THE RELATIONSHIP BETWEEN GOVERNMENT HEALTH EXPENDITURE AND ECONOMIC GROWTH: AN ANALYSIS OF KENYA: 1975 - 2020

By

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DECLARATION

This research paper is my original work and has not been presented for a degree award in any other university.

Signed  ..... Date..... 14/11/2022 .....

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This research paper has been submitted to the Department of Economics and Development Studies, the University of Nairobi with our approval as university supervisors;

Signature  Date: 4.12.2022

Urbanus M. Kioko (PhD)

DEDICATION

I dedicate this research paper to my family: My wife, Kitonyi Kimanzi and our children, Bakhita Mutingili Kimanzi, Charlotte Muthoni Kimanzi, and Atticus Kaki Kimanzi. We have formed family foundation together.

Again, I dedicate it to my parents: My father Kaki Munyau Munyasya and mother, Mutingili Kaki Munyau. I cannot choose better parents than you.

Also, I dedicate this research paper to my sisters: Cecilia Ndilima Kaki, Mary Ndilima Kaki, and Zipporah Syongwa Kaki. You took care of me when I was young, something I was unable to do you in return.

ACKNOWLEDGMENT

First, I would like to thank you YAHWEH, our LORD who lives in secret place of Elyon, and spends HIS nights in the shelter of Shaddai (Psalms 91: 1). I called upon you YAHWEH, the giver of Knowledge through JESUS CHRIST, our LORD (Colossian, 2:3). I will always declare with my mouth that JESUS is the LORD and believe in my heart that YAHWEH raised HIM from the dead – Hence, I am saved! (Romans 10: 8-18). To YAHWEH, be honour and glory!

Second, I would like to thank ME for determination and persistence even in situations whose odds seemed against me. I have always pushed myself beyond limit, started constructive wars, fought good fights, cried for help, asked for assistance, and more importantly, apologized even to those who offended me – For the sake of completing this course. As I shift my focus to PhD Economics, I must say that I am proud of myself!

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ABBREVIATIONS AND ACRONYMS

2SLS	Two-Stage Least Squares
ADF	Augmented Dickey-Fuller
ADL	Autoregressive Distributed Lag
CEMAC	Community for Central African Countries
CHE	Current Health Expenditures
DOLS	Dynamic Ordinary Least Square
ECM	Error Correlation Model
FMOLS	Fully Modified Ordinary Least Square
GDP	Gross Domestic Product
GDS	Gross Domestic Savings
GNI	Gross National Income
HISP	Health Insurance Subsidy Program
HLTF	High-Level Taskforce on Innovative International Financing for Health Systems
KHSSP	Kenya Health Sector Strategic and Investment Plan
MDGs	Millennium Development Goals
NHIF	National Health Insurance Fund
OECD	Organization for Economic Cooperation and Development
OLS	Ordinary Least Square
POLS	Panel Modified Ordinary Least Square
VAR	Vector Auto-Regressive
VECM	Vector Error Correction Model
WHO	World Health Organization

ABSTRACT

Health is a substantial pointer to economic growth and development. To generate new knowledge and skills and realize long-term advantages, economies require a healthy labour force. Studies done in health economics have shown that government health expenditure partly explains changes in economic growth. From a macroeconomic standpoint, investments in workers, health boost population health, which, in turn, increases productivity. There is existing literature on a connection between government health spending and economic growth, but there are hardly studies in Kenya on the effect of health on economic growth. This research paper aims to close this gap by determining how government health spending affects Kenya's economic growth. The study used the Solow model that introduced numerous components of estimation using log-log Autoregressive Distributed Lag (ADL) model, the key findings showed presence of a positive (coefficient = 1.407203) and a significant relationship (p = 0.009) between health spending per capita and the GDP per capita. From this perspective, the Kenyan government should efficiently allocate substantial amount of budget funds to the health sector, given that health expenditure necessitates substantial amount of economic growth.

CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

Health is a primary indicator of economic growth and development. Piabuo and Tieguhong (2017) related a healthy population with improved productivity, as well as increased income per individual. In this sense, the importance of a healthy population cannot be overstated by academics or decision-makers in the economic sphere because it acts as a potent catalyst for both social and economic advancement. The hypothesis of health-related growth serves as the foundation for most of the government health spending contribution to economic growth (Mushkin, 1962). This hypothesis regards health as a capital, and thus, investments directed towards health are considered to enhance labour productivity (Piabuo & Tieguhong, 2017; Bloom et al., 2000). Consequently, an increase in labour productivity improves individuals' income entire population welfare.

According to Bloom and Finlay (2009), economies require a healthy labour force to generate new knowledge and skills and reap long-term advantages. On contrary, a labour force with unhealthy workers tends to have low productivity. Consistent with Cole and Neumayer's (2006) observation, the negative effects of poor health on output explain the disparities in the economic developments in different parts of the world. As a result, and consistent with Bloom et al.'s (2000) and Bloom and Finlay's (2009) observation, the significant discrepancies in growth of economies between developed and less developed nations relate to employees' poor health and shorter life expectancy.

Economic growth and Government health spending vary between countries. Numerous research studies, such as Aboubacar and Xu (2017), carried out in health economics have revealed that expenditure on health is an imperative aspect in explaining the variations in economic growth levels. In particular, good health outcomes of a population somewhat through government health expenditures culminate in economic growth. From the macroeconomic perspective, investments geared towards the health of the workforce as well as infrastructure are anticipated to enhance the health conditions of the population (Aboubacar & Xu, 2017). Consequently, a desirable human capital improves output or productivity – measurable in Gross Domestic Product (GDP) terms.

According Piabuo and Tieguhong (2015, 2017), the importance of health for national and individual well-being, as well as for economic growth and development, has been acknowledged by numerous countries around the world. This is attested by numerous reforms and investments that countries have initiated to improve health sector in quest to attain Millennium Development Goals (MDGs) associated with health (Piabuo & Tieguhong, 2017). For instance, African leaders agreed to the 2001 Abuja Declaration, which advocates for 15% of all government spending to go into the health sector. Other similar declarations on government expenditure include the 2006 Addis Ababa Declaration, whose focus was on government investments in the health of community, and the 2008 Ouagadougou Declaration, whose emphases were on the provision of primary healthcare and improvement of health care systems (Piabuo & Tieguhong, 2017). Notably, the High-Level Taskforce on Innovative International Financing for Health Systems (HLTF) urged developing countries to allocate at least $44 per capita to health care to offer an imperative combination of health-related services (Piabuo & Tieguhong, 2017). Apart from Botswana, Rwanda, and Zambia, the rest of the African states have not met the 2001 Abuja Declaration's target of 15% budget spending on health (Nakatani & Kieny, 2013).

Creating an appropriate system to finance health care is one way for governments and leaders to demonstrate their commitment and political goodwill to the health status of their citizens (Bloom et al., 2004; Bloom & Finlay, 2009). Nonetheless, poor economic performance and the huge health care costs in third-world countries, particularly those in the African continent, hamper the motivation behind developing strong health-based financial systems. Many African nations are categorized as low-income nations and middle-income nations (Piabuo & Tieguhong, 2015, 2017). In this regard, these countries encounter severe problems relating to scarce finances to fund superior healthcare services.

In particular, the mean total expenditure of African nations on health was $135, which represents 4.2% of $3,150 spent in developed nations (Piabuo & Tieguhong, 2017). Small investments in health and initiatives aimed to address social and environmental impetus of health are primary impediments to improving health results in developing countries. In turn, developing nations, such as those in the African continent register the highest burden of infant and maternal mortality, and large cases of HIV/AIDs among the

population. Likewise, increased cases of non-communicable diseases and physical injuries are putting pressure on government health expenditures.

The constraints associated with healthcare financing in developing countries emanate from strategies and approaches used to finance healthcare. Over 40% of expenditures towards health emanate from out-of-pocket payments. Piabuo and Tieguhong (2017) regarded this method of financing health care as regressive. Findings of Nundoochan et al. (2019), Rice et al. (2018), and Salari et al. (2019) studies depicted out-of-pocket payments are regressive because they bring forth financial barriers to people inadequate finances to acquire quality and desirable health care services and, at the same time, increase destitution risks. In turn, these failings in financing health care cause disparities and ineptitudes in allocating health services within the country's urban and rural areas. The Abuja declaration was meant to solve this problem by ensuring that governments spend 15% of the health budget (Piabuo & Tieguhong, 2017). The primary goal was to lower out-of-pocket payments on health spending to below 20%. As of 2013, Botswana was the only country that managed to meet the Abuja Declaration target by ensuring that it spends 15% of its budget on health care and only 8% is out-of-pocket spending.

1.2 Government Health Expenditure Trends and Economic Growth in Kenya

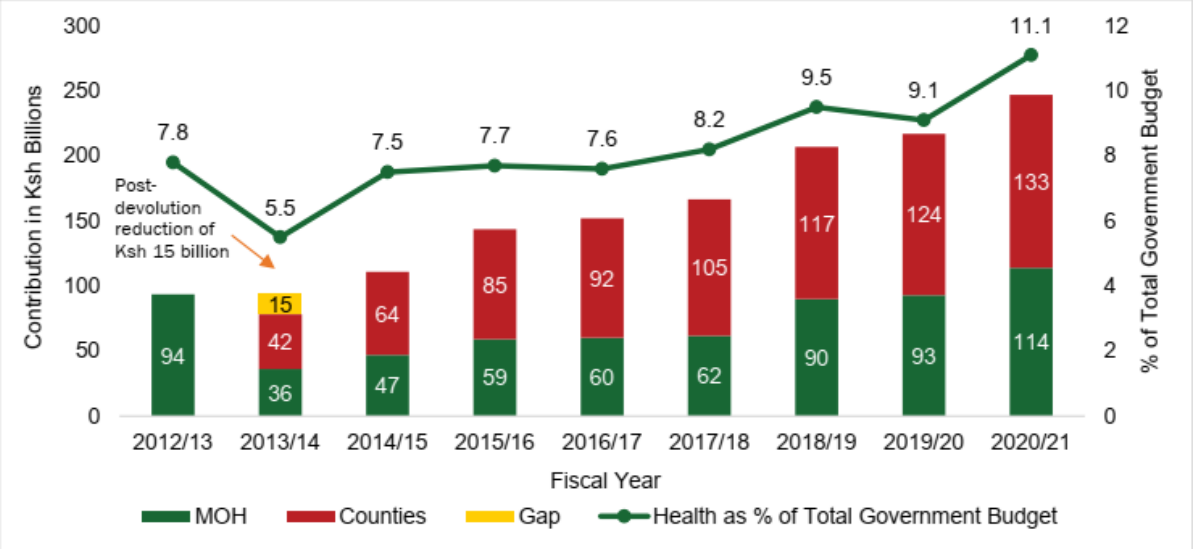
In the last decade or so, Kenya has experienced strong economic growth. For instance, GDP in FY2010 was 8.1% while that of FY2021 was 7.5% (World Bank, n.d.). With economic projections showing that the Kenyan economy will continue to grow by at least 5%, the country has an opportunity to improve its health sector (Njuguna & Wanjala, 2019). Currently, the expenditure of the government on health has stagnated at about 6% of total government expenditure, which is way below the Kenya Health Sector Strategic and Investment Plan (KHSSP) 2014-2018 of recommended 12%.

Kenya’s public sector health budget was 247 billion in FY2020/21. This was an increase from KSh 94 billion in FY 2012/13 (pre-devolution) (Ministry of Health [MOH], 2020). The increase in Kenya's public sector health budget represented more than a twofold expansion. Notably, the real allocation to health in the last three fiscal years increased by 7.5% (MOH, 2020). During the same time span, the real health allocation per capita rose by 2.5%. As Figure 1, demonstrates, health spending as a % of expenditure by the government has rose gradually since FY2013/14 until reaching 11.1% in FY2020/21 (MOH, 2020). Despite the increase, 11.1% of government expenditure on health is too

way below the Abuja Declaration's recommended 15% allocation of budgetary allocation on the health sector.

Figure 1

Actual Expenditures and Trend in Health Sector Budget Allocations

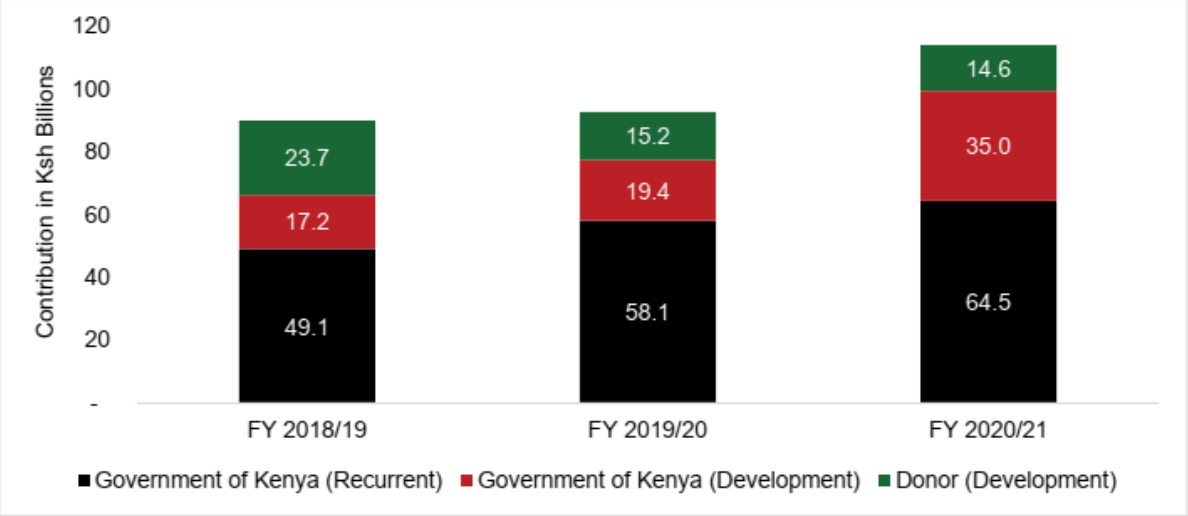


Note. Budget allocations in Kenya. Source: Ministry of Health

Kenyan government expenditure on health is increasing significantly. In FY2020/21, the Ministry of Health allocated KSh 247 billion to health services, which was an increase from KSh 207 billion in FY2018/19 and KSh 227 million in FY2019/20 (see Figure 2 below) (MOH, 2020). As a % of the total government budget (the combination of green and red sections), in FY2018/19, FY2018/19, and FY2020/21 the government (both national and county) spend 9.5%, 9.1%, and 11.1% of its total budget allocations (MOH, 2020). In regard to the expenditures of the MOH, these figures represented 6.5% of the national government budget, which was an increase from 5.1% allocated in FY2018/2019 and 4.5% allocated in FY2019/20 (MOH, 2020). In general, the increase in the Ministry of Health budget amounted to 27% during the three fiscal years.

Figure 2

Trends in Ministry of Health Budget Allocations in Ksh Billions



Note. Budget allocations in Kenya. Source: Ministry of Health - Kenya (2020)

1.3 Statement of the Problem

Many studies paid attention to government health expenditures and their respective effect on growth of economy. The results revealed varied correlations of two variables: government health spending and economic expansion. For example, Arisoy et al. (2010), Heshmati (2001), Kwak (2009), Piabuo and Tieguhong (2015, 2017) studies revealed that spending on health and growth of economy have positive relationships in various countries, including Cameroon, Turkey, and other OECD countries. Kar and Taban (2003) and Yumuşak and Yıldırım (2009) studies, on the other hand, have revealed presence of negative connection growth of an economy and spending on health.

The findings of Çetin and Ecevit (2011) and Elmi and Sadeghi (2012) established absence of correlation of government health spending and economic expansion. From this vantage point, these studies reveal how the link between growth in economies and spending on health sector varies between nations. The results Arisoy et al. (2010), Heshmati (2001), Kwak (2009), Piabuo and Tieguhong (2015, 2017), Çetin and Ecevit (2011) and Elmi and Sadeghi (2012), Kar and Taban (2003) and Yumuşak and Yıldırım (2009) indicated conflicting relationships between government health spending and economic expansion. However, there is an emerging consensus that most existing studies show presence of positive correlation of the two variables. So far, no known studies have been done on

correlation between government health spending and Kenya's economic growth. As such, we cannot assume with certainty that Kenya's spending on health sector and economic growth have a positive, negative, or no relationship. Therefore, and using data collected on both economic growth and government health spending in Kenya, it is possible to determine the relationship between these two parameters. Overall, this is the gap that this study intends to bridge.

1.4 Study objectives

1. To determine the association between government health expenditures and economic growth in Kenya.
2. To suggest policy implications based on the findings of this study.

1.5 Significance of Study

Given that health sector is crucial to Kenyans' physical and mental well-being, especially that of the productive population, this research is needed. Each day, a significant number of Kenyans are affected directly or indirectly by numerous diseases, Typhoid, HIV/AIDS, and Malaria, and this is detrimental to their productivity. Low productivity hurts economic growth. In this regard, a failure of the government to commit adequate resources for health weakens the ability of the people to get involved in labour force and other economic-related activities. This study's aims to provide evidence on the influence of government health expenditure on Kenya's economic growth.

Numerous studies conducted in some OECD nations, including Kwak (2009), Piabuo, and Tieguhong (2015, 2017), demonstrated that government health spending influence on economic growth is substantial. However, there is hardly research studies on the connection of government spending on health and growth of Kenya's economy. Consequently, this study will bring forth new information and knowledge in economic literature by revealing information about how government health spending affects Kenya's growth of economy. To researchers and policymakers, the study findings will complement the already existing information for policymakers to assign, implement, and monitor government health expenditure policies to ascertain their impact on economic growth. To the government, the MOH will utilize the study results to pinpoint areas where government health spending can contribute to the growth of the Kenya's economy.

CHAPTER TWO
LITERATURE REVIEW

2.0 Introduction

This chapter presents theoretical and empirical literature, as well as the summary of the literature.

2.1 Theoretical Literature

This section reviews Welfare economics, Schumpeterian growth theory, and endogenous growth theory.

2.1.1: Theory of Welfare Economics

The theory of welfare economics has relevance in this research of expenditure on health and growth of the economy. The welfare economy comprises a branch that focuses on social and economic well-being as it evaluates the manner in which resources in an economy are divided or allocated among social agents (Raghupathi & Raghupathi, 2020). From an economic growth dimension, the welfare state involves public expenditures on health, which are considered as impetus in growth models – endogenous and exogenous. In this regard, and according to Andrade et al. (2018), the welfare state seeks to improve human capital which constitutes acquaintance, skills, expertise and other characteristics that individuals consider pertinent to economic growth and development. In principle, a healthier population or workforce leads to a higher and readily available human capital for economic activities and growth.

In this way, a healthier population or workforce improves productivity and hence increases its output (Mankiw et al., 1992; Raghupathi & Raghupathi, 2020). In developed countries, welfare state expenditure on health increases innovation capacity in the health sector. Conversely, public spending on health in developing economies leads to transmission and diffusion of information and knowledge to process and implement useful technologies in the health sector (Andrade et al., 2018). Welfare state investment in health, therefore, generates substantial returns in the long-term not only at the personal level but also for the entire process.

2.1.2: Schumpeterian Growth Theory

This theory cites technological growth as the primary impetus for long-run economic growth. Notably, and in line with Aghion et al.'s (2005) and Raghupathi and Raghupathi's

(2020) argument, this proposition is founded on the economic principle of diminishing returns. According to Schumpeterian's growth theory, sustainable growth per capita output would need steady increases in capital employed per worker if the population continued to produce goods and services of comparable quality using the same production methods and practices (Howitt, 2005). Technological investments in health of workers is one approach to make sure that the amount of capital utilised per worker keeps increasing. From this perspective, government needs to invest a significant amount of resources in the health of their populations.

In situations where governments do not invest gradually in technologies relating to the health of their populations, and consistent with Howitt's (2005) observation, increases in invested capital per worker would decline its marginal productivity to zero beyond some point. Eventually, the country's growth rate would decline or stagnate. Therefore, it is important to invest a significant amount of resources in technologies that improve the health of workers. Overall, Schumpeterian growth theory underscores the need of child and maternal health as the essential aspect of human capital.

2.1.2: Endogenous Growth Theory

This theory suggests that health matters in economic growth. According to this theory, better life expectancy among people improves country's economic growth (Aghion et al., 2011; Raghupathi & Raghupathi, 2020). Particularly, those with longer life expectancies tend to save more, and their resources are then reinvested in the economy by building up capital. Eventually, capital accumulation will result in economic growth. Additionally, individuals who expect to have long life expectancy prefer to invest more money to learning, which promotes economic growth (Aghion et al., 2011). Parents typically favour low birth rates in populations where child mortality is low, which slows population growth overall and boosts economic growth per capita. Moreover, in good health individuals will characteristically be highly productive, which in turn enhances economic growth. One way of ensuring better life expectancy and in good health individuals is through investment in health among populations.

Theory of Welfare economics, Schumpeterian growth theory, and endogenous growth theory are applicable in this study given that they both explain how government expenditure including on health spending tend to spur economic growth.

2.3 Empirical Literature

Numerous research papers have reviewed the connection between economic expansion and government health spending in various nations. The empirical literature is subdivided into studied that had positive, negative, and no relationships.

2.3.1 Positive Relationship

Prior studies have revealed that growth in economy and spending on health care are positively correlated. Heshmati (2001) analysed how the GDP per capita and healthcare spending per capita of nation members of OECD were converging under certain conditions. In particular, the author used the Mankiw et al.'s (1992) augmented Solow growth model to elucidate variations in per capita output and spending per capita among many different countries. The study sample was collected between 1970 and 1992. Heshmati's (2001) study findings revealed that countries that had increased government health spending recorded higher growth in their economy.

Piabuo and Tieguhong (2017) reviewed past literature on government health spending and the growth of economies of several CEMAC and other African nations. The primary objective was to ascertain the correlation of government spending on health and growth of economies of CEMAC sub-regions member countries as well as the additional five African nations. Notably, these countries had upheld the Abuja Declaration's requirement that governments devote 15% of their budgets to health. The authors used Panel OLS, Fully Modified OLS, and Dynamic DOLS as the most appropriate incremental change of one unit in health care would lead to 0.3 and 0.38 units increase in GDP in CEMAC nations and the other five African nations that met the 15% GDP expenditure on the health sector.

Arisoy et al. (2010) study sought to determine how social spending and the economic growth interrelate. The researchers used time series data collected from the Turkish economy between 1960 and 2005. Using the cointegration methodology, the findings revealed that an elevated death rate decreases economic development. The results showed that spending on health and economic growth are positively correlated since it lowers death rates. The study concluded that increased health expenditures reduce the mortality rate, which in turn improves a nation's economic growth.

Eryigit et al.’s (2012) empirical study examined the long-term relationships of growth of Turkish economy and expenditures on education, health care, and defence. Authors used

time series data collected between 1950 and 2005. Remarkably, the cointegration method permits the use and presence of structural breaks between studied variables. Part of the study findings revealed the presence of two cointegrating vectors whose structural breaks were statistically significant (Eryigit et al., 2012). Based on the identified long-term equations, the study results showed that Turkish economic growth improved followed increased government health expenditure.

Bloom et al.'s (2004) study sought to determine how government health expenditure affects economic growth using a production function model. The production function model had job experience and health as two factors, in addition to the overall economic growth. Notably, microeconomists consider health and work experience as primary aspects of human capital. Bloom et al. (2004) constructed a panel of 104 nations noted in each 10 years in a period spanning 31 years: 1960 and 1990. The data was obtained from Penn Word Tables, International Labour Office, and United Nations. Using the nonlinear Two-Stage Least Squares (2SLS) estimation method, findings showed that healthy population has a favourable, considerable, and statistically substantial effect on total productivity of a population. These results were even noticeable when the researchers controlled the experience of the workforce.

In his study, Kwak (2009) sought to ascertain how health expenditure (public and private) influences economic growth. To determine how healthcare spending affects economic growth, the author used the Solow model. Based on this model, Kwak (2009) divided healthcare into public and private health expenditures. Additionally, the author conducted analyses using the information on government health spending and economic development from the OECD and less developed countries. The study findings showed that government health expenditure plays a significance role in the growth of economies by over 30% irrespective of level of income in each country. Also, the findings revealed that absolute health spending per capita, government health spending, and private spending on health granger caused variations in GDP per capita and not vice versa. Further, the results revealed that government health expenditure, as well as other health aspects under the control of the government, like enhanced sanitation, were statistically significant in elucidating differences in adult mortality and healthy life expectancy in developing economies. All in all, this study revealed that health expenditure results in positive economic growth.

Guisan and Arranz (2003) conducted a study that sought to develop econometric models of spending in public and private health in OECD nations. The authors, in particular, sought to assess how expenditures on the health sector influence growth of economies by comparing reviews of both public and private expenditures. Guisan and Arranz's (2003)study used panel data obtained from 24 OECD nations for 27 years: that is, between 1970 and 1996. Using OLS regression models and white heteroskedastic tests, the study results revealed that increased government expenditure on health enhances the well-being of people through overall productivity and individual consumption.

In his study, Aurangzeb (2003) reviewed the temporal connection of GDP per capita and Pakistan's government health expenditure per capita. The author specifically used Mankiw et al. (1992) augmented Solow growth model for the study. Aurangzeb (2003) used data collected from Pakistan for a period of 29 years: 1973 to 2001. Notably, Aurangzeb's (2003) paper was an extension of the Mankiw, Romer, and Weil (MRW) model which incorporated health capital, which was proxied by government health spending to augmented the Solow Model. Additionally, the authors included the openness variable in the model to determine how technology advancements might affect economic growth. The study's findings, which were based on the Error Association Model (ECM) and Johansen cointegration technique, showed that substantial connection exists between growth of economies and their corresponding government health spending.

Aguayo-Rico and Irish (2005) conducted an empirical study that sought to determine how government health expenditure affects the growth of economies. The sample of data was collected from 16 American countries, 13 European nations, 11 Asian countries, and 12 African countries between 1970 and 1990. The authors analysed data using the OLS approach. Statistically, the coefficient value of the connection of spending in health care and the rate of absolute GDP was 0.0017, while the p-value was 0.0006. In this regard, Aguayo-Rico and Irish's (2005) study results showed positive and significant relationship between absolute growth and health spending.

Bakare and Sanmi's (2011) study sought to determine the empirical correlation between Nigeria's growth of the economy and spending on the health sector. The authors relied on multiple regression analysis methods to determine the connection of expenditures on the health care and Nigeria's economic economy. Statistically, the coefficient value of relationship between total health expenditure and GDP was 0.695571, while the *p*-value

was 0.0000. These results meant that GDP and spending on health have positive and significant relationship. As such, Bakare and Sanmi (2011) recommended that Nigerian policymakers prioritise the health care by gradually raising its per annum budget portion as a way of boosting economic growth. However, they cautioned that a mere increment of budget allocation to the healthcare sector will have little or no impact on economic growth if policymakers do not implement public finance system that creates a link between specific expenditure and revenue decisions in a transparent manner.

2.3.2 Negative Relationship

Most theoretical frameworks, including the theory of economic welfare, Schumpeterian growth theory, and endogenous growth theory, associate government health expenditure with positive economic growth. However, some empirical studies have revealed that government health expenditure may have a negative correction with the growth of economies. Acemoglu and Johnson's (2007) study, for instance, relied on data collected between 1940 and 1980 on principal global international health improvements to ascertain the impact of expenditures on health towards the growth of economies. The authors used the assumption that mortality had no impact on life expectancy changes prior to the beginning of 1940 but had a significant impact after that period. By regressing per capita income growth on life expectancy, the study findings showed a negative impact between income per capita and improved life expectancy. In this regard, Acemoglu and Johnson (2007) interpreted these results to reflect a Malthusian effect of health-induced population growth.

In their study, Kar and Taban (2003) examined the influence of government expenditure on health towards growth of Turkey’s economy. Specifically, the authors intended to review how public spending on health, infrastructure, social security, education affected Turkey's economic growth. They used annual data for the period 1971 and 2000. Kar and Taban (2003) used cointegration methods to ascertain how spending in the health sector influences growth of economy. Part of the findings showed that health spending and growth of economy have a negatively significant association.

In another study, Ogundipe and Lawal (2011) sought to establish how government health expenditure impacts Nigeria’s economic growth. Primarily, the authors used data collected between 1985 and 2009 on fertility rate, capital and recurrent expenditures, and life expectancy at birth. Using Ordinary Least Squares, Ogundipe and Lawal's (2011)

study reported that government health spending had a negative impact on the Nigerian economy.

Yumuşak and Yıldırım's (2009) study relied on the econometric analysis to ascertain the correlation of spending on health and growth of Turkey's economy. The authors relied on data collected between 1980 and 2005 in Turkey. Yumuşak and Yıldırım (2009) mostly employed cointegration techniques to determine how government health spending affected economic growth. The study findings demonstrated a negative link between economic expansion and public health spending.

Oni's (2014) study looked at how government health spending affected Nigeria's economic growth from the standpoint of a country with healthy people as being a prosperous nation. The authors relied on multivariate analysis of time series data covering 41 years: 1970 and 2010. Notably, the authors obtained their information from the Statistical Bulletin, the African Statistical Year Books (African Development Bank), and the Central Bank of Nigeria (Oni, 2014). The findings showed increased life expectancy due to higher healthcare costs hinders economic growth.

2.3.3 No Relationship

Some studies have shown absence of connection between health spending and growth of economy in various countries. For instance, Çetin and Ecevit (2011) found absence of statistically significant effect of government health expenditure on health towards growth of economy. Another research study, by Elmi and Sadeghi (2012) showed, among other things, that there was no short-term correlation between government health spending and economic expansion. As such, the study findings meant that healthcare spending fails to culminate to substantial transformations in economic growth within short-term periods. Further, Baldacci et al. (2004) study revealed, in part, that government health spending in a lagged period has little effect on growth of an economy. From this standpoint, these studies showed the absence of a link between health spending and growth of economies.

2.4 Overview of the Literature

The empirical data analysis from several research studies demonstrates the varying influences of expenditures on the health sector on economic expansion in different nations. Once more, research from wealthy and developing countries reveals disparities

in terms of connection and direction of spending on the health and economic growth. Further, these findings from studies done on data collected in short and long periods in different countries and different methodologies show divergence.

The divergent findings found in the studies that have been evaluated served as the foundation for this research paper to review the influence of government expenditure on health on the growth of Kenya's economy. There are empirical research studies on the effect of government expenditures on health on the growth of economies across the world, but there are hardly studies conducted on the correlation of spending on health and growth of Kenya's economy, where expenditures on health sector are measured by human capital. By examining how government health spending affects the growth of economies, the research paper will augment body of knowledge in this field.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter offers the empirical model of the research study. Notably, the researcher defines variables of the model. In addition, the researcher explains the data, the sources of the data, and the test and analytical methods.

3.2 The Model

The study used augmented Solow growth model to examine economic growth using the assumptions of the neo-classical production model, such as decreasing returns on capital, population growth, and exogenous saving rate. The assumption of the Solow growth model is that the population's growth and savings rate determine the level of growth in a country. Therefore, countries that report high savings rates tend to have increased per capita income levels and constant long-run growth of the economy. Notably, long-term economic growth in countries is only experienced through the introduction of exogenous technological progress.

The model uses the aggregate production function

$$Y = AK^{\alpha}L^{\beta} \quad \text{..... (3.1)}$$

Where,

Y = GDP per capita growth rate (GDPc),

A = The total factor productivity (or level of production technology),

K = The composite for capital stock,

L = The composite for labour,

α = The output elasticity of capital, and

β = The output elasticity of labour.

Solow's model assumed that increased capital input would lead to increased labour productivity and total output. On the other hand, the higher total factor productivity would increase labour productivity. On contrary though, an increase in labour input would culminate in the decline of labour productivity due to the aspect of diminishing return to scale.

The Solow model does not provide the components of labour and capital. As such, this study adopted Aboubacar and Xu model which introduced some components into variable labour and capital. As per their study, the capital stock (K) is made of gof, where g =

Gross Domestic Savings (GDS) as a % of GDP, $\boldsymbol{o}$ = the official development assistance (ODA) as a % of Gross National Income (GNI), and $\boldsymbol{f}$ = foreign direct investment (FDI) as a % of GDP (Aboubacar & Xu, 2017). The labour (L) is made of $\boldsymbol{hp}$, where $\boldsymbol{h}$ = human capital and $\boldsymbol{p}$ = the labour force. In the study, the health expenditure per capita will proxy the human capital (h), while the population aged between 15 years and 64 years will proxy the labour force. By replacing Y, K, and L, in equation 3.1, the new equation becomes.

$$\boldsymbol{GDPc = A(gof)^{\alpha}(hp)^{\beta}} \quad \text{.....(3.2)}$$

To transform the equation into a linear equation, we take the logs of the entire equation,

$$\boldsymbol{lnGDPc = lnA + \alpha_1 lng + \alpha_2 lno + \alpha_3 lnf + \beta_1 lnh + \beta_2 lnp + \varepsilon} \quad \text{.....(3.3)}$$

Where $\boldsymbol{lnGDPc}$ is the natural logarithm of GDP per capita, $\boldsymbol{lnA}$ is the natural logarithm of the constant, $\boldsymbol{lng}$ is the natural logarithm of GDS, $\boldsymbol{lno}$ is the natural logarithm of the ODA,$\boldsymbol{lnf}$ is the natural logarithm of the FDI, and $\boldsymbol{lnh}$ is the natural logarithm of the health expenditure per capita, and $\boldsymbol{lnp}$ is the natural logarithm of the labour force.

3.3 Definition and Measurement of Variables

The main variables include Y (GDPc – gross domestic product per capita growth rate), A (total factor productivity – the constant), K (capital), and L (labour). Total factor productivity shows the relationship between output (gross domestic product in real terms) and inputs (capital and labour) involved in production. Their respective measures are presented in Table 1. The correlations between dependent and independent variable are expected to have the positive signs (see Table 1).

Table 1: *Model Variables and their Expected Signs*

Variable	Measurement	Apriori Expected Sign	Source
GDPc–**Gross domestic product per capita.**	GDPc is measured by diving gross domestic product by the total population.	The dependent variable	(Aboubacar & Xu, 2017)
g **- gross domestic savings**	***g*** is measured as gross domestic savings as a % of GDP.	**+**	(Aboubacar & Xu, 2017)
O **- official development**	***O*** is measured as official development assistance (as % of gross national income [GNI]).	**+**	(Aboubacar & Xu, 2017)
f-**foreign direct investment**	***f*** is measured as foreign direct investment as a % of GDP).	**+**	(Aboubacar & Xu, 2017)
h- **human capital**	***H*** is measured as total government health expenditure divided by total population.	**+**	(Aboubacar & Xu, 2017)
p- **labour force**	***p*** is the labour force as Kenya's population aged from 15 to 64 years.	**+**	(Aboubacar & Xu, 2017)

Note. Measures and expected signs of independent and dependent variables.

The main independent variable was ***h*** (human capital, proxied by government health expenditure per capita). The rest of the variables (***g*** = gross domestic savings, ***f*** = foreign direct investment, ***p*** = labour force, and ***o*** = official development assistance) acted as the model's control variables.

Based on conventional economic theory, countries with individuals characterised by good health should realise improved growth of their economies in different aspects. For example, spending on health is assumed to enhance the well-being of workers (or labour force) and thus, contribute positively to their productivity. Consequently, improved labour

output will augment gross domestic production and thus lead to economic growth. In addition, healthier and, at the same time, highly productive employees tend to earn higher wages. In turn, higher wages are associated with improved savings and consumption, which from the perspective of enhancing the happiness and well-being of individuals lead to economic growth.

The model has other control variables. These control variables include savings, population, foreign aid, and foreign investment. The population (p) variable is included in the model because of the age structure's importance in ascertaining economic growth level. In particular, and consistent with Aboubacar and Xu's (2017) observation, individuals aged from 15 years to 64 years are a physically active population that influences both productivity and economic growth.

GDS is an investment variable. Mainly, its inclusion in the model is founded on its significant contribution to the ascertainment of a country's aggregate income from an economic theory perspective. Theoretically, investments are considered drivers of economic growth through the generation of technological dissemination via foreign direct investment. The flow of foreign capital into a country through aid may influence economic growth via foreign exchange. The estimates of the variables will be done using STATA statistical software (Version 13).

3.5 Time Series Properties of the Data

This subsection focuses on the stationarity tests of data, cointegration tests, the Engel-Granger test, and the Granger causality tests.

3.5.1 Stationarity of Data

According to Seddighi (2013), testing for stationarity is a procedure that researchers/economists uses to ascertain whether data series' mean and variance are constant. These characteristics are essential in ensuring that regression results are meaningful. The study used **Augmented Dickey-Fuller (ADF)** test to ascertain the absence/presence of stationarity of a time-series data (Seddighi, 2013). The **ADF** test is used to maintain the validity of the test concerning white noise errors common in regression models. In this regard, the **ADF** test is meant to make sure that these errors are certainly white noise. Without a check on the stationarity of the series, the resultant findings of the regression model will be spurious.

The ADF Test in the autoregressive equations

H0: $/\boldsymbol{\rho}/= \mathbf{0}$

H1: $/\boldsymbol{\rho}/< \mathbf{0}$

The autoregressive equations are as below

(1) ADF with intercept and trend

$$\boldsymbol{\Delta y_t = \alpha + \beta_t + \rho y_{t-1} \sum_{i=1}^{k} \delta_i \Delta y_{t-1} + u_i} \quad \text{.....(3.4)}$$

In equation 3.4, ADF is used to determine unit-roots of the studied sample with the consideration of constant and trend. The *t* is the time index, α is a drift (the intercept constant), *p* is the coefficient showing process root (the primary focus of testing), β is the coefficient on time trend, *k* entails the lag order of the first-differences autoregressive process, and u is the independent residual term. Interpretation of unit roots considers the drift term and the linear time trend.

(2) ADF with intercept but no trend

$$\boldsymbol{\Delta y_t = \alpha + \rho y_{t-1} \sum_{i=1}^{k} \delta_i \Delta y_{t-1} + u_i} \quad \text{.....(3.5)}$$

In equation 3.5, ADF is used to determine the unit-roots of the studied sample without consideration of the trend. The *t* is the time index, α is a drift (the intercept constant), *p* is the coefficient showing the process root (the primary focus of testing), k entails the lag order of the first-differences autoregressive process, and u is the independent residual term. In particular, the interpretation of unit roots considers the drift term only.

(3) ADF without intercept and trend

$$\boldsymbol{\Delta y_t = \rho y_{t-1} \sum_{i=1}^{k} \delta_i \Delta y_{t-1} + u_i} \quad \text{.....(3.6)}$$

The *t* is the time index, *p* is the coefficient showing the process root (the primary focus of testing), *k* entails the lag order of the first-differences autoregressive process, and *u* is the independent residual term. In particular, the interpretation of unit roots do not consider the drift term and the linear time trend.

3.5.2 Cointegration

The study relied on the cointegration technique to determine the symmetry link among non-stationary series within the stationary model. This approach is used to avoid spurious and contradictory regression problems that emanate from regression carried out in non-stationary data series. In line with Seddighi's (2013) observation, the model used relatively a large sample data in mitigating the problems of losing vital information that in most cases occurs during the exercise of addressing nonstationary series via differencing. In this regard, the cointegration technique was used to maintain the data of non-stationary series and at the same time ensure that the statistical validity of the model under the estimation is not weakened.

The main tests used are Johansen cointegration and Engle-Granger tests methods. The Johansen cointegration is expressed as a VAR of order ***p*** as below:

$$\boldsymbol{y_t = u + A_1 y_{t-1} + \cdots + A_p y_{t-p} + \varepsilon} \quad \text{.....(3.7)}$$

Notably, $\boldsymbol{y_t}$ is a **nx1** vector of innovations. This vector variable is integrated of order 1. This is denoted by I(1) and $\boldsymbol{\varepsilon}$ is the nx1 vector of innovations and it represents independent identically distributed errors. Notably, *u* is a drift (the intercept constant), A is the coefficient of cointegration. VAR may be written as;

$$\Delta \boldsymbol{y_t = u + \Pi y_{t-1} + \sum_{i=1}^{p=1} \Gamma_i \, y_{t=1} + \varepsilon} \quad \text{.....(3.8)}$$

Where,

$$\boldsymbol{\Pi = \sum A_i - I} \text{ and } \boldsymbol{\Gamma_i = \sum_{j=i+1}^{p} A_j} \quad \text{.....(3.9)}$$

In equation 3.8, $\boldsymbol{u}$ is a drift (the intercept constant). $\boldsymbol{\Pi}$ and $\boldsymbol{\Gamma_i}$ are matrices of unknown parameters, while $\boldsymbol{\varepsilon}$ is the independently, identically distributed errors distributed white noise with zero mean and nonsingular covariance matrix. When the coefficient matrix $\boldsymbol{\Pi}$ is a reduced rank of ***r<n***, then ***nxr*** matrices $\boldsymbol{\alpha}$ and $\boldsymbol{\beta}$ exist with rank r such that $\boldsymbol{\Pi = \alpha\dot{\beta}}$ and $\boldsymbol{\dot{\beta} y_t}$ are stationary. Particularly, $\boldsymbol{\Gamma}$ signifies the times of cointegrating correlations. Notably, $\boldsymbol{\alpha}$ is an element of correction factors in the vector model. Every column of $\boldsymbol{\beta}$constitutes a cointegration factor. In each given $\boldsymbol{\Gamma}$, the maximum possible estimator of $\boldsymbol{\beta}$defines the mixture of $\boldsymbol{y_{t-1}}$ that brings forth the $\boldsymbol{\Gamma}$ largest acceptable correlations of $\Delta \boldsymbol{y_t}$ with $\boldsymbol{y_{t-1}}$ after adjusting for lagged variations and first-order variables (Johansen, 1995).

Johansen (1995) used two tests (the maximum Eigenvalue test and the trace test) to ascertain the significance of the reduced rank of the $\boldsymbol{\Pi}$ matrix and identified canonical correlations.

$$\boldsymbol{J_{trace} = -T\sum_{i=t+1}^{N} \ln(1-\dot{\lambda})} \quad \text{.....(3.4)}$$

$$\boldsymbol{J_{max} = -Tln(1-\dot{\lambda})} \quad \text{.....(3.5)}$$

$\boldsymbol{T}$ represents the sample size. On the other hand, $\dot{\lambda}$ represents $\boldsymbol{i^{th}}$ largest canonical correlation. Equation 3.4 is the trace test and it is used to identify canonical correlations. Equation 3.5 is the maximum eigenvalue test and it ascertains the significance of the reduced rank of the $\boldsymbol{\Pi}$ matrix.

The trace test	The maximum Eigenvalue test
H0: r cointegrating vectors	***H0:*** r cointegrating vectors
H1: n cointegrating vectors	***H1:*** r+1 cointegrating vectors

Engle and Granger (1987) brought forth a residual cointegration test founded on the maximum Eigenvalue test to test the significance of coefficients within an ordinary least squares (OLS) regression expression of: -

$$\boldsymbol{\Delta u = pu_t + \varepsilon_t} \quad \text{.....(3.6)}$$

Notably, $\boldsymbol{u_i}$ entailed the residual term. The test hypothesis was that cointegration occurs when residuals from OLS estimation of the non-stationary variables are stationary. Residuals with stationary trend mean that ECM should be done on variables following first differencing. This difference will cause a loss of long-run characteristics of the data. Overall, the study should use the Johansen cointegration method, rather than ECM, to determine a long-term correlation between studied variables.

3.5.3 Granger Causality

The researcher used Granger Causality to ascertain whether one time series can be used to forecast the other one. Mainly, the Granger Causality tests were performed through VAR equations. The researcher relied on *F*-test to test the null hypothesis that lagged values of variables cannot explain the explained variable in the model. The researcher

rejects the null hypothesis when the *p*-value of the *F*-test is greater than the conventional alpha (α) of 0.05.

3.8 Data Sources and Data Refinement

The study relied on secondary quantitative data obtained from Kenya Economic Surveys and the World Development Indicators. It was obtained through online research conducted on World Bank and Kenya Economic Surveys databases. The data obtained from these databases were time series data. Regarding the studied variables, the research chose to have a sample of data (1975-2020) comprising six explanatory variables namely *gdp*, *gds*, *oda*, *fdi*, *h*, and *p* and one dependent variable *gdp*. The data for the variables was analysed using STATA software (version 13).

3.9 Data Analysis

The study examined the relationship between Kenya's government expenditure on health and growth of its economy. The researcher relied on multivariate cointegration analysis to analyse the collected data. In particular, the researcher conducted Johansen's Cointegration Test, Engle-Granger, and Granger Causality tests. Consistent with Maddala and Kim's (1998) argument, multivariate cointegration analysis sought to uncover causal relationships of variables through the determination of whether the data of the group of variables share stochastic trends. Once more, the research study used log-log OLS regression analysis to ascertain how government health spending affects economic expansion. In line with Agresti's (2015) observation, this study used log-log Autoregressive Distributed Lag (ADL) model because some of the variables may have a non-linear correlation and, at the same, time minimise the impact of variables with large values. Besides, ADL was used because it was assumed that the time series data could have been represented by a linear function using the lagged values. An estimate of the effect of the primary independent variable (human capital = government health spending per capita) on Kenyan economic growth was used to carry out this data analysis.

CHAPTER FOUR
FINDINGS

4.1 Introduction

This chapter offers study results. Both stationarity tests and cointegration tests are presented in the chapter. The study used ADF test to ascertain the stationarity of analysed data. On the other hand, cointegration analysis was done using the Johansen cointegration, Engle-Granger test, and Granger causality tests, before actual regression analysis.

4.2 Stationary Tests

The term stationarity implies that statistical properties of collected time series data do not change in the long-term. In a situation where time-series data is not stationary, the conclusion drawn from its analysis does not portray the real picture of the studied phenomenon. As such, researchers must ensure that time-series data used in the analysis does not experience a systematic change in its mean and variance. Notably, regression analysis done on time series data is incomplete if done without testing for stationarity and transforming nonstationary data into a stationary one. In this study, the series data used were nonstationary (See Table 1 below and appendices 1(a) and 1(b).

Table 2: *Non-Stationarity Unit Roots*

Variables	ADF Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
lgdp	-2.097	-3.614	-2.944	-2.606
lgds	-0.586	-3.614	-2.944	-2.606
loda	-1.391	-3.614	-2.944	-2.606
lfdi	-2.601	-3.614	-2.944	-2.606
lh	-0.595	-3.614	-2.944	-2.606
lp	-1.292	-3.614	-2.944	-2.606

Note. Table denotes time series data is non-stationary at 1%, 5%, and 10% critical values.

In Table 2 above, the ADF test was conducted on time series data for stationarity. The ADF test seeks to uphold the validity of tests relating to white-noise errors. Primarily, the ADF seeks to prove that errors found in regression model are primarily white noise. The results show that ADF t-statistics are greater than critical values of time series data at 1%, 5%, and 10%. From this perspective, unit-roots using ADF revealed that lgdp (gross domestic product), lgds (gross domestic savings as a % of GDP), loda (official domestic assistance as a % of GNI), lfdi (foreign direct investment as a % of GDP), lh (health expenditure per capita), and lp (labour force as a % of the population aged between 15 years and 64 years) were nonstationary. In line with Adkins and Hill's (2011) and Hill et al. (2018) argument, this implied absence of long-term link among studied variables.

The variables were then differentiated and then subjected to ADF tests (see Table 2 and Appendix 2 (A) and 2(B).

Table 3: *Stationarity Unit Roots*

Variables	ADF Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
D(lgdp)***	-4.125	-3.621	-2.947	-2.607
D(lgds)***	-3.841	-3.621	-2.947	-2.607
D(loda)**	-3.347	-3.621	-2.947	-2.607
D(lfdi)***	-3.865	-3.621	-2.947	-2.607
D(lh)**	-3.381	-3.621	-2.947	-2.607
D(lp)**	-3.264	-3.621	-2.947	-2.607

Note. (***) denotes rejection of the H_0 at 1%, 5%, and 10% critical values. (**) denotes rejection of the H_O at 5%, and 10% critical values.

Table 3 shows that the values of ADF test statistics are less than critical values at 5%, and 10% (and in some cases at 1%). In line with Adkins and Hill's (2011) and Hill et al.'s (2018) recommendation, the null hypothesis is rejected and a concluded that the time series data is now stationary after first differencing. The first differencing transformed the data from nonstationary to stationary, and hence these variables were integrated into an order I(1). Consistent with Adkins and Hill's (2011) and Hill et al.'s (2018)

observations, these results imply that there were long-term connections among studied variables.

4.3 Cointegration Tests

Cointegration of the series was done using the Johansen test. Consistent with Hjalmarsson and Österholm's (2007) recommendation, the Johansen test was done to ascertain whether the cointegration relationship among studied variables – lgdp, lgds, loda, lfdi, lh, and lp. The results are summarized in Table 4 below.

Table 4: *The Johansen Cointegration Test*

Eigenvalue	Likelihood Ratio	5% Critical Value	Hypothesized No of CE(s)
	29.573162	94.15*	0
0.60758	50.152598	68.15*	1
0.37310	60.425869	47.21	2
0.30511	68.43378	29.68	3
0.12683	71.417581	15.41	4
0.11357	74.069708	3.76	5
0.00126	74.097469		6

Note. (*) denotes failure to reject the hypothesis at a 5% significant level.

The likelihood ratio test showed four cointegrating equations at 5% of significance. These findings implied that the six variables - lgdp, lgds, loda, lfdi, lh, and lp – have a long-run relationship, which according to Adkins and Hill (2011) and Hill et al. (2018), might not hold in the short-run. The existence of cointegration between the studied variable has ruled out the likelihood of spurious correlation among them.

Similarly, the researcher used the Engle-Granger test to ascertain the presence of cointegration among the studied variables. The results are summarized in Table 5 below.

Table 5: *The Engle-Granger Test*

ADF Test Statistic Z(t)	1% Critical Value	5% Critical Value	10% Critical Value

-4.435*	-2.630	-1.950	-1.608

Note. (*) denotes the rejection of the H_O at 1%, 5%, and 10% significant levels. Hence, there is a presence of cointegration in the series.

From Table, the t-ratio on the lagged value of estimated error is -4.435, which is larger than the 1%, 5%, and 10% critical values of -2.630, -1.950, and -1.608, respectively. According to Adkins and Hill (2011), "the null hypothesis of no cointegration is rejected when $t \leq t_c$ and fails to be rejected when $t > t_c$" (p. 402). In this case, and considering a 5% critical value, the *t*-statistic is -4.435<-1.950. In their book titled "Principles of Econometrics", Hill et al. (2018) considered the critical values generated by STATA to be incorrect, and hence they developed their Table of correct critical values and corresponding regression models for determining cointegration (See Appendix 3 (A)). From Appendix 3 (A)), the 5% critical value for cointegration with an intercept is -3.37, which is greater than the t-statistics of -4.435. In both cases (Table and STATA derived critical values), therefore, the null hypothesis that the least-squares residuals of the analysed data are nonstationary is rejected. In turn, the researcher concludes that the residuals are indeed stationary. All in all, and consistent with Adkins and Hill (2011), Hill et al. (2018), and Wooldridge's (2013) observation, these findings mean that the variables (lgdp lgds loda lfdi lh lp) are cointegrated.

The existence of cointegration did not establish the direction of the long-run relationship of the dependent variable (lgdp) and independent variables (lgds, loda, lfdi, lh, and lp). Given the presence of cointegration, this means the existence of Granger causality from dependent variables to explanatory variables, and vice versa. In this regard, the researcher conducted Granger-causality tests.

Table 6: *Granger Causality Tests*

Null Hypothesis	*F*-Statistics	Probability	Conclusion
lgds does not granger – change lgdp	2.9822	0.025	Bi-directional – lgds and lgdp cause one another
lgdp does not granger – change lgds	0.34577	0.041	
loda does not granger – change lgdp	3.9995	0.035	Bi-directional – loda and lgdp cause one another
lgdp does not granger – change loda	7.6703	0.022	
lfdi does not granger – change lgdp	0.34237	0.004	Bi-directional - lfdi and lgdp cause one another
lgdp does not granger – change lfdi	2.8738	0.008	
lh does not granger – change lgdp	0.85323	0.003	Bi-directional - lh and lgdp cause one another
lgdp does not granger – change lh	2.1075	0.009	
lp does not granger – change lgdp	0.15572	0.025	Bi-directional - lp and lgdp cause one another
lgdp does not granger – change lp	1.111	0.004	

Note. Granger causality tests of lgdp, lgds, loda, lfdi, lh, and lp.

Granger causality tests revealed presence of bidirectional causality of lgdp lgds loda lfdi lh variables. As such, independent variables (lgds loda lfdi lh lp) could predict the dependent variable (lgdp), and vice versa.

Given that the data of the variables have been transformed into a stationary state by differentiating them in the order of I(1) and then the least square residuals of analysed data determined to be cointegrated, then the researcher can use the regression model to estimate the corelation of dependent variable and independent variables as the likelihood of spurious regression is eliminated. In particular, the researcher estimated a least-squares equation among variables of order I(1).

4.4. Regression Results

The analysis was done using Autoregressive Distributed Lag (ADL) model. The dependent variable (lgdp) and independent variables (lgds, loda, lfdi, lh, and lp) were lagged in the regression model. Consistent with Adkins and Hill's (2011) and Hill et al. (2018) recommendation, the study used ADL (I,1) model, as both independent and dependent variables were lagged to ensure data stationarity. Table 6 below shows the results of the regression analysis (See more in Appendix 4).

Table 7

Summary Results of the Regression Model

D.lgdp	Coefficient	Std. Error	*t*-Statistic	Probability
D.lgds*	0.4846825	0.7759718	0.62	0.036
D. loda	-0.306827	0.8085837	-0.04	0.070
D. lfdi*	0.700101	0.1146814	0.61	0.005
D.lh*	1.407203	1.968801	0.71	0.009
D.lp*	1.050005	8.411868	0.12	0.001
Constant	-0.072837	0.2213201	-0.33	-0.744

Note. Coefficients of the multivariate regression model with lagged variables. * Means that the variable is statistically significant at $p = 0.05$.

Health expenditure per capita (D.lh) was the independent variable that was at the centre of focus in this study. The coefficient on health expenditure is 1.407203 and is positive and statistically significant at the 0.05 level. Consistent with Adkins and Hill's (2011), Frankfort-Nachmias and Leon-Guerrero's (2020), and Wooldridge's (2013) observation,

these results mean that for every 1% change in health expenditure per capita, GDP per capita (D.lgdp) will change by 1.4072% when other variables are kept constant. The significance level of the health spending per capita is significant because the value of *p* = 0.009 is below the conventional alpha (α) value of 0.05. Therefore, and as Adkins and Hill (2011), Frankfort-Nachmias and Leon-Guerrero (2020), and Wooldridge (2013) recommended, the null hypothesis is rejected and then conclusion is made that a substantial relationship between GDP per capital and government health expenditure per capital exists.

Apart from main independent variable, the study included four control variables – gross domestic savings, official domestic assistance, foreign direct investment, and labour force. The coefficient on gross domestic savings (as a % of GDP) (D.lgds) is 0.4846825 and is positive and statistically significant at the 0.05 level. Consistent with Frankfort-Nachmias and Leon-Guerrero's (2020) and Wooldridge's (2013) , the results mean that for every 1% change in gross domestic savings , the gross domestic product per capita (D.lgdp) will change by 0.4847% when other variables are kept constant.

The coefficient on official domestic assistance is -0.306827 and is negative and not statistically significant at the 0.05 level, as the *p*-value was 0.070. In line with Adkins and Hill's (2011), Frankfort-Nachmias and Leon-Guerrero's (2020), and Wooldridge's (2013) observation, these results mean for every 1% change in official domestic assistance, the gross domestic product per capita (D.lgdp) will change by 0.3068% when other variables are kept constant. As such, these results reveal that official domestic assistance has a negative relationship with the gross domestic product per capita. Given that conventional theory shows that positive relationship occurs between GDP per capita and official domestic assistance, there is a need for further study. Official domestic assistance is not statistically significant because the value of *p* = 0.070 (derived using STATA analysis) is above the conventional alpha (α) value of 0.05 level. Therefore, and as Adkins and Hill (2011) and Wooldridge (2013) recommended on interpretation, we fail to reject the null hypothesis and make conclusion that there is lack of significant relationship of official domestic assistance and the GDP per capita.

The coefficient on foreign direct investment (D.lfdi) is 0.700101 and is positive and statistically significant at the 0.05 level. In line with Frankfort-Nachmias and Leon-Guerrero (2020) and Wooldridge's (2013) recommendation on interpretation, these

results mean that for every 1% change in foreign direct investment, the gross domestic product per capita (D.lgdp) will change by 0.7001% when other variables are kept constant. FDI (as a % of gross domestic product) is statistically significant because the value of p = 0.005 (derived using STATA analysis) is below the conventional alpha (α) value of 0.05. Therefore, and as Adkins and Hill (2011), Frankfort-Nachmias and Leon-Guerrero (2020), and Wooldridge (2013) recommended, the null hypothesis can be rejected and then conclusion made that significant correlation of the two variables exists.

The coefficient on labour force (the % of people aged between 15 years and 64 years) (D.lp) is 1.050005 and is positive and statistically significant at the 0.05 level. As such, and in with Adkins and Hill's (2011) and Frankfort-Nachmias and Leon-Guerrero's (2020) argument, these results mean for that every 1% change in the labour force, the GDP per capita (D.lgdp) will change by 1.0500% when other variables are kept constant. The labour force is statistically significant because the value of p = 0.001 (derived using STATA analysis) is below the conventional alpha (α) value of 0.05. Therefore, and as Adkins and Hill (2011), Frankfort-Nachmias and Leon-Guerrero (2020), and Wooldridge (2013) recommended, the null hypothesis can be rejected and then conclusion made that a significant relationship between the two variables exists.

CHAPTER FIVE
DISCUSSION

5.1 Introduction

The chapter provides the discussion of the research paper. In particular, the empirical results are analysed and discussed from the perspective of previous study findings.

5.2 Discussion

The primary goal of the research paper was to empirically analyse the effect of government health spending and Kenya's economic growth. Time series data collected between 1975 and 2020 (n = 46) was used in the study. The data comprised of gross domestic product, gross domestic savings, official domestic assistance, foreign direct investment, the health expenditure per capita, and labour force. The study findings revealed that government health spending per capita is a significant and positive factor of Kenya's economic growth when proxied from GDP per capita. In particular, the results revealed that for each 1% change in government health spending per capita proxied by human capital, the gross domestic product per capita will change by 1.4072% when other variables are kept constant.

The findings of this study on government health expenditure and economics affirm the results of studies, such Aguayo-Rico and Irish (2005), Arisoy et al. (2010), Aurangzeb (2003), Bakare and Sanmi (2011), Baldacci et al. (2004), Bloom et al. (2004), Dreger and Reimers (2005), Elmi and Sadeghi (2012), Eryigit et al. (2012), Guisan and Arranz (2003), Heshmati (2001), Kwak (2009), Piabuo and Tieguhong (2015), and Piabuo and Tieguhong (2017). These studies established that health spending and growth in economy have positive and significant relationships. Notably, the study findings imply that higher health expenditure per capita fosters a healthy population, which in turn improves productivity and increases income per person. Therefore, and health as human capital, investments should be directed towards health to enhance labour productivity, which in turn increases economic growth.

The study also included four control variables, namely gross domestic savings, official domestic assistance, foreign direct investment, and labour force. The findings showed that gross domestic savings have a positive and significant effect on GDP per capita. The findings revealed that for every 1% change in gross domestic savings, the GDP per capita

will change by 0.4847% when other variables are kept constant. These findings are consistent with those of Ciftcioglu and Begovic (2010), and Ribaj and Mexhuani (2021) that revealed that the domestic savings rate has substantial impact on growth of economy when measured in GDP terms. For instance, Ciftcioglu and Begovic (2010) study's neo-classical model revealed that gross domestic savings and GDP per capital have positive and substantial correlations. From this perspective, the Kenyan government should institute clearly defined growth-improving policies that seek to increase both the total factor productivity and the accumulation of the rate of human capital stock.

Similarly, the findings showed that FDI and GDP per capita have positive and significant association. The findings implied that for every 1% change in FDI, the GDP per capita will change by 0.7001% when other variables are kept constant. These findings are in line with that of Encinas-Ferrer and Villegas-Zermeño's (2015) and Hakizimana's (2015) observation, which showed that FDI inflows leads to positive and significant economic growth. For instance, Hakizimana (2015) conducted in Rwanda using data collected between 2008 and 2012 showed the presence of a positive impact of FDI inflows on economic growth. Similarly, the study of Encinas-Ferrer and Villegas-Zermeño (2015) done using data collected from China, Brazil, Peru, South Korea, and Mexico revealed that FDI had a marginal impact on growth of economy. In this regard, the Kenyan government should institute specific growth-enhancing policies that seek to encourage FDI inflows into the country.

Further, the findings showed that the labour force, as proxied by the % of people aged between 15 years and 64 years, impacts GDP per capita positively and significantly. Statistically, the results showed that for each 1% increase in the labour force, the GDP per capita will rise by 1.0500%, when other variables are kept constant. These findings affirm existing literature of Roa et al. (2011) and Wijaya et al. (2021) that showed the presence of a positive and substantial correlation between the labour force and growth of economy. In particular, the study of Roa et al. (2011), which sought to determine the correlations of income growth, demographic trends, and attributes of the labour market, revealed that as more people enter the labour force, countries will likely realize increased economic growth.

In a different vein, the results showed that official domestic assistance has a negative but no substantial relationship with the GDP per capita. Statistically, the findings showed

that for every 1% change in official domestic assistance, the GDP per capita will change by 0.3068% when other variables are kept constant. These findings are contrary to the current literature, such as Kherallah et al. (1994) and Minoiu and Reddy (2010). For instance, the study of Minoiu and Reddy (2010) established that official domestic assistance primarily aimed at development positively and significantly effect on economic growth. Statistically, this study showed that a 1% rise in average bilateral aid in Scandinavian countries led to a 1.2% to 1.3% increase in average per capita GDP growth. From this perspective, these findings are inconsistent with views that aid finances in investments, such as human capabilities, physical infrastructure, and organizational development lead to positive economic growth.

CHAPTER SIX
SUMMARY, CONCLUSION, AND RECOMMENDATIONS

6.1 Introduction

The chapter provides a summary of the research paper, as well as the conclusions made from the perspective of results. In addition, the researcher presents policy implications from the findings and offers areas for further research.

6.2 Summary

This research paper sought to ascertain how Kenya's economic growth and government health expenditure, and formulate policy recommendations on health expenditures that should be channelled into the health sector to realize positive economic growth in Kenya. Time series data collected between 1975 and 2020 was used in this study. The data entailed GDP per capita, gross domestic savings, official domestic assistance, foreign direct investment, the health expenditure per capita, and labour force. The data was obtained from various credible sources, including Statistical Abstracts, World Bank's World Development Indicators, and Kenya's Economic Surveys. The study established that government spending on health per capita is a significant and positive impetus of Kenya's economic growth when measured from GDP per capita. These study findings mean that higher health expenditure per capita fosters a healthy population, which in turn improves productivity and increases income per person. As such, and health as capital, investments should be directed towards health to enhance labour productivity, which, in turn, improves economic growth. Further, the study included four control variables, namely gross domestic savings, official domestic assistance, foreign direct investment, and labour force. The findings showed that gross domestic savings, FDI, and labour force have a positive and significant impact on GDP per capita. On the other hand, official domestic assistance has a negative but no significant correlation with the gross domestic product per capita. From this perspective, these control variables lead to substantial changes in GDP per capita.

6.3 Conclusion

From empirical study findings, the conclusion is that Kenya's growth of economy and government spending on health have positive and significant relationship. In particular, an increase in government spending on health per capita improves Kenya's economic growth per capita. In the long-term, government spending on health per capita is

expected to improve economic growth per capita by raising a healthy population and increasing the life expectancy of workers. A healthy population is likely to record improved productivity, development of new skills and knowledge, and enhanced income per individual. These study results imply that government can play essential part in influencing the level of health expenditure per capita through resource allocations that optimize the desired economic growth level. Therefore, the findings single out government health spending as a primary impetus of Kenya's economic growth.

6.4 Recommendations

In this research paper, the results have shown that a positive and statistically significant (at 0.05 level) relationship exists between Kenya's economic growth and government health expenditure. As such, these findings have study ramifications, which the government through policymakers must address to improve Kenya's economic growth. They must ensure the level of government health expenditure they set spurs the growth of Kenya's economy. From this perspective, the following are some of the policy implications derived from the study findings.

The Kenyan government should allocate funds to the health sector as a study has revealed. Notably, the increase in funds to the health sector should only be done at a level where the country realizes optimal economic growth. The Kenyan government can achieve this objective through investment in healthcare facilities (hospitals, health clinics, and dispensaries) in remote and highly populated areas. Again, the government can invest in quality medical supplies and capital equipment to facilitate the provision of eminence health care to people. Further, the Kenyan government should invest in human capital through the training of doctors and nurses. The increase in government expenditure on health care and related investments will likely influence economic growth by 1.4072% per year.

A healthy population forms the foundation of economic growth. However, economic growth is only realized through population productivity, which is influenced by the skills and knowledge that workers possess. As such, the Kenyan government should allocate more resources to health education and human capital development. Primarily, the government can achieve this goal by investing a substantial amount of resources in health education and training facilities across the country and employing more qualified teachers to impart the skills and knowledge needed in the health-related labour market. Notably,

these investments will ensure that most Kenyans will have an opportunity to access quality health education, which creates externalities and improves production capacity that leading to a steady-state rate of economic growth.

Further, the Kenyan government should not invest in health sector to levels that do not crowd out the private health sector operating in the health sector. It should only increase expenditures to levels that render private health functions more productive at optimum levels and improves economic growth. In the private sector, the Kenyan government can give private organizations (health education, training facilities, and medical manufacturers) tax cuts or subsidies to increase their production or investments to levels where their impact on economic growth is positively optimal. In this way, the government will transform the targeted organizations in the private health sector into significant contributors to economic growth.

6.5 Limitations and Areas for Further Research

This research paper had some limitations. One limitation related to availability of data . The study used data from reliable sources, such as Statistical Abstracts, World Bank's World Development Indicators, and Kenya Economic Surveys. Despite their reliability, data entries for some years were not available, and hence the researcher had to extrapolate them. From this perspective, some estimates might have deviated from the actual data if these sources had all the needed information. Nonetheless, and despite some data unavailability, the researcher considered the study findings to reflect the real picture of the correlation of growth of Kenya's economy and government spending on health.

From the perspective of this research paper, there are new avenues under which researchers can conduct future research. For instance, future studies should explore the levels of government health expenditure that spur optimal economic growth and welfare development. Again, future studies should seek to determine aspects that impact government decisions to allocate health resources regarding other government expenditure components. Further, future studies should seek to ascertain the level at which private sector expenditure in the health sector influences on growth of economy.

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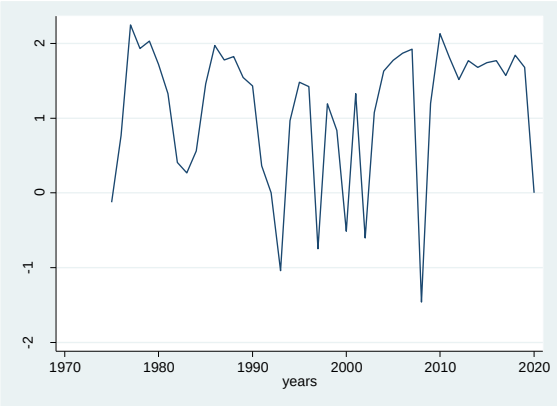
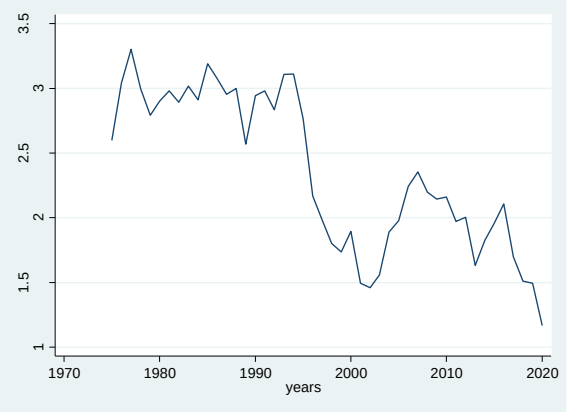
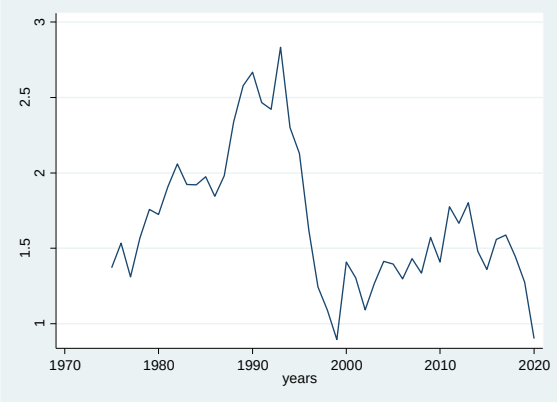
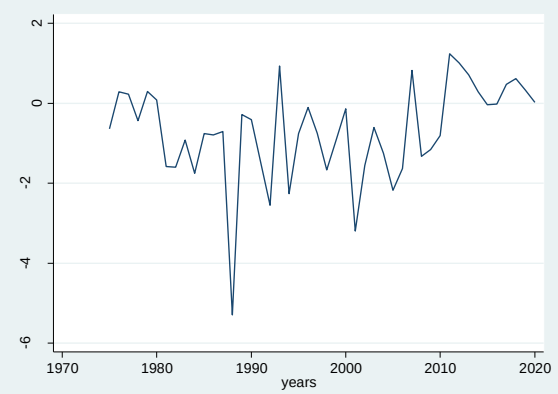
APPENDICES

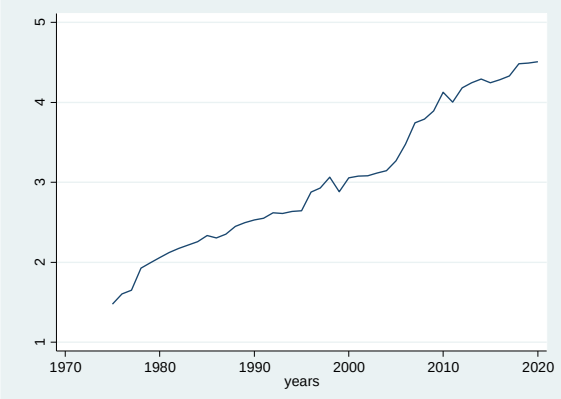
Appendix 1 (A): Non-Stationarity Graphs

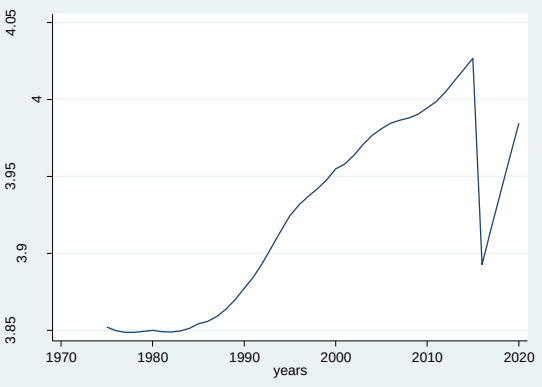








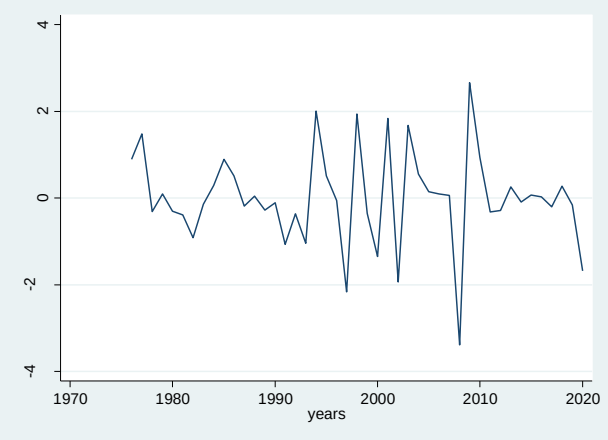


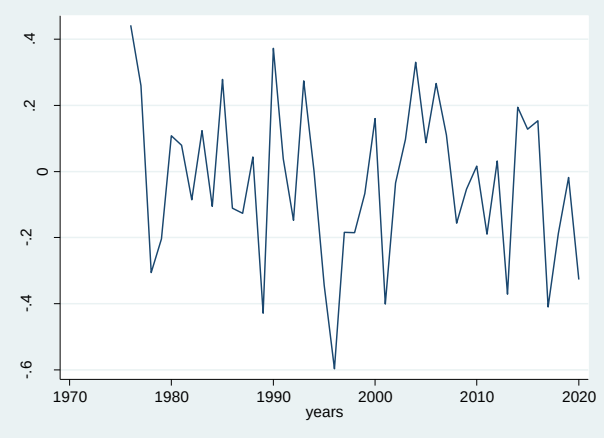


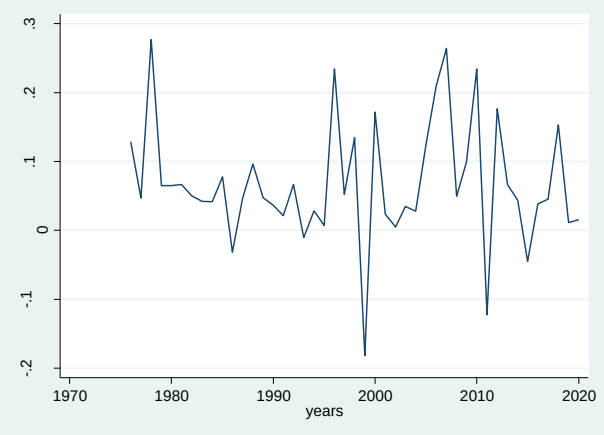
Appendix 1 (B): Non-Stationarity Unit Roots

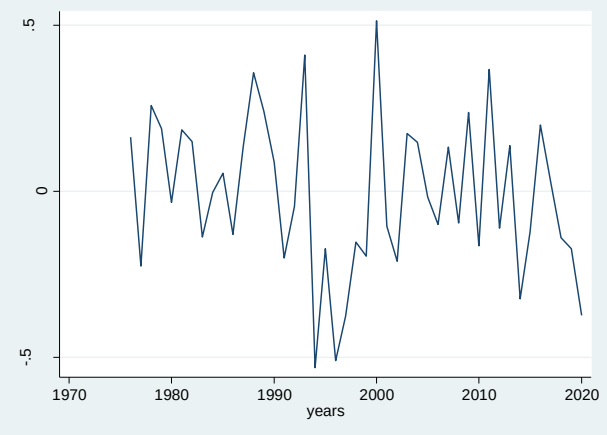
Variables	ADF Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
lgdp	-2.097	-3.614	2.944	2.606
lgds	-0.586	-3.614	2.944	-2.606
loda	-1.391	-3.614	2.944	-2.606
lfdi	-2.601	-3.614	2.944	-2.606
lh	-0.595	-3.614	2.944	-2.606
lp	-1.292	-3.614	2.944	-2.606

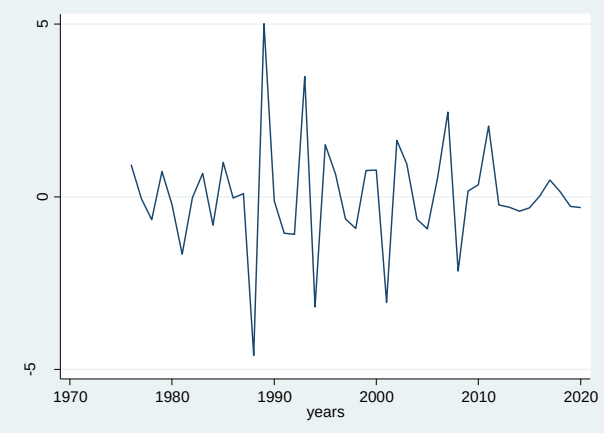
Appendix 2 (A): Stationarity Graphs

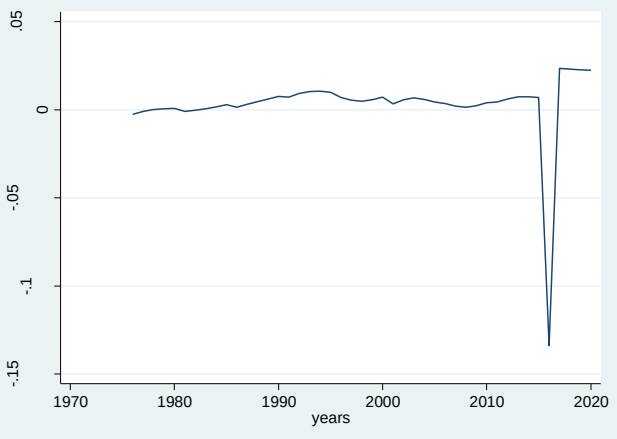












Appendix 2 (B): Stationarity Unit Roots

Variables	ADF Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
D(lgdp)***	-4.125	-3.621	-2.947	-2.607
D(lgds)***	-3.841	-3.621	-2.947	-2.607
D(loda)**	-3.347	-3.621	-2.947	-2.607
D(lfdi)***	-3.865	-3.621	-2.947	-2.607
D(lh)**	-3.381	-3.621	-2.947	-2.607
D(lp)**	-3.264	-3.621	-2.947	-2.607

Note. (***) denotes rejection of null hypothesis at 1%, 5%, and 10% critical values. (**) denotes rejection of null hypothesis at 5%, and 10% critical values.

Appendix 3 (A): Critical Values for the Cointegration Test

Regression Model	1% Critical Value	5% Critical Value	10 Critical Value
$y_t = \beta x_t + e_t$	-3.39	-2.76	-2.45
$y_t = \beta_1 + \beta x_t + e_t$	-3.96	-3.37	-3.07
$y_t = \beta_1 + \delta t + \beta x_t + e_t$	-3.98	-3.42	-3.13

Note. Adapted from Adkins and Hill (2011) and Hill et al. (2018)

Appendix 4: Regression Model using OLS

D.lgdp	Coefficient	Std. Error	*t*-Statistic	Probability
D.lgds	0.4846825	0.7759718	0.62	0.036
D. loda	-0.306827	0.8085837	-0.04	0.070
D. lfdi	0.700101	0.1146814	0.61	0.005
D.lh	1.407203	1.968801	0.71	0.009
D.lp	1.050005	8.411868	0.12	0.001
Constant	-0.072837	0.2213201	-0.33	-0.744
R-Squared = 0.9350		F-Statistics = 10.28		
Adj R-Squared = 0.8887		Prob F-statistics = 0.0091		
Root MSE = 0.81018				