical
------	-------------	-------------	--------------

Statistic	Value	Value	Value	Value
Z(t)	-6.154	-3.723	-2.989	-2.625

MacKinnon approximate p-value for Z(t) = 0.0000

. dfuller PGR

Dickey-Fuller test for unit root Number of obs = 30

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10% Critical
------	-------------	-------------	--------------

Statistic	Value	Value	Value
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Z(t)	-1.612	-3.716	-2.986	-2.624
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MacKinnon approximate p-value for Z(t) = 0.4770

. dfullerd.PGR

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

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10% Critical
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Statistic	Value	Value	Value
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Z(t)	-6.266	-3.723	-2.989	-2.625
------	--------	--------	--------	--------

MacKinnon approximate p-value for Z(t) = 0.0000

. dfuller HCI

Dickey-Fuller test for unit root Number of obs = 30

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10% Critical
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Statistic	Value	Value	Value	Value
Z(t)	-2.198	-3.716	-2.986	-2.624

MacKinnon approximate p-value for Z(t) = 0.2071

. dfuller d.HCI

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

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10% Critical
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Statistic	Value	Value	Value	Value
Z(t)	-7.241	-3.723	-2.989	-2.625

MacKinnon approximate p-value for Z(t) = 0.0000

. dfuller Ur

Dickey-Fuller test for unit root Number of obs = 30

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10% Critical
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Statistic	Value	Value	Value	Value
Z(t)	-1.433	-3.716	-2.986	-2.624

MacKinnon approximate p-value for Z(t) = 0.5663

. dfuller d.Ur

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

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10% Critical
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Statistic	Value	Value	Value	Value
Z(t)	-4.222	-3.723	-2.989	-2.625

MacKinnon approximate p-value for Z(t) = 0.0006

. dfullerOppn

Dickey-Fuller test for unit root Number of obs = 30

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10% Critical
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Statistic	Value	Value	Value
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Z(t)	-0.451	-3.716	-2.986	-2.624
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MacKinnon approximate p-value for Z(t) = 0.9013

. dfullerd.Oppn

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

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10% Critical
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Statistic	Value	Value	Value
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Z(t)	-3.746	-3.723	-2.989	-2.625
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MacKinnon approximate p-value for Z(t) = 0.0035

. dfuller SR

Dickey-Fuller test for unit root Number of obs = 30

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10% Critical
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Statistic	Value	Value	Value
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Z(t)	-1.844	-3.716	-2.986	-2.624
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MacKinnon approximate p-value for Z(t) = 0.3588

. dfuller d.SR

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

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value
Z(t)	-4.971	-3.723	-2.989 -2.625

MacKinnon approximate p-value for Z(t) = 0.0000

. dfuller AGR

Dickey-Fuller test for unit root Number of obs = 30

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value
Z(t)	-2.713	-3.716	-2.986 -2.624

MacKinnon approximate p-value for Z(t) = 0.0718

. dfullerd.AGR

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

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value
Z(t)	-7.685	-3.723	-2.989 -2.625

MacKinnon approximate p-value for Z(t) = 0.0000

. varsoc RGDPGR PGR HCI Ur Oppn SR AGR

Long run model

Cointegrating equations

Equation	Parms	chi2	P>chi2
_ce1	6	656.1494	0.0000

