THE IMPACT OF HUMAN CAPITAL ON ECONOMIC GROWTH IN ETHIOPIA:

EVIDENCE FROM JOHANSEN CO-INTEGRATION APPROACH

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The Impact of Human Capital on Economic Growth in Ethiopia: Evidence from Johansen Co-integration Approach

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DECLARATION

I, the undersigned hereby declare that this thesis titled "The Impact of Human Capital on Economic Growth in Ethiopia: Evidence from Johansen Co-integration Approach" is my original work and no part of this work has been presented for a degree in any other university, and that all sources of materials used and borrowed ideas for the thesis have been duly acknowledged in the list of references provided.

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ENDORSEMENT

This Thesis has been submitted to St. Mary's University, School of Graduate Studies for Examination with my approval as a university master's student advisor.

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Advisor　　　　　　　　　　　　　　　　　　　**Signature**

St. Mary's University, Addis Ababa　　　　　　　　**January, 2018**

APPROVAL OF BOARD OF EXAMINERS

As a member of the Board of Examiners of the Master Thesis open defense examination, we testify that we have read and evaluated the thesis prepared by Befekadu Bezabih under the title "THE IMPACT OF HUMAN CAPITAL ON ECONOMIC GROWTH IN ETHIOPIA: Evidence from Johansen Co-integration Approach" and we recommend that this thesis be accepted as fulfilling the thesis requirements for the degree of Master of Arts in Development Economics

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ACRONYMS AND ABBREVIATIONS

ADF	Augmented Dickey Fuller Test
AIC	Akaike Information Criterion
ARDL	Autoregressive Distributed Lag
CSA	Central Statistic Agency of Ethiopia
EPRDF	Ethiopian People Republic Democratic Front
FDRE	Federal Democratic Republic of Ethiopia
GCF	Gross Capital Formation
GDP	Gross Domestic Product
GTP	Growth and Transformation Plan
MOE	Ministry of Education
MOFEC	Ministry of Finance and Economic Cooperation
MOFED	Ministry of Finance and Economic Development
OLS	Ordinary Least Square
PASDEP	Plan for Accelerated and Sustainable Development to End Poverty
RGDP	Real Gross Domestic Product
SDPRP	Sustainable Development and Poverty Reduction Program
TFP	Total Factor Productivity
TGE	Transitional Government of Ethiopia
VAR	Vector Autoregressive
VECM	Vector Error Correction Model
UNESCO	United Nations Educational, Scientific and Cultural Organization
WBI	World Bank Index

ABSTRACT

Using a time series data from 1974-2015, this study employs the augmented Solow human-capital-growth model to investigate the impact of human capital on economic growth in Ethiopia. Expenditure on public health and education were taken as proxy variables for human capital development in order to see their impact on economic growth. The Augmented Dickey Fuller test is employed to test for stationarity and Johansen Cointegration technique is used to validate cointegration among variables as a sign of long run relationship. The error correction model is used to adjust for the short run error correction. Further tests of autocorrelation and residual normality distribution were done. The result of the ADF test has shown that all variables are non-stationary at level I (0) and stationary at I (1). There are two cointegrating equations implying convergence. The result of the error correction model show that the model is adjusting at a relatively stable rate of 35 % towards the long run equilibrium. The result of the short run causality tests show public expenditure on education, gross fixed capital formation and GDP have significant effect while labor force growth rate, public expenditure on health and inflation have shown to have statistically insignificant effect.

CHAPTER ONE

INTRODUCTION

1.1. BACKGROUND

A nation's human capital endowment, the skills and capacities that reside in people and that are put to productive use can be a more important determinants of its long term economic success than virtually any other resource (World Economic Forum 2016). Early neoclassical economic growth models give due attention to physical capital accumulation and technology to bring economic growth. In this regard, it is worth to note the Harrod (1939) and Domar (1946) models of economic growth as cited in Todaro (2010); which give due emphasis to a higher level of saving as having key role in the creation of better capital labor ratio (physical capital accumulation). Their assumption stipulates that countries with higher saving rate will grow faster than those with lower saving rate. In addition to the physical capital accumulation, they also noted the need for technological improvement in order to have a long term effect on economic growth.

Capital accumulation results when some proportion of present income is saved and invested in order to augment future output and income (Todaro, 2012). Human capital formation or development, according to Harbison (1973) cited in God's Time (2014) can be seen as the deliberate and continuous process of acquiring requisite knowledge, skills and experiences that are applied to produce economic value for driving sustainable national development.

Human capital is the term economists often use for education, health, and other human capacities that can raise productivity when increased (Todaro 2012). Human capital is productive investments embodied in human persons, including skills, location, and health (Todaro, 2012). Accumulation of human capital increases the productivity of workers and machines, equipment and other physical capital through innovation and adapting technology.

Generally speaking, investment in education and health are believed to be the major components of human capital accumulation. Educational investment can contribute to growth in two ways. First educated labor force can directly participate in the production process as a productive

factor. In this sense the accumulation of human capital would directly generate the growth of output. According to Maria Jesus (2001), this is called the level effect (input level effect). On the other hand, human capital can also contribute to raising technical progress (growth effect) since education can ease innovation, diffusion and adoption of new technologies thereby increasing productivity (Ibid). Education plays a key role in the ability of a developing country to absorb modern technology and to develop the capacity for self-sustaining growth and development. Education can also add to the value of production in the economy and also to the income of the person who has been educated.

Health is an investment good that increases the future productive power of the work force. Health is a prerequisite for increases in productivity as successful education relies among other things, on adequate health. This implies that healthier workers are more energetic and strong and their productivity is high. In this regard, health has a wider concept than mere understanding of absence of sickness. It is the ability of people to develop to their potential during their entire lives. In that sense, health is an important asset individuals possess, which has intrinsic value (being healthy is a very important source of well-being) as well as instrumental value (Bloom, Canning & Sevilla 2004).

Greater health capital may improve the return to investments in education; in part because health is an important factor in school attendance and in the formal learning process of a child. A longer life raises the return to investments in education; better health at any point during working life may in effect lower the rate of depreciation of education capital (Todaro, 2012).

Generally speaking, if done in compliance with equity and efficiency, investments in education and health will have positive impacts on income and the economy. Improved health and education help families escape some of the vicious circles of poverty in which they are trapped in. Thus both health and education can be seen as vital human capital components leading to growth and development.

Economies that are growing rapidly are the ones that have given direct attention to their human capital. "…differences in income then must come from differences in capital, labor, and technology" (Mankiw 2013). With higher income, people and governments can afford to spend more on education and health, and with greater health and education, higher productivity and

incomes are possible. Because of these relationships, development policy needs to focus on income, health, and education simultaneously.

This study will look at the impact of human capital formation on economic growth in Ethiopia considering both education and health aspects of human capital components in to consideration. Investments in education and health are taken as proxy variables for human capital developments. The results of the study is believed to contribute to the important implications on existing understandings of the contributions of human capital on economic growth in general and will further serve as insight for future studies on the causes of regional disparities in economic growth in Ethiopia, a contemporary popular subject of debate.

1.2. STATEMENT OF THE PROBLEM

Ethiopia alongside its Sub-Saharan counterparts has increasingly been investing much on her human capital development (Health and Education) for the last few decades. There appears to be though a continuing debate as to whether a return on investment in these identified sectors is worth noting, seeing it from a short and long run perspective while quality issues remain to be areas of concern. While this being a subject of debate, persisting questions as to which level of education and health situation are more responsive to economic growth are unfolding. In this regard, while the relative importance of the level of education and health condition is given little attention, much of the focus of this study would lie on their long and short run causality and explanation of economic growth expressed in real GDP.

Benhabib and Spiegel (1994) have attempted to empirically distinguish between considering human capital as an ordinary input in the production process and the growth of total factor productivity as a function of the level of human capital. They have considered human capital as level of education attained only. They used estimates of physical and human capital stocks to examine cross-country evidence on the determinants of economic growth. Noting what has been casted by Nelson and Phelps (1966), they have shed their doubt on the specification of treating human capital simply as another factor in growth accounting. In their assumption, the level of human capital affects productivity by determining the capacity of nations to innovate new technologies suited to domestic production. Furthermore, they adopted the Nelson and Phelps (1966) model to allow human capital levels to affect the speed of technological catch-up and diffusion. Hence, they assumed that the ability of a nation to adopt and implement new technology from abroad is a function of its domestic human capital stock.

On the contrary, Mohan (2010) treated human capital as an independent production function using the human capital augmented growth model and found human capital as playing an important role on economic growth mainly as an engine for improvement of output level. Several other empirical studies, including Schultz (1960, 1963), Denison (1962, 1974), Becker (1961), Harbison and Myers (1964), Mankiw, Romer and Weil (1992) and many others to some extent have shown increased human capital appears to explain a substantial part of the growth of output in both developed and developing countries.

Recent studies conducted in Ethiopia in this regard rather have shown to have consistent results. For example Dinkineh (2015) in his study showed that public expenditure on health and education, primary and secondary school enrolment have positive and statistically significant effect on economic growth both in the long run and short run and physical capital showed positive whilst inflation has negative effect on economic growth. Tertiary school enrolment, on the other hand has shown insignificant effect on economic growth both in the long run and short run. Kidanemariam (2015) on the other hand, using the ARDL approach to co-integration showed a stable long run relationship between real GDP per capita, education human capital and health human capital. Accordingly, the estimated long run model indicated that human capital in the form of health has big positive impact on real GDP per capita rise, followed by education human capital inter alia. Irrespective of these results, there is though neither general consensus on literature nor consistent use of similar proxies for human capital measurements. This study motivated by the apparent expansionary approach of the government on education and health sectors expenditure, primarily aims to determine the contribution of human capital on economic growth using expenditure on health and education as proxy variables. The study would also suggest policy implications for future spending.

1.3.   RESEARCH OBJECTIVES AND QUESTIONS

1.3.1 GENERAL OBJECTIVE

✓ The general objective of this study is to determine as to whether human capital formation has an impact on economic growth in Ethiopia.

1.3.2 SPECIFIC OBJECTIVES

✓ To determine whether there is any causal relationship between human capital accumulation; health and education expenditure and economic growth in Ethiopia
✓ To derive policy implications for future spending on the sectors

1.4. RESEARCH QUESTIONS

✓ Is there any causal relationship between human capital formation and economic growth in Ethiopia?

✓ Is economic growth in Ethiopia explained by human capital formation?

✓ Does human capital accumulation have a significant long-run and short-run impact on economic growth of Ethiopia?

1.5. HYPOTHESIS

H1=Factor accumulation (human Capital) has contribution to economic growth in Ethiopia

1.6. SIGNIFICANCE OF THE STUDY

The theories and facts underlying the concept of human capital and its contribution to the national economy have been a growing subject area of interest for researchers. The conventional approach to measuring the stock and development of human capital has frequently been related to educational enrollment ratios and expenditures on educational proxies and life expectancy and "under 5" mortality ratios in relation to health proxies. This study, taking both educational and health aspects of human capital, will give insight to policy makers in their decisions determining public spending on educational and health sectors. It is also the author's belief that the study will further support policy makers to compare financial expenditures on the stated sectors vis a vis the sectors contributions in the national economy of Ethiopia.

1.7. ORGANIZATION OF THE STUDY

This thesis work is organized into five chapters. The first chapter contains: introduction of the study, statement of the problem, research objectives, research hypothesis, and significance of the study, scope and limitation of the study. In chapter two, theoretical and empirical literatures conducted both in Ethiopia and other countries are reviewed, education and health policies during the different government era in Ethiopia are discussed. Chapter three is devoted for research methodology including, model specification, data types, collection methods and estimation issues and procedures are discussed in detail. In Chapter four, different hypothesis

testing and empirical results of data analysis are reported and evaluated. In the last chapter, discussions and implications of possible policy propositions are forwarded based on empirical findings of the study.

1.8. SCOPE AND LIMITATION OF THE STUDY

Informal and non-informal learning activities such as personal learning and On-the-Job training are given less emphasis in this study.

The study also plays down to consider the reverse effect i.e., the impact of economic growth on health and education and rather focuses on the vice versa. Moreover, though it is generally understood that human capital overtime depreciates, the study doesn't assume so.

Looking at the variables in the model and the data on hand, as a rule of thumb, the study would have selected different measurements for human capital stock as explained in different literatures. It is difficult that human capital itself independently contributes to individual development and national economic growth. According to Ashton & Green (1996), it is necessary that the link between human capital and economic performance should be considered within a social and political context to precisely measure the human capital. However, the study fails to consider the non-monetary aspects of human capital such as, the social, political, cultural and other factors. It would have been consistent to the intention of the researcher to see the existing economic variations in the country at regional level as to whether they are attributed to differences in human capital developments. However, data access and availability limited the researcher's intention.

CHAPTER TWO

LITERATURE REVIEW

2.1 THEORETICAL LITERATURE REVIEW

The foundation of the human capital theory lies in the fact that individuals and firms invest in human capital based not on present gains but on future pecuniary and non-pecuniary returns. Investments include various aspects such as schooling, training, acquiring information, migration, and activities that improve an individual's health (Mikaela Backman, 2013).

Traditionally, economic theory has given emphasis to physical capital accumulation as the most robust source of economic growth at least in the short-run, with exogenous technical progress being the long-run determinant of growth. The exogenity of technological progress in the neoclassical growth model and the difficulty of explaining long-term economic growth (because of diminishing returns to physical capital) have restricted the analytical capacity of the neoclassical model and its empirical verification (SushiL Kumar and Giri Jasankar Malik, 2010).

Human capital theory suggests that individuals and society derive economic benefits from investments in people (Sweetland, 1996). Education is often referred to as the prime human capital component but many authors including Becker (1993) and Schultz (1997) have argued that health and nutritional expenditure is also a part of human capital investment. In this regard, modern theory of economic growth argues that human capital, especially one that accommodates education and health has the principal role on achieving economic growth and development (Gyimah-Brempong and Wilson, 2005).

The concept that investment in human capital promotes economic growth arguably dates back to the time of Adam Smith (1776) and the early classical economists who give emphasis to the importance of investing in human capital. Paul Romer (1990) argues that every nation's macroeconomic objective revolves around sustained economic growth accompanied with social development and in this regard he opines human capital is deemed as an essential ingredient. However, Ralph Hipe (2013) remarks that human capital has to be measured quantitatively to validate theoretical frameworks.

Despite this necessity of human capital measurement, traditional method of the human capital measurement have often been criticized for their number of limitations such as for example, Wolf (2002) suggests that some of indicators can be actually considered as incomplete ones. To support his assertion, he exemplifies that a worker's wage one of human capital indicators as proxies-hardly measures 'authentic human capital'. By the drawback of traditional human capital measurement, it is acceptable to measure the authentic human capital instead of utilizing proxies such as income and productivity.

Second, it is difficult that human capital itself independently contributes to individual development and national economic growth. According to Ashton & Green (1996), it is necessary that the link between human capital and economic performance should be considered within a social and political context to precisely measure the human capital.

Despite the interlinkages between human capital and growth, most empirical studies have employed reduced-form equations that do not capture feedback effects. The literature often focuses on only one segment of the social spending-social indicators-growth nexus. That is, it either analyzes the growth effects of improving education or health indicators, or the impact of public spending on these indicators. Furthermore, research on the first stream has concentrated essentially on education capital, and has often focused on the impact of the initial stock of education capital on growth. As such, the empirical literature on the effects of health capital on growth is relatively thin. To this end, human capital has been measured in a range of different ways to the extent that one may end up in wondering to find the "right" model for the topic. The following empirical literature takes note of some of the measurement methods that are often in use in literatures.

2.2 EMPIRICAL REVIEW

Different researchers have used deferent measurements in order to see the contribution of Human capital. Using school enrollments and life expectancy as proxy for human capital stock and public expenditure on education and health for human capital investment, Eggoh, Houeninvob & Sossoub (2015) found human capital stock (school enrollment and life expectancy at birth) have positive effect on economic growth while human capital investment (public expenditures on

education and health) has a negative impact on economic growth. Literacy rates and educational attainments are other alternatives sought by other authors.

Jess Benhabib and Mark M. Spiegel (1994) have attempted to empirically distinguish between considering human capital as an ordinary input in the production process and the growth of total factor productivity as a function of the level of human capital. They have considered human capital as level of education attained only. They used estimates of physical and human capital stocks to examine cross-country evidence on the determinants of economic growth. Noting what has been casted by Nelson and Phelps (1966), they have shed their doubt on the specification of treating human capital simply as another factor in growth accounting. In their assumption, the level of human capital affects productivity by determining the capacity of nations to innovate new technologies suited to domestic production. Furthermore, they adapted the Nelson and Phelps (1966) model to allow human capital levels to affect the speed of technological catch-up and diffusion. Hence, they assumed that the ability of a nation to adopt and implement new technology from abroad is a function of its domestic human capital stock.

Atardi and Sala-i-Martin (2003) argue that Africa's growth tragedy of the 20th century can be explained by low endowments of human capital, poor external environment, and political instability. Cited in Hippe (2013) according to Becker (2002), human capital is the most decisive type of capital in contemporary economies. He refers to studies showing that human capital accounts for over 70% of total capital accumulation in the US representing more than a fifth of total GDP. Consequently, "technology may be the driver of a modern economy, especially of its high-tech sector, but human capital is certainly the fuel" (ibid).

Paul Romer (1990) on the other hand notes that an important distinction should be made between human capital and abstract technological knowledge. He further notes that although human capital involves the acquisition of knowledge, it differs in one respect from abstract knowledge such as invention or design. As such, human capital is a private good in that it is tied to a person and is therefore rival and excludable.

Related and recent studies in Ethiopia have shown consistent results. For example Dinkineh (2015) showed that public expenditure on health and education, primary and secondary school enrolment have positive and statistically significant effect on economic growth both in long run

and short run and physical capital shown positive whilst inflation has negative effect on economic growth (ibid). Tertiary school enrolment on the other hand has shown insignificant effect on economic growth both in the long run and short run.

Kidanemariam (2015) on the other hand, using the ARDL approach to co-integration showed a stable long run relationship between real GDP per capita, education human capital and health human Capital. Accordingly, the estimated long run model indicated that human capital in the form of health have big positive impact on real GDP per capita rise followed by education human capital, among other things.

A country can raise its human capital by providing education and training. Additionally, people gain ability (knowledge) through experience and by interacting with educated people. Nelson and Phelps (1966) argue that human capital raises productivity through innovation and adaptation of technology.

Explaining the lack of clarity in a continuing debate on the relative importance of level of education on per capita income, Gyimah Brempong K., Oliver Paddison, & Workie Mitiku (2006), mention one aspect as private and social returns to education, based on which there have been suggestions that African countries should support primary education at the expense of higher education since the social returns to the former are much higher than those of the latter. Forgetting the notion of level of education as substitutes in their relative importance to growth, they consider them as compliments and continue to explain that one of the many ways to evaluate the social impact of higher education in human capital is to estimate its impact on the growth rate of per capita income.

Easterly (2002), writes at length on Ethiopia's growth in TFP within the three different regimes namely that of the monarchy, Marxist and reformist periods as being 1.26%, -1.22% and 2.58%, respectively. Accordingly the difference in growth of TFP as part of human capital exhibited in these regimes are believed to be due to their different economic policy, political instability and natural disaster like drought.

2.3 ECONOMIC GROWTH IN ETHIOPIA IN DIFFERENT ERAS

Ethiopia is the oldest independent and arguably non-colonized country in Africa. It is the tenth largest country in Africa, covering 1,104,300 square kilometers (with 1 million sq km land area and 104,300 sq km water) and is the political power and major constituent of the landmass known as the Horn of Africa. It is a country with great geographical diversity ranging from peaks up to 4,550m above sea level down to a depression of 110m below sea level. More than half of the country lies above 1,500 meters. The predominant climate type is tropical monsoon, with three broad climatic variations: the "Kolla" or hot lowlands, below approximately 1,500 meters, the "Wayna Degas" at around 1,500- 2,400 meters and the "Dega" or cool temperate highlands above 2,400 meters. (HSDP, 2010)

According to projections from the 2007 population and housing census the estimated total population in 2015 is 99.4 million. It is one of the least urbanized countries in the world with about more than $4/5^{th}$ of the population living in rural areas (81.5% rural vs only 19.5% urban) and nationally, the average household size is 4.7 persons. The population age pyramid has remained predominately young.

The economic policy and hence performance of the country varied with the regimes that ruled the country. In the last four decades for example, the Ethiopian economy has changed from a relatively liberalized economy (till 1974) to a more controlled one (1974-1989/90) and again back to what appears to be a liberalized one (after 1991) or at least what the government claims it to be.

2.3.1 ECONOMIC GROWTH POLICES DURING THE IMPERIAL REGIME

Traditionally what is called "the Imperial Regime' refers to the reign of emperor Haile-Sellasie I and the time span between (1930-1974) in particular and as to some authors it dates back to the emperor's immediate predecessors in general. In terms of development policy trajectory followed, Christopher Clapham (2006) describes the characteristics of this period as lacking dominant paradigm for the country's economic and political development except different initiatives tried to be introduced from here and there. There was very little to be said in terms of economic and social development in Ethiopia between 1941 and 1957 (Eshetu, 1990).

According to Georgi G. (1981), cited in ukessays.com (2013), the imperial government of Haile-Sellasie was believed to be the first Ethiopian government to craft and exercise different development policies as Ethiopia was the first African state to have a recorded attempt of economic development planning. But the plans determined only general trends and likely development rates as they gave an extremely generalized allocation to particular sectors of the economy.

During this time, three five-year plans were prepared for the development of the economy with different targets and area of priorities. They were:

1. The first five year plan of (1957-62)
2. The second five year plan of (1963-67) and
3. The Third five year plan (1968-73)

During 1941-1957, foreign trade plus local whole sale trade was mainly in the hands of foreigners (mainly Armenians, Greeks, Italians, Indians and Arabs) which left minimal commercial activities in the hands of the local people. However, the period has shown that the country's economy achieved sustained economic growth in general.

2.3.2 ECONOMIC GROWTH POLICES DURING THE DERG REGIME (1974 TO 1991)

This period has evidenced a major shift in economic policy from its predecessors. The Derg adopted the socialist ideology, which basically was the ideology of the Ethiopian educated elite of that period. During this time, central planning was introduced first in the form of what was then referred to as National Revolutionary Development Campaigns (1978-1984) and subsequently in the form of a Ten-Year Perspective Plan (1984/85 – 1993/94). The goals of the socialist inclined military regime by way of its Ten-Year Perspective Plan (TYPP), was to ultimately build a socialist economy.

The structure and objective of the economy was changed alongside the objective of the socialist government. During the period 1974-1991, the performance of the economy was the worst during the planned economic era in which real GDP registered an average growth rate of 2.3% per annum (per capita income growth being -0.4%) between 1974/75 and 1989/90 (Geda, A. and Befekadu Degefe, 2002, cited in Woubet, 2006). The Public ownership of rural land

proclamation or what is commonly referred to as "land to a tiller" issued by the Derg regime on March 4, 1975 and consequent events and formations of different associations and cooperatives marked the pick time in this era

2.3.3 ECONOMIC GROWTH POLICIES DURING EPRDF; 1991 AND ONWARDS

According to African development bank group, (2000:4), the initial stage of the Transitional Government popular general objective was given as attaining fast broad based economic development and in terms of macroeconomic policy, this period has witnessed a marked departure from the previous 'Socialist' system or the 'Derg regime'. According to Alemayehu (2001:5), this difference lies on openly adopting a market-oriented economic policy. During the start of year 2000 and onwards Ethiopia often seemingly announced her official economic policy direction as being that of "Developmental State Model" which before then was practiced and followed by the East Asian countries, many of which are categorized as "Tiger Economies". Some authors even argue on the dates that Ethiopia started to follow developmental state model by taking it as far back as year 1995, when the government for the first time was established as Federal Democratic Republic of Ethiopia (FDRE).

This is clearer in the often quoted 51 pages-long incomplete monograph "for not quotations" Masters' Thesis of the late Prime Minister of Ethiopia, Meles Zenawi than anywhere else. Among the propositions contained in Meles's developmental state paradigm, are:

- Neo-liberalism is a dead end, incapable of bringing about the African renaissance;
- Social development is essential for economic development and social development cannot be brought about by market mechanisms alone;
- Technological development is at the heart of economic development, and hence, development in underdeveloped Africa cannot be brought about by market mechanisms alone;
- Market failures are deep and pervasive in deveining countries and market mechanisms alone cannot bring about accelerated development
- The engine of development at initial phases has to be agriculture, and this is so not only because growth in the relatively massive agricultural sector will have bigger impacts on

total growth of the economy directly but also because agricultural growth accelerates non-agricultural growth and structural transformation even more;

- Equitable distribution of assets in the rural areas plays a critical role in accelerating agricultural development and overall development and structural transformation;

- Developing countries face formidable market failures and institutional inadequacies which create vicious circles and poverty traps, which can adequately be addressed only by an activist state;

- Development is a political process first and economic and social process later;

- A stable democracy can emerge in a poor country and

- A developmental state can be a democratic state; and indeed; a democratic developmental state is likely to be more successful in its development efforts than others.

What followed then after in Ethiopia was all about talks of poverty eradication, sustainable development, accelerated development, growth and Transformation and etc.

Therefore since 2002 the FDRE government came up with successive huge and stretched strategic plans including SDPRP (2002/03-2004/05), PASDEP (2005/06-2010/11) and GTP1 (2010/11-2014/15) and GTP2 (2014/15-2019/20) with the objective of bringing an accelerated and sustainable development, ensuring the fruits of development accrue to the poor people, putting an end to the country's status as an international alms recipient and to progressively improve her standing in the global integration process, realizing accelerated economic development through strengthened free market economy (MOFED, 2002).

The common characteristics of these plans are bringing radical change in the economy, creating huge demand, changing small and fragmented plan into massive and coordinated plan by selecting key sectors in the economy such as rural and agricultural development policies and strategies, food security, pastoral development, roads, water resource development and Education and it was believed that this will transform other sectors which were previously associated with a concept of unbalanced growth. Accordingly, some outstanding sectors will create huge demand and pull other economic sectors.

2.4 HUMAN CAPITAL DEVELOPMENT: EDUCATION POLICY IN ETHIOPIA

Education is a complex issue to comprehend. But to simply define it, it is a process by which man transmits his experiences, new findings, and values accumulated over the years in his struggle for survival and development, through generations (FDRGE, 1994). Education enables individuals and society to make all-rounded participation in the development process by acquiring knowledge, ability, skills and attitudes. It also aims at strengthening individuals' and society's problem-solving capacity, ability and culture starting from basic education and at all levels. ibid, education enables man to identify harmful traditions and replace them by useful ones. It helps man to improve, change, as well as develop and conserve his environment for the purpose of an all-rounded development by diffusing science and technology into the society. Education also plays a role in the promotion of respect for human rights and democratic values, creating the condition for equality, mutual Understanding and cooperation among people. Education does not operate in isolation however. It rather has to be integrated with research, practice and development to contribute towards an all- rounded development of society. In Ethiopia, education dates back to the sixth century when the Sabean alphabet was introduced along with Christianity. Beginning in the early years of the Christian era, the churches of Ethiopia developed school system which over the centuries served not only as focal points for learning but also prepared the nation's religious and governmental leaders. Church educations remained the predominant form of education until the commencement of modern secular education in Ethiopia. The indigenous system of church education had its parallel in the schools of Falashas, and the Quranic schools of the Muslims (Woubet, 2006).

Because, any investigation into the workings of the environment and the universe in general is regarded as anti-Christian and sinful, studies of the sciences, and domestic handicrafts were very limited and often discouraged. The primary urge was religious rather than scientific and developmental. The primary purpose of church education was to lead men to accepting the existing order of things as it is, to preserve whatever has been down through the years, and in turn to pass it unchanged to the next generation. (Ibid).It tended to stifle healthy curiosity and independent thinking. The Pedagogy was based on repetition and memorization, with strict adherence to the convention preferred by the teacher.

According to Teshome (1979), church education has not been impartial in the provision of education to the public and didn't serve the whole nation. But no other church in Africa has had such a great impact on the development of education as the Ethiopian Orthodox Church. In the long history of church education, Ethiopia evolved a particularly Ethiopian education system. The full curriculum consisted of religious teachings, prose, poetry and poems as well as documentation in Geez and Amharic. It is emphasized that education has, meaning only when in its cultural context. But the pattern of education is believed to be changed very little in contrast to the emerging socio economic transformations. Little was done to combine the educational effort of an ancient church with that of a government system. Hence, any account of education in Ethiopia must recognize the contributions made by church education.

The Ethiopian secular education system has been to a large extent foreign and alien to the nation's needs and requirements. It was emphasized that Ethiopian education should neither be French, American, British or Italian. But it was not possible to have a sensible extension of education to the existing socio economic conditions in the country, afterwards. Developments in the field of modern education can be discussed in the three phases as follows.

2.4.1 EDUCATION DURING THE IMPERIAL PERIOD.

At the beginning of the twentieth century, the education system's failure to meet the needs of people involved in statecraft, diplomacy, commerce, and industry led to the introduction of government-sponsored secular education. Hence the more planned and coordinated expansion of education has been done after 1941. The primary objective of education had been to produce trained manpower that could run the emergent state bureaucracy. Particularly after 1941, the government's main concern was to replace expatriates that worked at various levels in the state machineries by Ethiopian nationals. In this respect the perspective of education was very limited. This leads to the establishment of the first public school in Addis Ababa in 1907, and a year later a primary school opened in Harer. Foreign languages, elementary mathematics, and rudimentary science were taught in French to a limited number of students, along with Amharic and religious subjects (Teshome, 2006).

The Italian occupation (1936-1941) and the Second World War seriously disrupted the development of modern secular education started during the Menelik era. It was after 1941 that a

series of concrete educational policies were introduced for the promotion of education in the country. The Ethiopian government continued to believe that education held the key to its development. To meet this need, reconstruction began with the re-establishment of the Ministry of Education in 1942. To enhance expansion, a Board of Education was established in each region and an educational tax was also introduced to partly finance education. To supplement government efforts, private and voluntary organizations were encouraged to open schools. The missionaries were also, for the first time, officially invited to participate in providing educational services. From 1942 until 1955, the Ethiopian Government was engaged in the expansion of the education system. The high expenditure on education in relation to total expenditure, as well as the rapid growth of student enrolment showed the commitment of the Ethiopian government to the expansion of education. Non formal education in the form of adult education and literacy programs were coordinated and sponsored by the adult Education and Literacy Department of the Ministry of Education. Work oriented or functional literacy programs directed to workers in specific fields such as agriculture, textile and other activities were provided. According to Woubet (2006) these efforts are reinforced by the measures taken during the course of the three consecutive five-year development plans which have provided a strong role for education to play in the economy. Among these objectives are;

1. To provide education for the majority, particularly for the rural population, in line with more adequate networks of modest rural roads and bus services.
2. To provide an educational system which create a modern scientific outlook in life, which will be in harmony with Ethiopia's cultural tradition.
3. To provide education that develops positive attitude towards manual work and practical skills.
4. To place appropriate emphasis on the quality of education and promoting efficiency.
5. To provide a system within which a more effective national medium of communication through the Amharic language can be realized.

In relation to these objectives, there were two institutions of higher education: Haile Selassie I University in Addis Ababa, formed by imperial charter in 1961, and the private University of Asmera, founded by a Roman Catholic religious order based in Italy.

As a result, from 1942 to 1972, the education sector was allowed to expand with confidence and optimism. Gross Primary enrollment increased by 60% between 1968 and 1972. Between 1961 and 1971, the government expanded the public school system more than fourfold, and it declared universal primary education a long-range objective. In 1971 there were 1,300 primary and secondary schools and 13,000 teachers, and enrollment had reached 600,000. (MOE, 1975)

However, the optimism was not sustainable. The schools were found to be highly inefficient especially in terms of dropouts. 50% of grade one students had dropped out by the end of the second year of schooling. Grade five had less than 10 percent of the students of grade 1. 17. The issue of equity was not properly addressed. Education in the beginning was an urban male dominated phenomenon. Under the pressure of growing public dissatisfaction and mounting student activism in the university and secondary schools, the imperial government initiated a comprehensive study of the education system. Completed in July 1972, the Education Sector Review (ESR) recommended attaining universal primary education as quickly and inexpensively as possible, realizing the curriculum through the inclusion of informal training, equalizing educational opportunities, and relating the entire system to the national development process.

The ESR criticized the education system's focus on preparing students for the next level of academic study and on the completion of rigid qualifying examinations. Also criticized was the government's lack of concern for the young people who dropped out before learning marketable skills, a situation that contributed to unemployment.

2.4.2. EDUCATION DURING THE DERG

After the overthrow of imperial rule, the provisional military government dismantled the feudal socioeconomic structure through a series of reforms that also affected educational development. The structure and organization of educational activities were changed alongside the objectives of the socialist government. In the National Democratic Revolution Program of the Ethiopian Government (April, 1976), Educational Guideline was issued; which states, "an educational program that will provide free education, step by step, to the broad masses". The Government's goals for education are (1) education for production, (2) education for scientific consciousness, and (3) education for political consciousness. The new regime nationalized all private schools, except church-affiliated ones, and made them part of the public school system. Additionally, the

government reorganized Haile Selassie I University and renamed it Addis Ababa University soon after the military government initiated reforms of the education system based partly on ESR recommendations and partly on the military regime's socialist ideology.

According to TGE (1994), The general policy program did not provide an elaborate policy of education up until 1984/85 when A Ten Year Perspective Plan (1974/75-1984/85) was adopted with the following major goals of the education sector.

1. To provide education that meets the basic needs of the people as well as serves as an instrument in the struggle against feudalism, imperialism and bureaucratic capitalism.
2. To give priority to providing polytechnic education to all those children with in appropriate age bracket
3. To provide skilled manpower in such numbers proportions and quality as needed.
4. To promote continued education
5. To eradicate illiteracy and expand preschool education.

The military regime worked toward a more even distribution of schools by concentrating its efforts on small towns and rural areas that had been neglected during the Imperial regime. With technical assistance from the Ministry of Education, individual communities performed all primary school construction. In large part because of such community involvement, the number of primary schools grew from 3,196 in 1974/75 to 7,900 in 1985/86, an average increase of 428 schools annually. The number of primary schools increased significantly in all regions except Eritrea and Tigray, where there was a decline. (Tekeste Negash,1996)

A major move towards expansion of non-formal education was made by the Socialist regime. Two main programs were launched, the National Work Campaign for Development through Cooperation, and The Ethiopian National Literacy Campaign. One of the success stories in the socialist regime has been the achievement in terms of reduction of illiteracy rate in the country. The national literacy campaign began in early 1975 when the government mobilized more than 60,000 students and teachers, sending them all over the country for two-year terms of service. This experience was crucial to the creation in 1979 of the National Literacy Campaign Coordinating Committee (NLCCC) and a nationwide effort to raise literacy levels. The literacy rate, fewer than 10 percent during the Imperial regime, increased to about 63 percent by 1984,

according to government figures. The literacy campaign received international acclaim when the United Nations Educational, Scientific, and Cultural Organization (UNESCO) awarded Ethiopia the International Reading Association Literacy Prize in 1980.(Teshome ,1988).

However the Derg failed to build on what was already achieved in the past. Recommendations of the ESR were barely followed as claimed. Private sector development and the development of the market incentive structure both in the education sector and in the labor market were highly discouraged. The Education system has been centralized in both the Imperial and the Derg regimes. And the red tape in a highly decentralized system of education might incur wastes and stifle growth (Teshome, 1988).

2.4.3. EDUCATION DURING EPRDF

According to the Transitional Government of Ethiopia (1994), it was necessary to replace the educational system that served the old discarded order by the new one. The development of the education sector in Ethiopia has been at an early stage. On the eve of the ongoing educational reform process, which began in 1994 following the endorsement of the New Education and Training Policy, enrollment in primary education stood at about 2.81 million. This includes over-age pupils that amount 34 % of the school-age population. Likewise, enrolment ratio in secondary level stood at about 15% and in the third level at 1 %. 29 Compared to African countries, Ethiopia's enrolment ratios fared among the lowest in primary education and somewhat better though below average in secondary education. Similarly, enrollment in all levels of education is male biased, the tertiary level being worse. (TGE, 1994)

The new strategy presupposes the overall lack of coordination between education, training, research and development efforts in the country. The objectives of Ethiopian education as stated in the various documents of The Transitional Government of Ethiopia, The Education and Training Strategy (1994) are summarized as follows.

1. To provide a good quality primary education with an ultimate aim of achieving Universal Primary Education.
2. To make education relevant by providing problem solving skills and an all rounded education catering to the needs of the individual and the society.

3. To provide vocational education and training at different levels attuned to the manpower requirements of the economy.

4. To provide a secondary education of appropriate quality in an equitable way.

5. To promote higher education of good quality, relevance and focusing on Research & Development.

6. To make available special and non-formal education in line with the needs and capability of the country.

7. To improve the quality of training, professional competence and career structure of teachers and other professionals.

8. To strengthen the management and organization of the educational system so as to make it decentralized, coordinated professional and efficient.

9. Increase the financing of education by encouraging community participation, introducing cost sharing mechanisms, involving the private sector in the provision of education.

10. To improve the collaboration and coordination of the education sector with other relevant sectors.

11. Production of lower, middle, and higher level skilled manpower that can participate in the country's economic growth and social development.

The structure of the Ethiopian education system encompasses formal and non-formal education. But it is not clear how the non-formal education will be implemented. For this reason, it is viewed as open-ended in terms of training program and in terms of institutional arrangement. The emphasis has shifted to the formal education; addressing the problems of low enrolment in the formal schools, rectifying gender imbalance and the like. (TGE, 1994)

The New Education and Training Policy also addressed the issues of technical Vocational training. Thus, it is stipulated in the document that Parallel to general education, diversified technical and vocational training will be provided for those who leave school from any level of education for the development of middle level manpower. (MOE, 1994)

It was also stipulated that every nation and nationality has the right to learn in its own language at least at the basic education and general primary level. But this has put into question the speed at which the adaptation would take place in terms of preparation and provision of teaching

materials and training of the appropriate pedagogical and managerial staff. This change has been revolutionary rather than a cautionary transformation. In this respect, a study by Workalemahu (2004) shows that the necessary preconditions were not fulfilled to select the language as a medium of instruction: there were no available curriculum materials; teachers did not get adequate training; there was imposition on those who don't speak the local language.

High repetition rates intensify the stress on already overburdened schools and increase the numbers of children and youth who eventually drop out of school completely. Too often, investment is thought to be simply more schools, and places for more kids in school. These are necessary conditions but insufficient alone to bring about needed development gains. More is needed, including increasing curriculum relevancy, training teachers to use the most effective pedagogy, improving the way schools are organized and managed, and involving parents and the larger community in supporting schools and ensuring quality education (Woubet ,2006)

2.5. HUMAN CAPITAL DEVELOPMENT: HEALTH POLICY IN ETHIOPIA

The main cause of many of Ethiopia's health problems is the relative isolation of large segments of the population from the modern sector. Additionally, widespread illiteracy prevents the dissemination of information on modern health practices. A shortage of trained personnel and insufficient funding also hampers the equitable distribution of health services. Moreover, most health institutions were concentrated in urban centers prior to 1974 and were concerned with curative rather than preventive medicine. (HSDP, 2010)

Little can be referred about the previous governments' effort in terms of establishing health facilities and access in a concerted manner. It is only recently that the government has given much emphasis to the health problems. Hence, the current Government therefore accords health a prominent role in its order of priorities and is committed to the attainment of these goals utilizing all accessible internal and external resources. In particular the Government fully appreciates the decisive role of popular participation and the development of self-reliance in these endeavors and is therefore determined to create the requisite social and political conditions conducive to their realization (TGE, 1994).

According to TGE (1994), the Government believes that health policy cannot be considered in isolation from policies addressing population dynamics, food availability, acceptable living

conditions and other requisites essential for health improvement and shall therefore develop effective inter sectoral link for a comprehensive betterment of life. So health development shall be seen not only in humanitarian terms but as an essential component of the package of social and economic development as well as being an instrument of social justice and equity. Pursuant to the above, the health policy of the Transitional Government shall incorporate the following basic components.

According to HSDP (2010) The National Health Policy is an overarching policy document that gives strong emphasis to the fulfillment of the needs of the less privileged rural population that constitutes about 81.5 % of the total population in Ethiopia. The Health Policy outlines:

1. Democratization and decentralization of the health system;
2. Development of the preventive components of the health service;
3. Ensuring accessibility of health care by all population
4. Promoting inter-sectoral collaboration, involvement of the NGOs and the private sector;
5. Promoting and enhancing national self- reliance in health development by mobilizing and efficiently utilizing internal and external resources.

Having the national health policy as an umbrella for the development of HSDP IV, other health and health related policies and strategies have been considered. These include:

1. Policy and Strategy for Prevention and Control of HIV/AIDS
2. The National Drug Policy
3. The National Population Policy
4. The National Policy on Women
5. Child Survival Strategy
6. National Nutrition Program
7. National Strategy for the prevention, control and elimination of malaria
8. National TB prevention and control strategy
9. Development and Transformation Plan (DTP)

Hence by applying the policies mentioned the government of Ethiopia has claimed achieving a success story in the world.

CHAPTER THREE

RESEARCH METHODOLOGY

Literature has emphasized that the notion of human capital is very important in Economic Theory. However, human capital needs to be measured quantitatively to validate theoretical models. Yet quantitative measurement alone may not dictate the whole story of the impact of human capital on economic growth, especially for developing countries like Ethiopia as economic growth can be explained by many distinct factors such as the productivity and composition of public expenditure, the socio-cultural condition of the people, the political platform, the manner expenditures are financed and etc. In situations like this, relying on a single method may have a danger to be noticed. However as this is a case noted in the limitation section, only quantitative analyses are employed to address the issue of human capital formation and economic growth. The quantitative analysis is employed for all variable proxies entered in to the model.

Using a time series data of 42 years from 1974to 2015, this study looks at the impact of Human capital formation on economic growth in Ethiopia, in light of the different variables used as proxies.

3.1 DATA DESCRIPTION, SOURCES AND TOOLS

The study uses time series annual data from 1974 to 2015. Most of the data are collected from The MOFEC, WORLD Data bank, CSA and Planning and Economic Commission of Ethiopia..

Table 1: Sources of data

#	Variable Name	Unit of Measurement	Source of Data
1	Real GDP	% Change in RGDP	Planning and Economic Commission
2	GCF	% of RGDP	Planning and Economic Commission
3	Gov. Education Expend	% of RGDP	MOFEC
4	Gov. Health Expend	% of RGDP	MOFEC
5	Labor Force	Labor force Growth rate	World Bank Data Bank and CSA
6	Inflation	Inflation growth rate	CSA

3.2 ECONOMETRIC MODEL SPECIFICATION

The number of methods followed in measuring and estimating human capital contributions are as many as the number of literature works done in the area depending on context specific situations. A relatively simple adoption is the use of the augmented Solow human-capital-growth model. This model is an improvement on the Solow growth model. Solow's original model did not explicitly incorporate human capital. In order to do that, Mankiw, Romer, and Weil (1992) came up with the augmented Solow model which incorporates human capital as a separate input in to the model. This is due to the fact that labor possesses heterogeneous level of education, skills and health condition which were assumed to be homogeneous in the original Solow model.

The modification in the Solow model serves the suitability and hence, the adaptation of the model for our context. The basic assumption in this approach is that increase in workers' quality through improved education and health, improves output. This supports the human capital theory which postulates that education and healthcare of workers ensure greater productivity.

The augmented Solow model using the standard Cobb Douglas production function is therefore specified as follows:

$$Y_t = K_t^{\alpha} H_t^{\beta} (AL)^{1-\alpha-\beta} \quad = \tag{1}$$

Where

Y=Output level

K=Stock of Physical Capital

H=Level of Human Capital

L=Labor force measured by labor force growth rate

A=Level of total factor productivity

α =Elasticity of capital input with respect to output

β =Elasticity of Human Capital input with respect to output

U=is an error term

Econometric Equation

$$Y_t = K_t^{\alpha} H_t^{\beta} (AL)^{1-\alpha-\beta} U \tag{2}$$

Transformed in to log linear

$$\ln Y_t = \alpha \ln K_t + \beta \ln H_t + (1-\alpha-\beta) \ln AL + V$$
$$where \quad V = \ln U \tag{3}$$

To further suit to the theoretical context and the relevance of this study, the model is modified to accommodate additional variables. These variables include government's expenditure on education and health (capital and recurrent) and inflation. The first two variables are incorporated as a showcase to capture government's investment in human capital development. The other variable captured to suit this model is Inflation. Growth is usually calculated in real terms: that is inflation-adjusted terms to eliminate the distorting effect of inflation on the price of goods produced.

The new expanded model is thus stated as follows.

$$\ln Y = \alpha \ln K + \beta \ln H + (1 - \alpha - \beta) \ln AL + \ln GovE + \ln GovH + \ln I + V \qquad (4)$$

Output level (Y) is represented by real Gross Domestic Product (RGDP); stock of physical capital (K) is measured by the country's Gross Fixed Capital Formation; (H) is a measure of human capital development for which Government's capital and recurrent expenditure on education (GovE) and health care (GovH) are taken as proxies; (AL) is Labor force measured by labor force growth rate expressed as a product of (A) total factor productivity. It is expected that all other explanatory variables except labor force (as it is in the Solow's model) would exhibit positive relationship with the dependent variable.

3.3 MODEL ESTIMATION

This study engages in a series of six-step procedure in order to determine the relationship between human capital development and economic growth in Ethiopia. These procedures are the stationarity test for variables, cointegration rank of estimation, the VECM for short run adjustment to the long run, short run causality test for the sum of the differences of the explanatory variables, autocorrelation and residual normality tests. The Augmented Dickey Fuller (ADF) test is employed to determine the stationarity (and hence absence of unit roots) in the time-series data used while the Johansen co-integration test and VECM were employed to find out the long run equilibrium convergence and the speed of disequilibrium adjustments respectively. The short run causality tests are employed in order to see the significance of the sums of lags of explanatory variables. Finally test for autocorrelation and residual normality distribution is done.

CHAPTER FOUR

RESULTS AND DISCUSSION

The time series data model specification and hence formulation given in chapter three is not suitable for OLS estimation. This is because of the fact that most macroeconomic time series contain unit roots and the regression of one non-stationary series on another is likely to yield spurious results. The macroeconomic data for Ethiopia is not an exception in this regard. This means, the data may not be stationary at a level I (0) and hence, we cannot run OLS Method. In light of the above justification, before running for any time series estimation method, the data is recommended to be checked for stationarity.

4.1 STATIONARITY TEST RESULT

The concept of "stationarity" is related to the properties of stochastic processes. Empirical work based on time series data assumes that the underlying time series is stationary. Time series data is assumed to be stationary if the mean, variance and covariance of the series are independent of time and the value of the covariance between the two time periods depends only on the distance or gap or lag between the two time periods and not on the actual time at which the covariance is computed Gujarati (2005:797). In other words, there exists stationary process if it generates constant mean and variance.

In order to check for stationarity, there are many tests that could be employed while the most widely known and commonly used approach is to do the Dickey Fuller test or the ADF Test in case of collinearity of the error terms. If a time series is nonstationary, we can study its behavior only for the time period under consideration and hence it's not possible to generalize it to other time periods. That means forecasting is difficult. Hence, to check for stationarity, unit root test is recommended.

4.1.1 AUGMENTED DICKEY FULLER TEST (ADF)

The Dickey Fuller Test assumes that the error term u_t is uncorrelated. But in cases where u_{ts} are correlated, the ADF is recommended to be used. This is done by "augmenting" the preceding three equations by adding the lagged values of the dependent variable ΔY.

Table 2: Results for stationarity test

#	Variable Name	Test Statistic	5% Critical Value	Condition	Remark
1	Real GDP	-2.587	-1.95	Suppressed Constant term	Stationary
		-6.428	-3.54	Trend Term	Stationary
		-4.867	-1.686	Drift	Stationary
2	GCF	-6.278	-1.95	Suppressed Constant term	Stationary
		-8.126	-3.54	Trend Term	Stationary
		-7.385	-1.686	Drift	Stationary
3	Inflation	-8.732	-1.95	Suppressed Constant term	Stationary
		-8.505	-3.54	Trend Term	Stationary
		-8.62	-1.686	Drift	Stationary
4	Edu	-2.594	-1.95	Suppressed Constant term	Stationary
		-5.485	-3.54	Trend Term	Stationary
		-4.516	-1.686	Drift	Stationary
5	Health	-3.582	-1.95	Suppressed Constant term	Stationary
		-5.496	-3.54	Trend Term	Stationary
		-4.947	-1.686	Drift	Stationary
6	Labor Force	-9.681	-1.95	Suppressed Constant term	Stationary
		-9.495	-3.54	Trend Term	Stationary
		-9.59	-1.686	Drift	Stationary

Null hypothesis $H_{0=}$ data has unit root (non-stationary**)**

Alternate hypothesis $H_{1=}$ data doesn't have unit root (stationary)

Guideline (Criteria): if absolute value of the test statistic is greater than /5% critical value/, the criteria is to reject the null hypothesis and to accept the data as stationary and vice versa otherwise. As can be seen from the ADF test results, all the time series are stationary at I (1) while they are not at I (0). When all variables are integrated of the same order and in this case with integrated at order one; it is advised that Johansen cointegration estimation method should be used.

4.2 COINTEGRATED RANK OF VARIABLES

If two integrated variables have shown to share a common stochastic trend such that a linear combination of these variables is stationary, they are called cointegrated. For example, the plots of yearly ln GDP, GCF, Labor force growth rate, Education and health expenditure and inflation in Figure 1 exhibit fluctuation at a constant mean and hence its mean is reverting and appears to be stationary. The meaning of Cointegration mimics static or long run relationships (state of equilibrium or static model) while short run depicts the short run disequilibrium (dynamics)

Figure 1, plots of variables
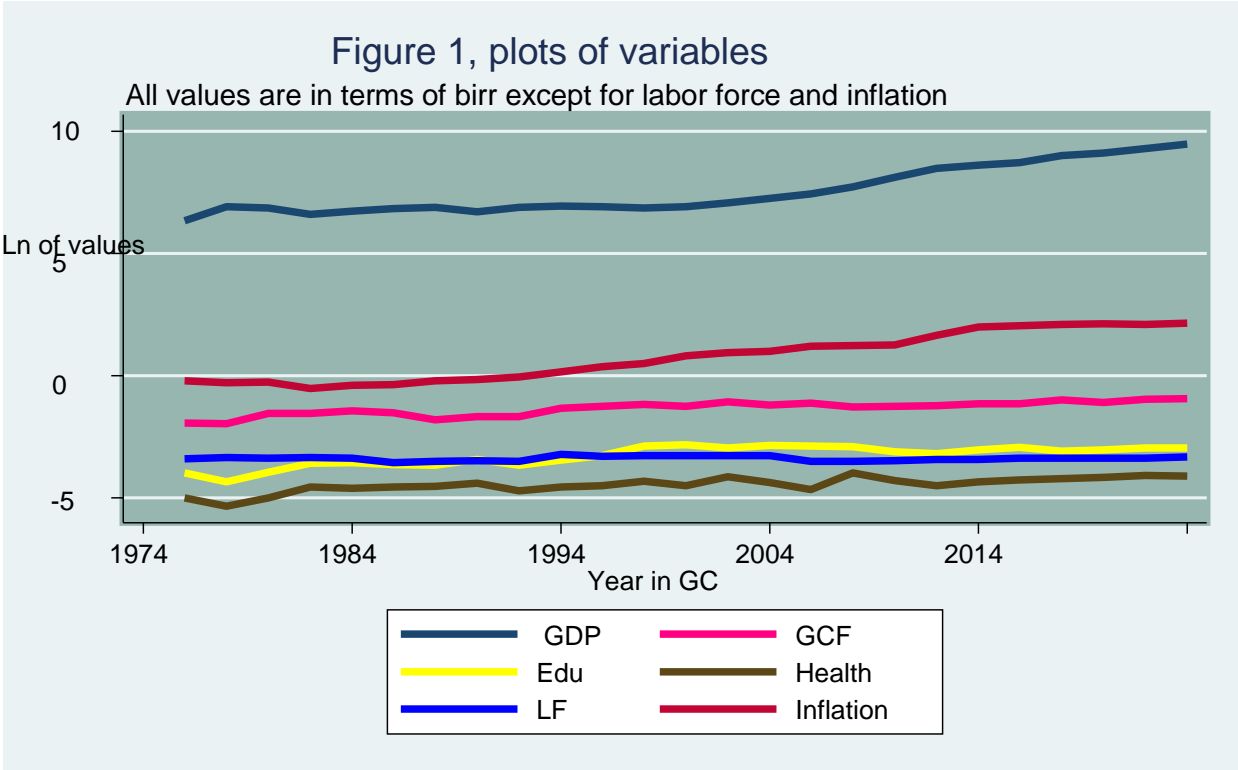
4.3 OPTIMUM LAG SELECTION CRITERIA

Literature informs that there is a good number of lag-order selection criterion most commonly used in applied work methods. However, most authors prefer the Akaike Information Criterion (AIC) as they claim it tends to produce the most accurate structural and semi-structural impulse response estimates for realistic sample sizes. In light of this understanding, we have chosen AIC determined a maximum lag length period of four.

Guideline: The lower the AIC value, the better will be the model all the time.

Table 3: Lag selection criterion

```
. varsoc gdp gcf edu health lr inf

   Selection-order criteria
   Sample:  1978 - 2015                              Number of obs     =       38
```

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-59.4109				1.3e-06	3.44268	3.53467	3.70124
1	95.5937	310.01	36	0.000	2.5e-09*	-2.82072	-2.17675*	-1.01076*
2	125.169	59.15	36	0.009	4.0e-09	-2.48256	-1.28662	.878797
3	172.94	95.543	36	0.000	3.3e-09	-3.10212	-1.3542	1.81064
4	224.937	103.99*	36	0.000	3.8e-09	-3.94404*	-1.64414	2.52012

```
   Endogenous:  gdp gcf edu health lr inf
    Exogenous:  _cons
```

4.4 THE JOHANSEN COINTEGRATION ESTIMATION

The Johansen test can be seen as a multivariate generalization of the augmented Dickey-Fuller test. The generalization is the examination of linear combinations of variables for unit roots. The Johansen test and estimation strategy (maximum likelihood) makes it possible to estimate all cointegrating vectors when there are more than two variables. If there are three variables each with unit roots, there are at most two cointegrating vectors. More generally, if there are n variables which all have unit roots, there are at most n – 1 cointegrating vectors.

Based on Johansen, S. and Juselius, K (1990), studies, it is suggested that the Johansen test for Cointegration is to be used when

  ✓ All Variables are non- stationary at level I(0) and
  ✓ All Variables are stationary at first differenced I (1) and not I(2) and beyond.

While the use of differenced variables will avoid the spurious (nonsensical) regression problem, it will also remove any long-run information. In modeling time series data, it is suggested to retain the long-run information but to ensure that it reflects the co-movement of variables due to the underlying equilibrating tendencies of economic forces, rather than those due to common but unrelated time trends in the data.

By the long run we refer to the state of equilibrium where there is no inherent tendency to change since economic forces are in balance while the short run depicts the disequilibrium state.

Since we already have identified that our variables are not stationary at I(0) and stationary at I(1), we can simply run the Johansen cointegration model in order to see the possible long-run equilibrium relationships, i.e. co-integration and we can estimate how many "cointegrating vectors" exist among the variables using the Johansen's technique.

4.6 ESTIMATION OF JOHANSEN TEST FOR COINTEGRATION

Table 4: Cointegration rank

```
. vecrank gdp gcf edu health lr inf, trend(constant) lags(4) max

                        Johansen tests for cointegration
Trend: constant                                    Number of obs =      38
Sample:  1978 - 2015                                         Lags =       4
─────────────────────────────────────────────────────────────────────────
                                                        5%
maximum                                    trace    critical
   rank    parms        LL     eigenvalue  statistic   value
    0       114      136.1994          .    177.4746    94.15
    1       125     174.98623    0.87015    99.9009     68.52
    2       134     201.64566    0.75417    46.5820*    47.21
    3       141     215.04082    0.50590    19.7917     29.68
    4       146     222.95831    0.34079     3.9568     15.41
    5       149     224.87735    0.09607     0.1187      3.76
    6       150     224.93669    0.00312

                                                        5%
maximum                                     max     critical
   rank    parms        LL     eigenvalue  statistic   value
    0       114      136.1994          .     77.5737    39.37
    1       125     174.98623    0.87015    53.3189     33.46
    2       134     201.64566    0.75417    26.7903     27.07
    3       141     215.04082    0.50590    15.8350     20.97
    4       146     222.95831    0.34079     3.8381     14.07
    5       149     224.87735    0.09607     0.1187      3.76
    6       150     224.93669    0.00312
─────────────────────────────────────────────────────────────────────────
```

H$_0$: Null hypothesis =there is no cointegration

H$_1$: Alt hypothesis= there is cointegration

Guideline: if the trace statistic is greater than the critical value (5%), reject the null hypothesis and accept the alternative hypothesis

4.7 INTERPRETATION OF THE JOHANSEN ESTIMATION

As can be seen from the above Johannsen cointegration estimation results, we have two cointegrating equations from a maximum of 5 (n-1). At a null hypothesis of 0 cointegration equation, the trace statistic result of 177.4746 is greater than the value 94.15 at 5% critical value (95% confidence level). The guideline in this case is to reject the null hypothesis and in return accept the alternative hypothesis until the converse is true. At a null hypothesis of 2 cointegration equations, the trace statistic result of 46.5820* is less than the 5% critical value i.e, 47.21. Based on the guideline, if the trace statistic value is less than the critical value, the decision will be accepting the null hypothesis with two cointegration equations.

4.8 THE VECM

VECM adjusts to both short run changes in variables and deviations from equilibrium. Variables that are individually non-stationary may be co-integrated. In this regard, stationarity test is done individually to all variables and all variables in the model are to have unit roots (non-stationary) at level I (0) and are expected to become stationary at I(1). Using the Johansen con-integration method, it was found that two cointegrated equations are in the model. Hence, use of VECM model is suggested. In this model, the equation is differenced and an error-correction term measuring the previous period's deviation from long-run equilibrium is included

4.8.1. VECTOR ERROR-CORRECTION MODEL

Table 5: Vector error correction model

```
Vector error-correction model

Sample:  1978 - 2015                          No. of obs    =         38
                                              AIC           = -3.560298
Log likelihood =  201.6457                    HQIC          = -1.505723
Det(Sigma_ml)  =  9.91e-13                     SBIC          =  2.214348

Equation            Parms     RMSE      R-sq       chi2     P>chi2
--------------------------------------------------------------------
D_gdp                 21     .072346   0.9246   196.2278    0.0000
D_gcf                 21     .186257   0.7020    37.68525   0.0140
D_edu                 21     .129386   0.8632   100.9602    0.0000
D_health              21      .18509   0.8060    66.48906   0.0000
D_lr                  21     .096381   0.8680   105.2064    0.0000
D_inf                 21     .954324   0.7382    45.11893   0.0017
--------------------------------------------------------------------
```

4.9 SHORT RUN ADJUSTMENT

Table 6: Coefficient of cointegration

		Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_gdp							
_ce1							
	L1.	-.3535758	.149226	-2.37	0.018	-.6460535	-.0610982
_ce2							
	L1.	-.5310597	.1399631	-3.79	0.000	-.8053824	-.2567371
gdp							
	LD.	-.7292734	.2733354	-2.67	0.008	-1.265001	-.1935458
	L2D.	-.3000777	.2659779	-1.13	0.259	-.8213848	.2212295
	L3D.	-.2004791	.2294778	-0.87	0.382	-.6502474	.2492891
gcf							
	LD.	.2742723	.1359247	2.02	0.044	.0078648	.5406799
	L2D.	.2621779	.1065401	2.46	0.014	.0533632	.4709926
	L3D.	.1611141	.1235839	1.30	0.192	-.0811059	.403334
edu							
	LD.	-.3473086	.1584263	-2.19	0.028	-.6578184	-.0367988
	L2D.	-.403941	.1795063	-2.25	0.024	-.755767	-.052115
	L3D.	-.2996645	.2092594	-1.43	0.152	-.7098054	.1104764
health							
	LD.	.1607293	.1191173	1.35	0.177	-.0727364	.394195
	L2D.	-.0035244	.1010567	-0.03	0.972	-.2015918	.1945431
	L3D.	.0484592	.13266	0.37	0.715	-.2115496	.3084681
lr							
	LD.	.1493885	.2192702	0.68	0.496	-.2803732	.5791503
	L2D.	-.0642222	.1671384	-0.38	0.701	-.3918074	.263363
	L3D.	-.0496386	.1239926	-0.40	0.689	-.2926597	.1933824
inf							
	LD.	-.0173576	.0243208	-0.71	0.475	-.0650254	.0303103
	L2D.	-.0020714	.019569	-0.11	0.916	-.0404259	.0362831
	L3D.	.0160045	.0146344	1.09	0.274	-.0126784	.0446873
_cons		.0446604	.0255059	1.75	0.080	-.0053303	.0946511

4.9.1 INTERPRETATION OF THE VECM

Guideline: when the error correction term is significant (0.05) and the sign is negative there is long run equilibrium or loosely speaking causality running from the explanatory variables to the dependent variable in this case to Real GDP. The ideal situation in the long run equilibrium is to have a negative coefficient of cointegration equation with significant p value. The estimation of

VECM in table 6 shows there are two cointegrating equations with both negative coefficient of variables with P values less than 5%. Hence the model is judged to have a short run adjustment to the long run equilibrium running from the independent variables to GDP

4.9.2 INTERPRETATION

There is a long run equilibrium (causality) running from the dependent variable Real GDP to all the explanatory variables since the error correction term is negative and P value is significant.

This means that Ce1 and Ce2 explain the model is adjusting itself at the rate of 35 % and 53% towards the long run equilibrium respectively. This is certainly a significant and stable correction. What this means in other terms is, the coefficient of the speed of adjustments imply that 35% and 53% of the disturbance in the short run will be corrected each year. In other words negative coefficients greater than unity and significant meaning, the system corrects its previous period disequilibrium at the indicated speed to reaching its long run equilibrium steady state position.

4.9.3 SHORT RUN (SINGLE AND JOINT CAUSALITY OF LAGS)

Hereunder, we discuss the short run causality of the differenced individual lag of explanatory variables and that of their sum at a maximum lag order running from the explanatory variables to the dependent (target variable) GDP. The results of all variables except health, labor force growth rate and inflation are consistent with predictions.

The result of the first lag of GDP, GCF and Education expenditures show statistically significant figure. That means, there is a short run causality running from these variables to GDP.

Short run causality test for Real GDP

As can be seen from the test statistics, there is a short run causality running from lags of GDP to GDP which is consistent to theories and our predictions that lags of GDP may Granger cause

```
. test ([D_gdp]: LD.gdp L2D.gdp L3D.gdp)

 ( 1)   [D_gdp]LD.gdp = 0
 ( 2)   [D_gdp]L2D.gdp = 0
 ( 3)   [D_gdp]L3D.gdp = 0

        chi2( 3) =     7.77
      Prob > chi2 =    0.05
```
itself

Short run test for GCF

```
. test ([D_gdp]: LD.gcf L2D.gcf L3D.gcf)

 ( 1)   [D_gdp]LD.gcf = 0
 ( 2)   [D_gdp]L2D.gcf = 0
 ( 3)   [D_gdp]L3D.gcf = 0

        chi2( 3) =     6.87
      Prob > chi2 =    0.0462
```

As can be seen from the test statistics result above, there is short run causality running from lags of GCF to GDP which is again consistent to theories and our predictions. Hence, the test result shows that the ever expanding infrastructure and physical investments in various part of the country can be explained by a short run impact that it has in the country's economic growth.

Short run causality test for education

Human capital formation is theoretically related with the development of educational sector which inter alia comprises the quality as well as numeric components (expansion of education). As can be seen from the test statistics results, there is short run causality running from lags of government expenditure on education to GDP which is again consistent to theories and our predictions. Hence, the test result shows that the government's spending on educational sector can be explained by a short run impact that it has in the country's economic growth.

```
. test ([D_gdp]: LD.edu L2D.edu L3D.gcf)

 ( 1)   [D_gdp]LD.edu = 0
 ( 2)   [D_gdp]L2D.edu = 0
 ( 3)   [D_gdp]L3D.gcf = 0

        chi2( 3) =     7.70
      Prob > chi2 =    0.05
```

Short run causality test for Health

One of the paradoxical and inconsistent results to theories and to our predictions is that of government expenditure on health. It appears that the sum of the differenced lags of health has insignificant contribution to the country's economic growth. However, its impact on economic growth in the long term may have contributed to the existence of long run equilibrium. The contribution of health in economic growth and wellbeing of the labor force is something under studied in the Ethiopian context and it is much attributed to economic development than economic growth.

```
. test ([D_gdp]: LD.health L2D.health L3D.health)

 ( 1)   [D_gdp]LD.health = 0
 ( 2)   [D_gdp]L2D.health = 0
 ( 3)   [D_gdp]L3D.health = 0

          chi2(  3) =     2.44
        Prob > chi2 =     0.4865
```

Short run causality test for labor force growth rate

The traditional national income theory uses labor as one factor of production on which national income depends. In our case, the labor force growth rate is insignificant in the short run economic contribution, which can be explained by the fact that mere increase in labor force may not increase output. This is consistent at some point to the Augmented Solow Model predictions and again to theories of demography. In Solow's model, while investment in physical capital may affect growth positively, population growth does it negatively. However, depending on the population structure of a nation labor force growth might have insignificant contribution to increase in national income.

```
. test ([D_gdp]: LD.lr L2D.lr L3D.lr)

 ( 1)   [D_gdp]LD.lr = 0
 ( 2)   [D_gdp]L2D.lr = 0
 ( 3)   [D_gdp]L3D.lr = 0

          chi2(  3) =     2.39
        Prob > chi2 =     0.4959
```

Short run causality test for inflation rate

Theoretically, high inflation is consistent with low rates of unemployment, implying that there is a positive impact on economic growth. However, most of the time the inflationary rate in Ethiopia is artificial and one that may not be explained by economic attribute. Sometimes the inflationary measures are government policy measures. In any case, the test statistic shows that inflation rate is found to be insignificant.

```
. test ([D_gdp]: LD.inf L2D.inf L3D.inf)

 ( 1)   [D_gdp]LD.inf = 0
 ( 2)   [D_gdp]L2D.inf = 0
 ( 3)   [D_gdp]L3D.inf = 0

          chi2( 3) =     3.47
        Prob > chi2 =    0.3250
```

Table 7: Cointegrating equations

```
Cointegrating equations

Equation          Parms        chi2      P>chi2
────────────────────────────────────────────────
_ce1                  4     959.7433    0.0000
_ce2                  4     707.6168    0.0000
────────────────────────────────────────────────
```

Table 8: Johansen Normalization

```
            Johansen normalization restrictions imposed
─────────────────────────────────────────────────────────────────────────
        beta │     Coef.    Std. Err.      z     P>|z|    [95% Conf. Interval]
─────────────┼───────────────────────────────────────────────────────────────
_ce1         │
        gdp  │         1          .         .       .           .           .
        gcf  │         0    (omitted)
        edu  │  .0336967     .209857      0.16    0.872   -.3776154    .4450089
     health  │ -.7235025    .2167351     -3.34    0.001   -1.148296   -.2987095
         lr  │ -2.574039    .3892895     -6.61    0.000   -3.337032   -1.811045
        inf  │  .0893591    .0577195      1.55    0.122   -.0237691    .2024873
       _cons │  -14.9592          .         .       .           .           .
─────────────┼───────────────────────────────────────────────────────────────
_ce2         │
        gdp  │ -1.11e-16          .         .       .           .           .
        gcf  │         1          .         .       .           .           .
        edu  │ -1.126329    .1840218     -6.12    0.000   -1.487005   -.7656528
     health  │  .5022924    .1900532      2.64    0.008    .129795     .8747897
         lr  │  2.580913    .3413646      7.56    0.000   1.911851    3.249976
        inf  │ -.1873616    .0506138     -3.70    0.000   -.2865628   -.0881605
       _cons │  2.802937          .         .       .           .           .
─────────────┴───────────────────────────────────────────────────────────────
```

Table 9: Results for Test of Autocorrelation

```
Lagrange-multiplier test
```

lag	chi2	df	Prob > chi2
1	29.8753	36	0.75412
2	30.3920	36	0.73204
3	41.2353	36	0.25234
4	37.2759	36	0.41019

```
H0: no autocorrelation at lag order
```

Our lag selection criteria dictated us to choose lag 4. At lag 4, the p value is 0.41019; which is greater than 5%. The decision in this case is to accept H0 (there is no autocorrelation). Hence we accept the null hypothesis. Again in all the lags above the p value is insignificant. As such we have no autocorrelation problem and we can judge that the model is free from autocorrelation problem.

Test for residual normal distribution

H0: the residuals are normally distributed

H1: the residuals are not normally distributed

Table 10: Results for residual normal distribution

```
. vecnorm, jbera
```

```
Jarque-Bera test
```

Equation	chi2	df	Prob > chi2
D_gdp	0.761	2	0.68351
D_gcf	1.302	2	0.52145
D_edu	2.046	2	0.35955
D_health	0.073	2	0.96392
D_lr	2.072	2	0.35488
D_inf	0.722	2	0.69689
ALL	6.977	12	0.85914

Ho: Residuals are normally distributed.

H1: Residuals are not normally distributed.

In order to see the normality distribution of the residuals, the Jarque Bera test is used. As can be seen from the test result, residual distribution of all variables for all models shows that the distribution is normal. Results for all the variables shows that the p value for all variables is greater than 5% and hence we can say that the model is free from the a problem of non-normality distribution of the residual (error) terms.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 CONCLUSIONS

In this study I have examined the impact (formation) of human capital on economic growth in Ethiopia using a time series data running from 1974 to 2015. Some econometric empirical inferences such as stationarity, cointegration and the long run diagnostic tests were employed to grasp the nature of time series data. The results of the long run model revealed that there is a long run equilibrium to which short run dynamic adjustments of 35% and 53% are justified looking at the two cointegrating equations respectively. Hence one of the main finding is that there is a long run equilibrium to which short run adjustments are statistically significant and stable. Three variables such as RGDP, GCF and government expenditure on education are found to have a statistically significant effect on real gross domestic product in the short run and they are the main contributors to RGDP. On the other hand, government expenditure on health, labor force growth rate and inflation rate are shown to have statistically insignificant impact on economic growth which is paradoxical and not consistent to theories and predictions.

Though a huge economic contribution as in that of developed economies like USA is not expected Hippe (2003), due to partly data management and partly institutional capacities , there is however a growing and consistent evidence that both the health and education components of human capital are contributing to the economy.

5.2 RECOMMENDATIONS

It is a question to be answered and empirically supported as to whether the government's recent expansionary approach on education sector and the resultant spending on education have contributed to its short and long run economic aspiration while quality issues and the debate on the level of measurement being something to be answered. Health is also a sector which has gaining a lot of attention in recent times from the government and it is wise to see its contribution in the long and short term periods. The spending on education and GCF have shown to have significant effect on economic growth in the short run and it's the recommendation of this paper that policy makers do continue the injection of money on these sectors while concerns

being raised on qualities seeking due attention. The spending on public health has shown to have a statistically insignificant result at least in the short run and it is the recommendation of this paper that policy makers should be cautious on health spending. Further investigation of health contribution should be recommended to be analyzed. That means policy makers and / or the government should strive to create health sector institutional capacity that improves basic health service in a cost efficient way. The study also further recommends that the current accelerated and sustained growth aspirations in infrastructure and other capital developments are in line with several studies focusing on physical capital developments. In general the policy makers and the government should focus on securing more resources and structures that are essential and appropriate for better and efficient basic health service provision. Such measures apart from focusing on creating new institutional capacity, they should further strengthen and change the existing institutional setups of the education and health sectors of Ethiopia that produce quality manpower.

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Appendix 1-Data in ln

All variables except Labor Force GR and Inflation are expressed in Millions of Birr

Year	Real GDP	GCF	Edu Expend	Health Expend	Labor F GR	Inflation
1974	8.6364566	9.86141478	5.084672311	3.835573833	-3.52860005	2.370243741
1975	8.7267593	9.67193373	5.03624456	4.000400116	-3.752596553	1.547562509
1976	8.8671657	9.64257723	5.03627705	4.192529394	-3.364958803	2.939161922
1977	8.9092353	9.55506418	5.003603965	4.253767036	-3.087089955	3.086486637
1978	9.0506578	9.73861291	5.211244169	4.271234729	-3.364846263	2.923161581
1979	9.0081936	9.92588485	5.301392633	4.310664888	-3.364991497	2.564949357
1980	9.173806	9.99332826	5.430047137	4.570992734	-3.753544277	2.525728644
1981	9.2895476	10.002201	5.642126905	4.695741884	-3.610659946	0.641853886
1982	9.3867516	9.98192898	5.744185181	4.656148431	-3.221969355	1.987874348
1983	9.2753788	10.2400669	5.810500069	4.705467907	-3.752671587	1.360976553
1984	9.4458077	9.68452276	5.913078591	4.801887623	-3.404532738	-
1985	9.5835774	10.2055162	5.956093813	4.833579847	-3.333195801	2.797281335
1986	9.5396441	10.2870478	6.037823186	4.992063909	-3.18702596	1.871802177
1987	9.5956028	10.557062	6.103345757	5.041099835	-3.528612659	-
1988	9.6638017	10.2110458	6.1834765	5.133501684	-3.364845973	0.832909123
1989	9.7156508	10.1070812	6.205704579	5.161466184	-3.495101441	2.261763098
1990	9.8169955	9.8875614	6.193782748	5.078169324	-3.459281895	1.648658626
1991	9.9824308	9.726452	6.270008746	5.241164835	-3.40324906	2.995732274
1992	10.204755	10.2759817	6.540153713	5.544356795	-3.327467982	3.086486637
1993	10.242628	10.3567582	6.904731713	5.855902523	-3.382483164	2.041220329
1994	10.44778	10.4901069	7.032383279	6.064180479	-3.345753656	1.193922468
1995	10.503755	10.617809	7.231914882	6.177861123	-3.369814827	2.595254707
1996	10.659962	10.6704659	7.281041489	6.370277624	-3.543024265	-0.105360516
1997	10.677241	10.6647839	7.323533688	6.464276729	-3.50822059	-
1998	10.839821	10.7107221	7.439988124	6.458918053	-3.4773157	1.360976553
1999	10.824079	10.6943965	7.393719014	6.343757404	-3.497376855	1.458615023
2000	11.097202	10.8345881	7.687980668	6.591906901	-3.204904241	1.686398954
2001	11.117673	10.9630991	7.901305341	6.668698278	-3.302909918	-
2002	11.095825	10.8585181	8.236472962	6.79317461	-3.271178286	-
2003	11.194134	11.1646438	8.400427888	6.7307436	-3.259391385	2.388762789
2004	11.359775	11.1657906	8.417968038	7.26196218	-3.264622238	1.987874348
2005	11.565661	11.3272342	8.742371608	7.217766197	-3.271603181	1.808288771
2006	11.777854	11.305003	8.939984661	7.158046962	-3.507838634	2.360854001
2007	12.045203	11.4177793	9.211519676	8.132882737	-3.491158031	2.76000994
2008	12.41242	11.5170768	10.07190939	8.996770843	-3.466255141	3.230804396
2009	12.713072	11.7196713	10.31767134	9.088135449	-3.434796349	3.594568775
2010	12.845646	11.8558341	10.6051183	9.413577499	-3.407188779	1.029619417
2011	13.152075	12.1109594	10.85368593	9.462637983	-3.375326498	2.895911938
2012	13.524257	12.2066825	11.09726525	9.70164734	-3.368345091	3.529297384
2013	13.672703	12.5489032	11.2499156	10.0521502	-3.363835305	2.602689685
2014	13.874558	12.908277	11.45072133	10.35022703	-3.368045367	2.028148247
2015	14.076305	13.1454638	11.72818333	10.61779232	-3.31061542	2.261763098