T. C.
GAZIANTEP UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
DEPARTMENT OF ECONOMICS
ECONOMICS PROGRAM

**THE DETERMINANTS OF ECONOMIC GROWTH IN THE GAMBIA:
A TIME SERIES ANALYSIS**

**MASTERS OF SCIENCE (M.Sc.) THESIS
IN
ECONOMICS**

By
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Gaziantep, TURKEY
May, 2019

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DECLARATION

I hereby declare that all information(s) in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Muhammed L. Sanyang

DEDICATION

To my parents

ABSTRACT

THE DETERMINANTS OF ECONOMIC GROWTH IN THE GAMBIA: A TIME SERIES ANALYSIS

Muhammed L. Sanyang

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The main objective of this study is to investigate the determinants of economic growth in the Gambia during the period 1970- 2018. The Autoregressive Distributed Lag (ARDL) approach to Co-integration and Error Correction Model are applied in order to investigate the long- run and short- run relationship between the dependent variable (real GDP) and its determinants. The findings of the study shows that there is a stable long run relationship between the variables of real GDP, physical capital, human capital, export, aid, external debt and inflation.

The empirical findings reveal that both physical capital and human capital are found to have a positive impact on economic growth while debt affects the growth of the economy negatively and statistically significant at 1 percent. However, the study found out that physical capital, foreign aid and inflation have statistically insignificant effect on economic growth in the long run. This study also has an important policy implication. The findings of this study indicated that economic growth can be significantly improved when the physical capital and human capital increases. Hence the government and/ or policy makers should strive to increase capital formation (investment) which is a back bone of growth and allocate adequate finance for human capital, which can help to improve on the quality of education and providing basic health services to the community. Additionally, to avoid misallocation and mismanagement of external debt problem, there should be a close monitoring and consistent debt management strategies.

Key words: Economic growth, Physical capital, Human capital, Export of goods and services, Foreign aid, External debt and Inflation.

ÖZET

GAMBİA'DA EKONOMİK BÜYÜME BELİRLEMELERİ: BİR ZAMAN SERİ ANALİZİ

Muhammed L. Sanyang

Yüksek Lisans Tez, İktisat Bölümü

Danışman: Doç.Dr. Tuba Başkonuş DİREKÇİ

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79 sayfa

Bu çalışmanın temel amacı, 1970- 2018 döneminde Gambiya'da ekonomik büyümenin belirleyicilerini araştırmaktır. Bağımlı değişken (gerçek GSYİH) ve belirleyicileri arasındaki uzun vadeli ve kısa vadeli ilişkiyi araştırmak için Eşbütünleşmeye yaklaşımı ve Hata Düzeltme Modeline Otoregressif Dağıtılmış Gecikme (ARDL) uygulanmaktadır. Çalışmanın bulguları, reel GSYİH, fiziksel sermaye, beşeri sermaye, ihracat, yardım, dış borç ve enflasyon değişkenleri arasında uzun vadeli bir ilişki olduğunu göstermektedir.

Ampirik bulgular, hem fiziksel sermayenin hem de beşeri sermayenin ekonomik büyüme üzerinde olumlu bir etkiye sahip olduğunu ortaya çıkarırken, borç ekonominin büyümesini negatif ve istatistiksel olarak anlamlı bir şekilde yüzde bir olarak etkilediğini ortaya koymaktadır. Bununla birlikte, çalışma fiziksel sermaye, dış yardım ve enflasyonun uzun vadede ekonomik büyüme üzerinde istatistiksel olarak önemli bir etkisi olmadığını ortaya koymuştur. Bu çalışmanın ayrıca önemli bir politika çıkarımı vardır. Bu çalışmanın bulguları, fiziksel sermayenin ve beşeri sermayenin arttığında ekonomik büyümenin önemli ölçüde iyileştirilebileceğini göstermiştir. Bu nedenle, hükümet ve / veya politika yapıcılar, büyümenin bir belkemiği olan sermaye oluşumunu (yatırım) arttırmaya çalışmalı ve insan sermayesi için yeterli finansmanı tahsis etmeli, bu da eğitim kalitesinin iyileştirilmesine ve topluma temel sağlık hizmetlerinin sağlanmasına yardımcı olabilir. Ek olarak, yanlış tahsis ve dış borç sorununun yanlış yönetilmesinden kaçınmak için, yakın bir izleme ve tutarlı bir borç yönetimi stratejileri olmalıdır.

Anahtar kelimeler: Ekonomik büyüme, Fiziksel sermaye, Beşeri sermaye, Mal ve hizmet ihracatı, Dış yardım, Dış borç ve Enflasyon.

ACKNOWLEDGEMENT

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ACRONYMS

ADF	Augmented Dickey Fuller
AFDB	Africa Development Bank
AIC	Akaike Information Criterion
ARDL	Autoregressive Distributed Lag
CBG	Central Bank of the Gambia
DW	Durban Watson
ECM	Error Correction Method
ECT	Error Correction Term
GBOS	Gambia Bureau of Statistics
GCF	Gross Capital Formation
GDP	Gross Domestic Product
HDI	Human Development Index
HIPC	Highly Indebted Poor Countries
IMF	International Monetary Fund
MDGs	Millennium Development Goal
NDP	National Development Plan
OECD	Organization of Economic Co-operation and Development
OLS	Ordinary Least Squares
OPEC	Organization of Petroleum Exporting Countries
PP	Phillips Perron
RGDP	Real Gross Domestic Product
SSA	Sub- Saharan Africa
UN	United Nation
UNDP	United Nation Development Program
VAR	Vector Autoregressive
WBI	World Bank Index

CHAPTER ONE

INTRODUCTION

1.1. BACKGROUND OF THE STUDY

Countries generally desire for economic development. Economic growth is accepted to have explain most of the aspects of development, in an effort to ensure sustainable economic growth countries spend much of their time and resources. What causes economic growth? Why do countries grow faster than others? These are the most important issues that have been given extensive consideration in recent times.

In both developed and developing countries, economic growth is a major concern for policy makers. As a result, growth theory has long occupied a central role in economics. The process is dynamic, focusing on how and why capital, output, consumption and population change over time. In the modern social sciences, the economic growth process and the economic performance between countries are some of the most challenging, important and interesting areas. The sources of economic growth are a very important question for many economists who are interested in knowing the factors that enable a rapid growth experienced by some countries whilst others remain in underdevelopemt and poverty.

Growth is mostly calculated in real terms: that is in order to eliminate the effects of inflation on the prices of goods produced, inflation is adjusted. Economic growth is measured using national income accounting. Economic growth is generally distinguished from development economics as an area of study. Economic growth is the study of how nations can advance their economies while economic development is the study of the economics of development process in low income countries. The pattern of growth of real GDP can be considered as sustainable economic growth while the short run fluctuation of growth over the pattern is a business cycle. Economic development on the other hand includes economic growth, unemployment, distribution of income, levels of literacy and standard of education, health care system,

quality and availability of housing, levels of environment standards and poverty. [1]

As one of the poorest countries in the world, the Gambia depends on agriculture heavily, which contributes 33.3% (IMF, 2017) to GDP. Accordingly, more than 75% of the population depends on agricultural production for livelihood either directly or indirectly. Recently the country has experienced robust economic growth, despite having the history of poor performance in growth over the past decades.

The economy of the Gambia has an average GDP growth rate of 3.46%, which has not had an impressive growth performance in recent years, and is very low compared to the average growth rate of most Sub-Saharan African countries. 2017/2018 can be marked successful in terms of macroeconomic stability maintenance and strong fiscal management leading to falling inflation to a single digit, which has been a major challenge over the past years. In order to becoming a middle income country by 2025, the country need to improve on economic stability and financial discipline.[2]

In its drive to sustainable economic developement, the Government of the Gambia launched the National Developement Plan (2018- 2021), a five year development plan that seeks to provide economic prosperity to the people of the Gambia. The NDP envisage that at the end of its successful implementation the Gambia will move to middle income country status. The NDP among other things seeks to reduce the rate of poverty and unemployment in the Gambia as it stands at a higher rate, it is also poised to provide adequate and affordable health care and education system to the people of the Gambia thereby boosting its human capital. The National Developement Plan (NDP) is also cognisance of the fact that no meaningful

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[1] Economic growth is defined as the increase in the market value of the goods and services produced by an economy over time. It is conventionally measured as the percent rate of increase in real Gross Domestic product (IMF, 2017).

[2] The challenges that could hinder the growth and transformation agenda, include(s):

- A possible financial risk associated with growing stock of external debt, shortage of foreign exchange and limited financial options for the growth and transformation plan.
- Low levels of domestic savings and financial intermediation aggravated by negative real interest rates which continues to act as a dismotivation to savings mobilization while hampering access to credit.
- A decline in export value due to vulnerability to international commodity price fluctuations and few commodity choices for export market.

The need to nurture a competitive private sector to drive the growth and transformation agenda. (UNDP report. 2017).

developement can take place without the rule of low, freedom of the citizenry and democracy. As a result of that the successful implementation of the NDP will provide the needed democracy and freedom that will enable the Gambian people enjoy the dividends of their sacrifice in upholding democracy.

1.2. PROBLEM STATEMENT

The Gambia is defined as the smallest country in mainland Africa with an approximate size of 11,000 km square. The Gambia is divided into almost two equal halves throughout its length by the river Gambia and surrounded by her only neighbor Senegal on three sides: The North, South, and East. The Western part of the country opens to the Atlantic Ocean. According to The Gambia Bureau of Statistics, the Gambia has a population of approximately 2.1 million inhabitants (2017). The youths making up to 63% of the population, the Gambia has a huge potential of skill labor if the right investments are made by the government in the fields of education and skill development.

The economy of the Gambia experienced exogenous shocks caused by the regional Ebola crisis and erratic rainfall, causing a fall in real GDP growth from 5.6% to -0.2% in 2014 (AFDB, 2015). In 2015 growth rebounded to 4.4% but declined in 2016 to 2.2% as a result of policy changes, electoral uncertainty and unusually short rainy season. In 2017, GDP growth increased to an estimated 5.1% driven mainly by the agriculture and services sector and is projected to stabilized to annual estimated 4% over the medium term, depending on changes in policies to attract investors and a strong sustainable economic growth drive (AFDB, 2017).

The budget deficit in the Gambia increased to 1.7% in GDP in 2008, to 10% in 2014 and to 9.5% in 2016 due to high government spending. Domestic borrowing was largely used to finance the deficit. Domestic debt stock increased from 37.1% of GDP in 2013 to 67.9% in 2016, resulting in a sharp increase in total public debt stock to 83.3% of GDP and in 2016 increased to 120%. Inflation increased due to high food prices and depreciation in the face of main currencies was 6.85% in 2015 and rose to 7.2% in 2016. Inflation is decreased to 6.9% in 2018 after increasing monetary policy and increasing agricultural production. In 2015, the current account balance declined from 15% of GDP to 8.7% as a result of appropriate trade conditions. In 2015, foreign

trade deficit fell from 25.75% of GDP to 17.9% in 2016. Imports rose from 34% of GDP in 2016 to 38% in 2018 and led to an increase in the current account deficit to 10% of GDP in 2018.

The Gambia remains vulnerable to shocks due to its size and over dependence on tourism and subsistence rain- fed agriculture. Insufficient access to electricity pose a major challenge, about 47% at the national level, making the cost of electricity in the Gambia among the most expensive in Sub- Saharan Africa ($0.26 per kWh). The rate of poverty in the Gambia remained unchanged between 48.1% in 2010 to 48.65% in 2015. The unemployment rate of young people has reached about 70% thereby forcing many youths to look out for alternative means of survival, including illegal migration and other illegal activities.

Between 1990 and 2017, the Gambia's Human Development Index (HDI) increased by 38.20%, while the 2017 Human Development Index of 0.460 is lower than the 0.504 average for countries in the low HDI group, and below the Sub-Saharan Africa average of 0.537. This positioned the Gambia in 174 out of 189 countries and territories. GNI per capita, expressed in fixed 2011 international dollar conversion rates has indicated that the GNI for the Gambia is $1, 516, and the average per capita GDP for the Low Human Development Index countries is $ 2, 521 per capita and the sub-Saharan Africa average is $3, 399. The global literacy rate is over 82%. Regionally, Sub-Saharan Africa has the lowest rate at 59.9%. The adult literacy rate in the Gambia stood at 42%, compared to other small countries such as, Seychelles 94% and Mauritius 93% as the highest in Sub- Saharan Africa. (UN, HDI 2018 report).[3]

1.3. OBJECTIVES OF THE STUDY

The main objective of this study is to a critical overview and comprehensive study of the macroeconomc determinants of economic growth in The Gambia in the period 1970- 2018. Specifically the study aims to:

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[3] The United Nations (UN) Human Development Index (HDI) 2018 report looks at long-term human development trends caused by changes in health, education and income, and is based on a survey of 189 countries.

➢ Analyze the major determinants of economic growth in The Gambia between the periods of 1970- 2018, using the ARDL model.

➢ Analyze the long run and short run relationships among the variables under study.

➢ Recommend the major macroeconomic policy indicators and actions that must be taken to speed up the process of economic growth and prosperity in The Gambia.

1.4. RESEARCH/ QUESTION(S)

There exist many economic and non- economic factors affecting economic growth in The Gambia. In that regard, this study basically focuses on the macroeconomic determinants of economic growth, which includes physical capital, human capital, export, aid, external debt, agriculture and inflation. For this reason the following questions should be addressed.

➢ What are the major determinants of economic growth in The Gambia?

➢ Which macroeconomic variables(s) are more potent for economic growth in The Gambia?

➢ To what extend those the macroeconomic variables affect growth rate?

➢ Is there exist a long run relationship between real GDP and the selected macroeconomic variables?

1.5. SIGNIFICANCE OF THIS STUDY

There exist many studies that are carried on the determinants of economic growth that uses macroeconomic variables like gross capital formation, human capital and other factors like rainfall. However, this study uses variables that many empirical studies have confirmed as the factors affecting economic growth in both developing and developed countries in the long run. This variables include physical capital, human capital, Aid, inflation, external debt, export of goods and services. Therefore one can be believed that a multi disciplinary and continuous rigorous study is required to take the policy implications seriously as relevant to The Gambia. This study will provide policy recommendations that are relevant to the growth of the Gambian economy. Additionally, this study will serve as a research guide to other researches as well as provide a policy direction on the path to economic prosperity of the Gambia

in both the short, medium and long term.

1.6. LIMITATIONS OF THIS STUDY

This study is limited to the period between 1970 to 2018, which is covered forty seven years of time series data on macroeconomic variables that can affect economic growth.

Data availability is one of the major limitations of this study. Shortage of data to cover all the study period for some variables like human capital and physical capital, for this reason, total expenditure on economic and health is used as the proxy for human capital while total investment is used as a proxy for physical capital.

Data inconsistency from different organizations is another limitation faced while doing this study. In order to avoid the inconsistency data was sourced from the same source. However, there are non economic factors affecting growth like political stability, monitoring and fiscal policy, and the rules of rule that are not addressed here and can be considered other limitations of this study.

1.7. ORGANIZATION OF THIS PAPER

This study consist of six chapters. The first chapter deals with the introduction of the study. Chapter two contains the literature reviewed (both theoritical and empirical) related to economic growth. The third Chapter presents the overview of the Gambian economy. In chapter four, the research methodology used in this study is presented which includes: model specification, the procedure used in estimation and variable(s) definition. The fifth Chapter cointains the results of the data analysis and its interpretations. The final chapter which is the sixth chapter gives the conclusion of this study which also provides some policy recommendation (s) that came from this study.

CHAPTER TWO
LITERATURE REVIEW

2.1. THEORITICAL LITERATURE

2.1.1. Economic growth theories

The sources of different performance of economic growth across nations and the process of economic growth are one of the most important, interesting and challenging areas in modern social science. For the classical economists from Adam Smith, and notable, Thomas Malthus, David Ricardo, and Karl Marx that were all concerned with the growth of the economy (i.e., the increase in the production of goods and services), understanding the process of economic growth was central to their works. And one of the main question that has always constitute one focus of development economist is ' What determines the rate of growth?'.

The problem of economic growth attracted great interest for the classical economist and was main during their work. Many nations have been challenged with the issues of economic growth. Adam Smith (1776) in his book the wealth of nations state the prosperity of a nation and its economic development can be determined primarily by demand and suppply forces in a competitive market (invisible hand), physical capital accumulation (investment), division of labor and technological advancement.

Many studies have investigated the underlying factors of economic growth. Different conceptual and methodological viewpoints are used, emphasis have been placed on the different set of explanatory parameters in these studies and gave insights to the sources of economic growth.

A panel data or cross- country approach have been used on a variety of studies to address the problem of economic growth. As most of the studies used the standard neo- classical growth model, recent studies focus on endogenous growth

model. The periods from the 1950s and 1960s, and 30 years later from the 1980s and 1990s were the two powerful periods in the work on growth theory. In the period from the 1950s and 1960s, the neoclassical theory of growth was best know by the contributions of Robert Solow (1956).

2.1.1.1. The Keynesian growth theory

Keynesians approach believed that in order to boost growth, government should increase demand unlike Smith's conception of saving (frugality). According to Keynesian consumer demand is one of the economic growth conditions. If an economy is expanding and large group of workers are employed, household sector will have more income and then consumption expenditure will increase but with a contracting economy and a large group of workers unemployed, household income will fall, then consumption expenditure will decrease. The theory supports expansionary fiscal policy. Government spending on infrastructure, education and, unemployment benefits as its main tools. It is observed that overdoing Keynesian policies increases inflation.

The Harrod- Domar (H-D) model explain the importance of savings and investment in developing economies. The model postulated that savings is positively correlated to economic growth. With a high savings more investment can be made on physical capital development.

The national income equation can be writen as follows:

$$Y_t = C_t + S_t \text{-- [1]}$$

Where Y_t = GDP, C_t = consumption and S_t = saving.

Gross investment (I_t) is assumed to be equal to aggregrate saving (S_t) in the Harrod- Domar model;

That is $I_t = S_t$ --- [2]

Substituting euqation (2) in to equation (3) yields equation (4) as ;

$$Y_t = C_t + I_t \text{-- [3]}$$

The capital stock evolution over time is given by:

$$K_{t+1} = (1 - \delta)K_t + I_t \text{--- [4]}$$

Where δ is depreciation. Taking saving (S_t) is a proportion of GDP (Y_t),

$$S_t = sY_t \text{-- [5]}$$

We know that $\mathbf{v} = \frac{\mathbf{K}}{\mathbf{Y}}$, therefore $\mathbf{K = vY}$ and $\mathbf{I_t = S_t = sY_t}$, substituting that into equation [4] gives:

$$vY_{t+1} = (1 - \delta)vY_t + sY_t \text{-- [6]}$$

We now divide both sides of the equation by v, and substract Y_t gives equations [7] below:

$$Y_{t+1} - Y_t = \left(\frac{s}{v} - \delta\right) Y_t \text{--[7]}$$

Now dividing both sides of equation [7] by Y_t yields that:

$$\frac{\nabla Y}{Y} = \left(\frac{s}{v}\right) - \delta, \rightarrow g_y = \left(\frac{s}{v}\right) - \delta \text{--[8]}$$

The result simply states that the growth rate (g_y) of GDP is determined jointly by the savings ratio (s) divided by the capital- output ration (v). When the savings ratio is higher and the capital output ratio and depreciation rate are lower, the faster will an economy grow (Brian Snowdon and Howard R. Vane, 2005).

2.1.1.2. The neo- classical theory of Growth

Neo-classical growth theory states that a stable economic growth can be achieved with the appropriate mix of three driving forces: labor, capital and technology. The theory states that by changing the amount of labor and capital in the production function, an equilibrium situation can be realized. It is also state that economic growth cannot be achieved without advances in technology, so technological changes have a significant impact on the economy.

The basic assumptions of the Solow model show fixed returns to the scale, the substitutability between capital and labor, which reduces the marginal efficiency of capital, and externally determined technical progress.[4]

The long-run determinants of economic growth, based on the Solow growth model, are: high savings rate, high technology level, capital depreciation rate etc. We can therefore measure growth mathematically using the simple equation as:

$$\Delta Y_t = \frac{\partial Y \Delta K_t}{\partial K} + \frac{\partial Y \Delta L_t}{\partial L} + \frac{\partial Y \Delta A_t}{\partial A} \text{---[9]}$$

We now divide both sides of equation [9] by Y_t, it becomes that:

---

[4] Production takes place under fixed rates and there is no possibility of substitution of labor instead of capital. "Economic Growth Theory (Solow, 1956)."

$$\frac{\Delta Y_t}{Y_t} = \frac{\partial Y}{\partial k}\frac{\Delta K_t}{Y_t} + \frac{\partial Y}{\partial L}\frac{\Delta L_t}{Y_t} + \frac{\partial Y}{\partial A}\frac{\Delta A_t}{Y_t} \text{--} [10]$$

The above equation [10] divides GDP growth into parts that are attributable to labor, capital stock and technological growth. Then:

$$\frac{\partial Y}{\partial K} * \frac{\Delta K}{Y_t} = \frac{\partial Y}{\partial K} * \frac{K_t}{Y_t} * \frac{\Delta K}{K_t} \ \ = \beta_k\frac{\Delta K}{K_t} \ \ = \beta_k g_k$$

Equation [10] can be used to form equation [11] using the same method as show below.

$$g_y = \beta_k g_k + \beta_L g_L + \beta_A g_A \text{--}[11]$$

$$\text{Or } \beta_A g_A = g_y - (\beta_k g_k + \beta_L g_L) \text{--}[12]$$

According to the Neo- classical theory of growth, three important forecasts are made by the model. First, increasing capital relative to labor brings economic growth, since given more capital can make people more productive. Second, in term of faster growth, poor countries with less capital per person tends to grow faster than rich countries with sufficient capital because each investment in capital produces a higher return. Third, due to diminishing returns to capital, economies reach a steady state where any increase in capital no longer create economic growth.[5]

2.1.1.3.   The Endogenous growth theory

It became increasingly clear in the mid- 1980s that the neoclassical growth model was theoretically unsatisfactory tool to explain the long run growth determinants. Technological progress is assumed to be exogenous and common across countries which is the main limitations of the Solow model.

Neo – classical theory argues that Capital and Labour are essential components of enhancing growth. However, it also attributes a huge chunk of development to advancements in technology. The new growth theory attributed to Romer(1986), has a different departure point. It first holds growth as a natural process of the long – run equilibrium. Though the endogenous growth model has resembless with the Neo – classical, it subscribes to the idea of increasing returns to scale in production. The Endogenous Growth theory can be summarised as follows:

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[5] Based on Robert Solow and Trevor Swan, steady state is a point where investment equals depreciation and the economy is at equilibrium, which may occur during a period of growth.

Endogenous growth economist are of the believe that more investment in human capital and innovations can lead to more enhancement in productivity. As such the government and the private sector should support innovation capabilities while providing resources for individuals and businesses to be more creative. Under the endogenous theory knowledge based industries play a very important role most especially the telecommunication, software and high tech firms as they are becoming very powerful in emerging and developed economies.

The **AK** theory is the first postulate on external growth, that does not provide a clear difference between capital accumulation and technological progress.

Thus: $Y = AK$ --[13]

Savings rate influence the future growth of the economy.

$$\dot{K} = sY - \delta k \text{ --[14]}$$

When you divide both sides of eqaution [15] by K and simplify it gives:

$$\frac{\dot{K}}{K} = s\frac{Y}{K} - \delta \rightarrow g_K = sA - \delta \text{ --[15]}$$

Where g_K is the capital growth and $A = \frac{Y}{K}$, hence permanent growth rate will be achieved when there is an increase in the savings rate s.

The Romer model (1986) tries to explain how and why the developed economies in the world are constantly growing. According to the model, the technological growth in the developing world is driven by research and development and the promotion of the research and development sector promotes technological progress. Total production function in the Romer model:

$$Y = K^{\alpha}(AL_y)^{1-\alpha} \text{ --[16]}$$

Where **A** represents techology and L_y is the labor force.

The idea of Human Capital, which could be a result of enhanced human development, lies within the proposition of this thesis, which establishes to propose that human capital could be improved by investment and a steady rate of economic growth and vice – versa. This theory has reviewed the relationship between output and capital, including that of human capital.

2.2. EMPIRICAL LITERATURE

Empirical Literature review comprises of past empirical studies, theories and models related to research topic. This provides the researcher to understand the previous work done on the research topic. Many researchers have examined the sources of growth cross different countries, using panel data approach and time series data in both developing and developed economies on a wide variety of variables.

There exist many empirical studies conducted on the determinants of economic growth (Ficher, 1993; Barro, 1991, 1997; Zafar Iqbal et al., 1998; Edwin Dewan et al., 2001; Ndambiri H.K et al., 2012; Patrick Enu et al., 2013; Biswas and Shana, 2014) and many more. Some of the researches are done to test the validity of the traditional growth models and other basic models. Most of the studies focus on a cross- country basis to determine the major sources of economic growth rather than on a single country. According to the empirical studies of the above researchers, economic growth is influenced by many macroeconomic variables like Physical capital formation, human capital, export, Aid, inflation, government expenditure, money supply, external debt etc. The empirical relations are reviewed in this section as follows:

Table 2.1: Empirical Literature reviews

Source (s)	Variables used	Result (s)
Biswas and Saha, 2014. The relationship between gross domestic capital and economic growth.	GDP, employment, export, foreign direct investment, inflation and money supply	The result found that, gross capital formation and economc growth have a positive relation and statistically significant. Further more the study also suggests that employment, export, foreign direct investment, and money supply have a positive correlation on India's GDP growth where as inflation and fiscal deficit have a negative impact.

Zafar *et al.*, 1998. The contribution of physical capital to economic growth 1960 to 1997	GDP, labour force, investment, investment in both physical and human capital, inflation and openness to trade.	The result indicates that the increase in the rate of physical capital accumulation leads to higher economic growth rate in both per capita income and rela GDP. The result also shows that the variables under study are necessary for economic growth.
Ndambiri H.K. et al. 2012. A study on Economic growth done on 19 sub-Saharan Africa countries for the period 1982-2000	Physical capital, labor force, foreign direct investment, foreign aid, consumer price index, government expenditure and military rule.	The result indicates that physical capital formation is the main determinant of economic growth in the region. It also found that Physical capital, labor force, foreign direct investment, consumer price index, government expenditure and military rule are significant determinants of economic growth in the long run. There was a negative relationship between foreign aid and economic growth in sub- Saharan Arica.
Halad and Mallik, 2006. A study on human capital and economic growth in India during the period 1960 to 2005 using the Johansen methods of co-integration.	GNP, expenditure on health and education, gross capital formation, employment, export, foreign direct investment and money supply.	According to the results, both school enrolment and expenditure on education and health (proxy for human capital) are positively related to economic growth and had statistical significant effect on the long-run per capital gross national product.

Patrick Enu *et al*. (2013). The relationship between human capital and economic in Ghana during the period 1970 to 2011.	Economic growth, human capital, labor force, foreign direct investment, foreign aid, consumer price index and government expenditure.	The research indicated that there is a direct relationship between human capital and economic growth. The study also found that human capital, labor force, foreign direct investment, foreign aid, consumer price index and government expenditure are significant determinants of growth in real gross domestic product per capita in Ghana.
Iqbal and Zahid, 1998. A study done in Pakistan on exports and economic growth 1956 to 1997.	GDP, exports, foreign direct investment and inflation.	The result showed that, exports and economic growth have a direct relationship. It also indicates that a one percentage increase in export- GDP ratio leads to a 0.7 percentage raise in the growth rate of GDP per capita.
Khaled R.M. *et al*., (2010). A study done on the relationship between exports and economic growth in Libya 1970 to 2007	Real GDP, exports, imports, openness to trade and foreign direct investment	The result showed that any rise in export would have a significant positive influence on economic growth in both the short and long- runs. The study also found that economies that are more open to trade and capital flows have faster economic growth rate and higher GDP per capita.

Ugochukwu and Chinyere, 2013. A study on exports and the Nigerian economy during the period 1986 to 2011	Real GDP, oil and non -oil export, trade openness and foreign direct investment inflows.	The study showed that both oil and non-oil exports have a positive impact on economic growth and are statistically significant. The result found that holding other variables constant, for every one percent increase in the value of oil export, GDP will increase by 0.62 percent and 0.29 percent for every one percent increase in the value of the non-oil export.
E.M. Ekanayakeet *et al*. (2008). A study conducted on foreign aid and economic growth in 85 developing countries in Asia, Africa and Latin America.	GDP, foreign aid, agriculture, foreign direct investment and external debt.	The study found that foreign aid has a negative impact on economic growth in Asia and Latin America countries. However, the study found that aid has a positive relationship with economic growth in Africa countries.
Malik (2008). A study on foreign aid and economic growth in sub-Sahran Africa.	GDP, foreign aid, exports, foreign direct investment and gross capital accumulation	The result found that there exist a negative impact of foreign aid on economic growth in sub- Saharan African countries. According to the result any unit increase in foreign aid will lead to a decline in GDP growth.
Boboye *et al*. (2012). A study on external debt and the Nigerian economy	GDP, external debt, foreign aid, inflation and government expenditure.	The study found that external debt burden has an adverse effect on economic growth, nation income and per capita income. It shows that a high level of external debt leds to a nation's currency devaluation stirkes and poor education and health system.

IMF working paper (2002) based on a panel data of 93 developing countries from 1969 to 1998	Real GDP and external debt	The paper indicated that a reasonable level of external debt helps finance productive investment and expected to enhance economic growth but beyong a threshold level, additional indebtedness may reduce economic growth. Annual per capita growth would reduce by 0.5% to 1% in countries with average indebtedness and doubling debt ratio to real GDP.
Barro (2013). A research done on 100 countries of the world including the Gambia from 1960 to 1990.	Real GDP and inflation.	The research indicated that an increase in average inflation by 10% is likely to reduce the rate of growth of real GDP by 0.3 percent and as well reduce the ratio of investment to real GDP by 0.6 percent per year.
Dritsakis, N. et al. (2004). The main determinants of economic growth: An empirical investigation with granger causality analysis for Greece 1960- 2002	GDP, exports, gross capital formation and foreign direct investment	The results shows that the granger causality test found that there is a unidirectional causal relationship between exports and gross capital formation and alo a unidirectional causal relationship between foreign direct investment and economic growth. The variables are found to have a significant impact on economic growth.

Bonga and Ahiakpor (2015). Determinats of economic growth in Sub- Saharan Africa: The case of Ghana 1970- 2012.	The rate of labour force, population density, inflation rate, agriculture productivity and current account balance	The empirical results show that the variables such as current account balance, inflation rate and population growth are important determinants in driving the growth of the Ghanaian economy. The result also suggest that economic growth policy in Ghana should be confined within a specific growth theory, be it neoclassical and Keynesian.
Oyebanjo O., 2017. Determinants of economic growth in Sub- Saharan Africa: Decomposition of export and imports	GDP, export, import, capital and labour force.	The result show that export and import contribute significantly to economic growth. Growth in raw material exports, and not manufactured exports, is associated more to GDP growth while growth in manufactured imports, and not raw material imports, is significantly associated with GDP growth.

CHAPTER THREE
AN OVERVIEW OF THE GAMBIAN ECONOMY

3.1. INTRODUCTION

The Gambia has gone through different changes of political regimes that has impacted the growth of the Gambian economy. There have been problems of inconsistencies in policy implementations due to changes in government structures. The 1981 failed military attack has a serious effect on the growth history of the Gambia.

In the modern political economic history of the Gambia, there are three distinguish regimes that followed different macroeconomic policies with its impact on the growth performance of the country. There are the pre 1994 (the Jawara regime), the period 1994 to 2016 (the military (Jammeh) regime) and 2017 to the present (the Barrow regime). Several radical policy changes and blows have characterized the economic policy history of the Gambia. During the Jawara regime (pre 1994) market-oriented economic system was the economic policy is mainly used. However, from the period 1994 to 2016 the system was characterized by a market- oriented economic system with intermittent government interference. From 2017 to date the regime also supported the market- oriented economic system.

Alemeyehu and Befekadu (2005) stated that " *cyclical political processes and regime shifts were unpredictable and voilent with negative consequences on the economic performance of the country. Economic insecurity pervades the system as a rule of law, and enforcement of contracts and property right insecurity are configured on an unstable political base.*"

3.2. MACROECONOMİC PERFORMANCE

The Gambia is a small economy that is heavily based on tourism, agriculture and money deposits and is open to outer socks. The macroeconomic situation continues to be characterized by high debt levels, estimated to be 129.2% of GDP in 2018, and create debt shortages. Approximately 40% of the domestic debt is held by domestic banks and creates a risk of stability in the banking sector.

The Gambia has a vision of becoming a middle income country in the coming years after implementing the National Development Plan (NDP) 2018- 2021. The NDP seeks to provide good governance and accountability, social cohesion, and national reconciliation and a revatilized and transformed economy for the well beign of all Gambian. The Gambian economy has not experienced an impressive growth performance for the last two decades with an average GDP growth rate of 3.8%, having an average GDP growth rates of 4.2%, 3.3% and 4.5% for the three(3) regimes respectively. (see figure 3.1). Since 1980, the country's average GDP grew at a rate of 3.5%, per capita income growing at an average of 0.1% while the population grew at an estimated average of 3.4% during the same period (World Bank Development Indicator, 2017).

Although the growth in the Gambia is generally slow but the overall economic performance reflected the expansion of the country. According to the International Monetary Fund (IMF), real GDP grow on average by 3.3% from the periods 1980- 2018. During the fiscal year 2015, the real GDP revealed a remarkable growth rate of 5.9% compared to the 3.3% for sub- Saharan African countries for 2015. The growth was mainly attributed to the contributions of the service sector (64%), agriculture sector (17.3%) and industrial sector (13.5%).

According to the report of GBOS (2017), National poverty rate had increased slightly from 48.1% in 2010 to 48.6% in 2015[6]. While this increase of the poverty rate was statistically insignificant, the number of poor people increased substantially by 18.2% from 0.79 million in 2010 to 0.94 million in 2015. Poverty remains a serious issue in the rural areas, the poverty rate in rhe rural areas increased from 64.2% in 2010 to 59.5% in 2015 an increase of 8.3%. The rural poverty rate

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[6] Based on the international standard of US$1.25 a day, purchasing power parity adjusted (World Bank's World Development Indicators, 2018).

accounts for 64% of the total poverty rate in the country. Conversly urban poverty declined by 5.4% from 33.4% to 31.6%. Inequality remains flat. The gini coefficient been the most common measure of inequality. The National gini stands at 0.359 with inequality higher in the urban areas.

An economy of US$ 915.00 million of GDP, agriculture and the service sector serves as the backbone of the economy of The Gambia. Agriculture accounts for 21.4 percent of GDP and comprises of the cultivation of groundnuts mainly for export; maize, coose, millet, and vegetables for domestic consumption. The Gambian agriculture is a rain-fed agricultural system and as such remains susceptible to the adverse patterns in rainfall caused mainly by the scourges of climate change. In 2014, a projection of 5.6% growth rate in GDP was reduced to 0.2% mainly due to the erratic rainfalls that negatively affected the agricultural season. Coupled with that, the outbreak of the Ebola virus in the region (even though The Gambia was spared) also lead to a failed tourism season in the same year. 2015 witnessed a rebound of 4.4% in GDP growth before it declined to 2.2% in 2016 due to uncertainties concerning political matters, unfavorable agricultural season, and border blockage with her only neighbor caused by disputes with the Senegalese transporters' trade union (AFDB, 2019) . In 2017, the GDP growth rate was estimated at 3.5% as a result of strong performance of the agricultural sector, tourism, and trade. The growth rate of The Gambian economy is expected to stabilize at around 5% in the medium term especially over the implementation period of the newly developed National Development Plan of 2018 to 2021. A plan of USD 2.4 Billion initiated by the new administration lead by the current president Mr. Adama Barrow (The World Bank, 2018).

Despite the above-highlighted setbacks in recent years, the Gambia remains hopeful of better economic prospects for the future as a country. Current International Monetary Fund (IMF) data puts the inflation rate at 5.3% (IMF, 2019).

The new government that came into power in early 2017 is determined to invest in agriculture, maintain good governance and the rule of law, attract more tourist into the beaches of the coast of the river Gambia, and create, and maintain a favourable investment climate for the aim of attracting more FDI into the country. The Gambia is a member of the African Risk Capacity (ARC)- an insurance scheme

launched by the AFDB to compensate African countries that suffer losses in agriculture (crop failure) due to natural disasters such as flood, drought, famine etc.

The financial sector in the Gambia is a bank-based financial system. With an independent central bank (The Central Bank of The Gambia-CBG), The Gambia uses its own local currency: the Dalasi. The Dalasi is a freely floated local currency with its value determined by the free forces of demand and supply. Despite this, government interventions in the foreign exchange market during the previous administration had caused market inefficiency and uncertainties in the past. As a result of that the new government since early 2017, the foreign exchange market has been largely unaffected by any unforeseen government intervention. This has contributed to the present climate of trust and an increase in foreign currency supply mainly from a recovering tourism sector, re-export trade, and an increase in private remittances from $205.6 million in 2016 to $226.7 million in 2017 (Central Bank of The Gambia (CBG), 2018).

The CBG through the monetary policy committee (MPC) enacts monetary policies and issues directives to local commercial banks as and when the need arises. The MPC decides on the MPC Rate[7] which serves as a direct indicator of the lending rate of commercial banks. From a high of 23% (1st September 2016 to 9th May 2017), the MPC Rate has been reduced to 20% (May 2017) and further to 15% (starting from June of 2017). This aimed at interest rates normalization and an improvement in the conditions of domestic credit (lending) by local commercial banks (CBG, 2018).

The value of the dalasi has been relatively stable against major hard currencies in recent times. From June to August of 2017, the dalasi depreciated against the British pound by 1.6%, and 6.4% against the Euro. However, it recorded an appreciation of 0.5% against the US dollar (The World Bank, 2018). At present, the value of the dalasi as against these currencies is as follows: 57.23 to the Euro, 65.02 to the British Pounds Sterling, 49.45 to the USD, and 0.09 to the CFA. The USD remains to be the most traded currency accounting for 55.9% of all dealings. This is followed by the Euro (27.7%), the Pound sterling (13.0%), CFA (0.7%) and all other foreign currencies accounting for only 2.8% (CBG, 2018).

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[7] The MPC rate is the rate which dictates all other rates in the domestic economy.

Figure 3.1: Average GDP growth rate, GDP per capita and population in different regimes (1965 - 2017).
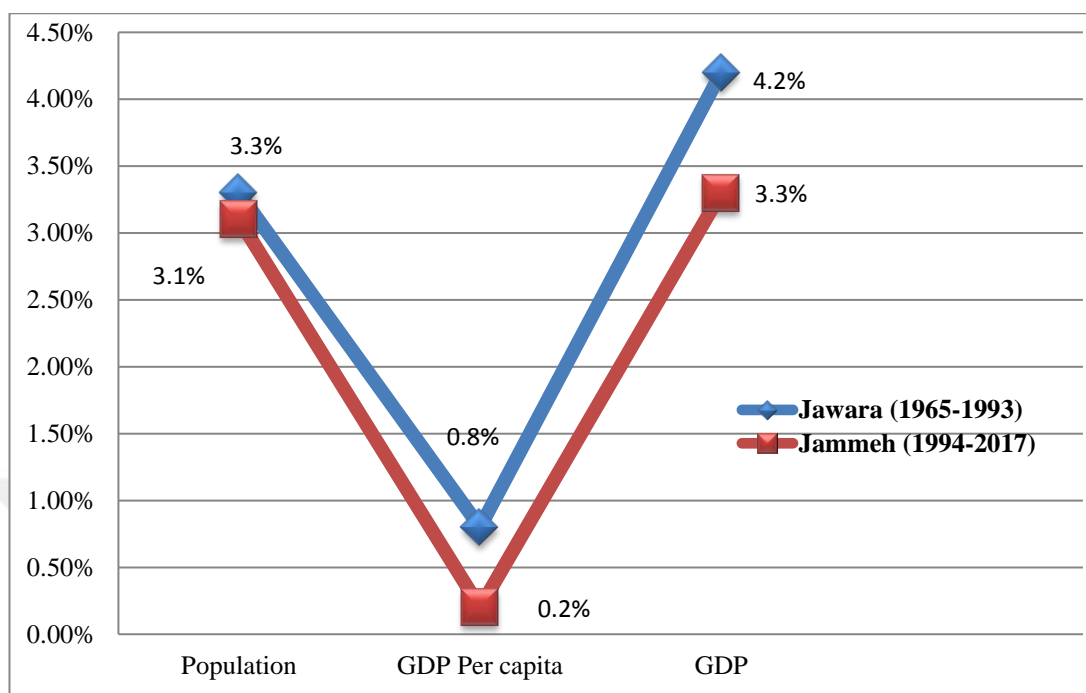
Source: Own computation from World Bank, IMF and AFDB data

As seen in Figure 3.1, the GDP and GDP growth rate per capita in the Jawara regime was better than the Jammeh regime, taking into account the length of government stay. While the average growth rate of the economy and per capita income was 4.2 percent and 0.8 percent in the period 1965 - 1993 (Jawara), the population grew by 3.3% on average in the same period. Nevertheless, economic growth was low during the period of 1994- 2016 (Jammeh Regime) and GDP per capita grew by 3.3 percent and 0.2 percent, respectively, while population grew 3.3 percent and 3.1 percent, respectively. During the Jammeh period, economic growth is relatively fair; despite the increase in per capita income, the population growth was under 3.1%.

Figure 3.2: share of GDP in different regimes (1965- 2017)
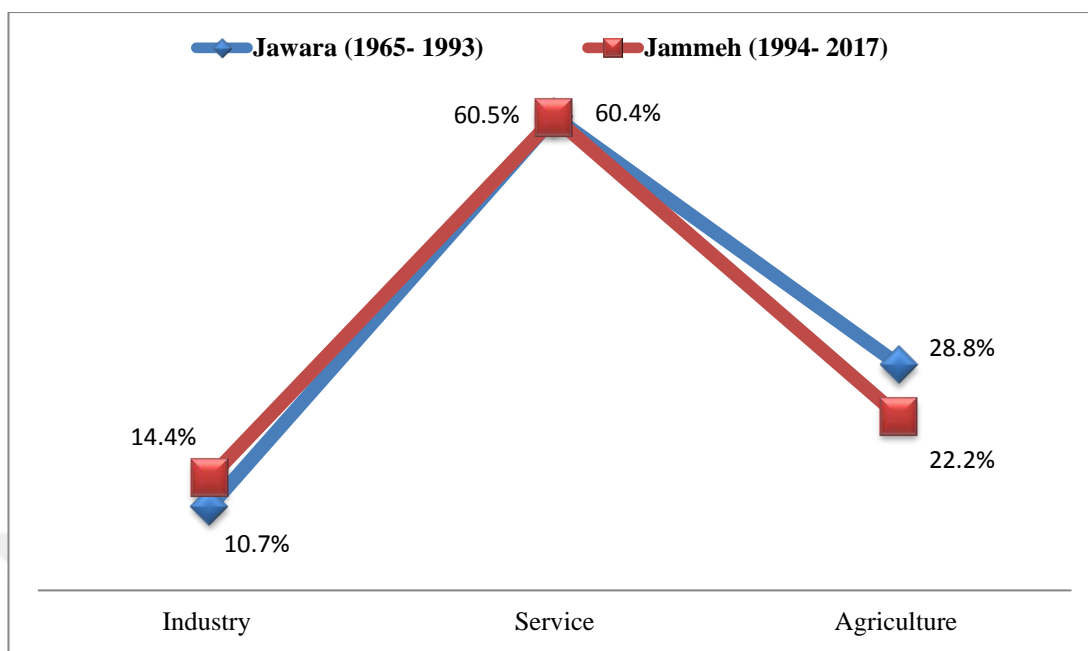
Source: Own computation from World Bank, IMF and AFDB data

From figure 3.2 above, the industrial sector share has remained stagnant in the past years. There has not been any significant change with respect to increasing the share of industry, although the country's development plans shows direction from agriculture to industry and services. During the period 1994 to 2017 the average growth rate of the industry sector was 14.4%. For this reason the Gambia is predominantly an agriculture base economy where it employs more than 75% of the population and contributes 33.3% to GDP in 2018, the economic performance in the Gambia is largely determined by what happens in the agriculture sector. The structure of the economy has not changed that much despite the amazing economic growth, the services sector have always been dominating the other sectors. According to the Gambia Bureau of Statistics report, growth in the service sector is attributed growth in Tourism, Telecommunication and Financial services as the major components. Therefore, the services sector dominated the share of the economy, which has a relatively rapid growth rate among the three sectorial growth rates. (I.e. agriculture, industry and services grew at an average growth rate of 22.2, 14.4 and 60.4 percents respectively during the period 1994- 2017).

Figure 3.3: Trend of GDP growth and sectorial shares (1990- 2018).
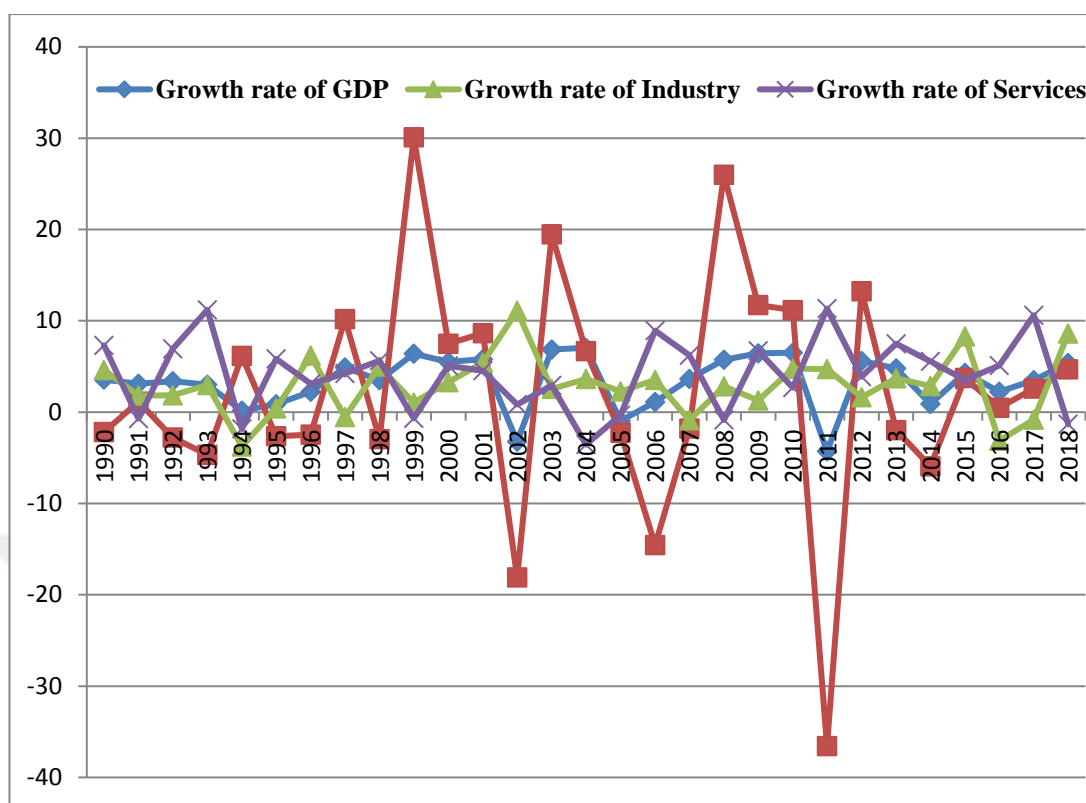
Source: Own computation from World Bank and IMF data

The growth of the Gambian economy between 1990 and 2018 was released as seen in the graph. GDP growth rate remained low during period. Nevertheless, while the growth of agricultural and industrial sector was driven by GDP growth, the service sector was strong in growth and took the largest share of GDP in the 1990-2018 period and accounted for 67.2 percent of total GDP in 2018. The agricultural sector in the Gambia is below its full capacity as shown in the figure below. This is as a result of the lack of market for the agriculture produce which discourages famers to venture in to large scale agricultural production. The inadequate number of industries in the Gambia lead to the low contribution of the industrial sector to GDP growth, this also affects the contribution of the agriculture sector since the agricultural produce needed to be transformed in to finish goods for public use. The service sector remains the biggest contributor to GDP but services does not reduce poverty hence the level of poverty in the Gambia is high and economic growth is low.

3.2.1. Saving and Investment

The economic growth of the Gambia is significantly affected by investment and savings rate. However, the economy of Gambia has been dominated by low savings and investment rate. The ratio of gross domestic savings to GDP has been 3.8 percent on average in the last 18 years. As a share of GDP, Gross Capital Formation has seen a significant improvement of 18.0 percent over the past 18 years as compared to the gross domestic savings.

Gross capital formation (formally gross investment) was expected to reach a good share of GDP, it reaches 27.8 percent of GDP during 2012/13 (World Bank 2012/13). The gross domestic saving rate registered 14.4 percent of GDP during the same period which is very low comparing to the investment rate need. Gross domestic savings has been very low in the country over the past decades as a result gross investment has been low. For the growth of domestic saving rate, the government should improve on the stimulation of domestic saving including the creation of wide range of awareness activities in both urban and rural areas of the country; strengthening existing saving tools and introduction of new saving mobilization instruments such as selling of government Bonds, deepening of financial institutions, introducing private social security scheme, fortify government workers social security scheme, reinforce saving for housing program, and sustaining the level of government savings. One of the key drivers of growth on the demand side has been the expansion of investment over the past years.

Figure 3.4: Trend of Real GDP growth, Gross Capital Formation (GCF), and Gross Domestic Savings (GDS) (1980- 2017)
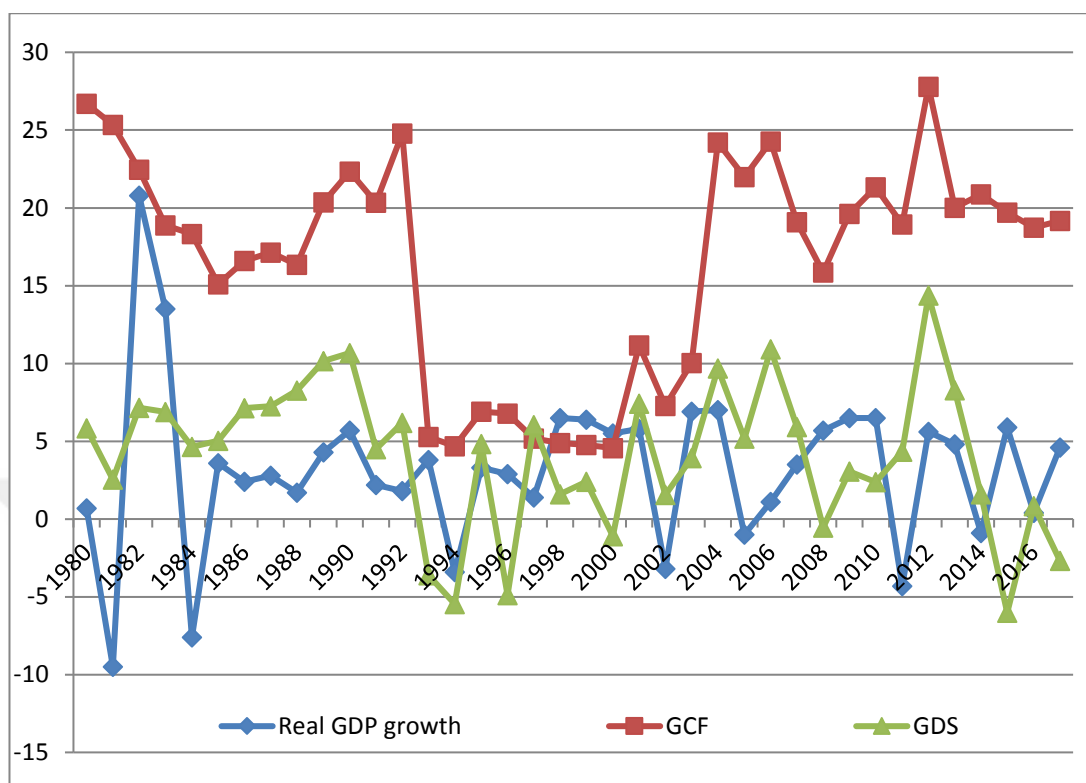
Source: Own compilation based on the IMF, World Bank and AFDB data's.

3.2.2. Social Sectors development and Economic Growth

The growth of an economy can be mainly driven by human capital and most of the time health and education expenditures have been used to measure human capital. In the period of 1994-2017 education and health coverage and good distribution was higher compared to the pre-1994 period. The life expectancy at birth was 62 years (WHO, 2016). In 2012, the total budget for education and health was 19.45% for education, 12.7% for health and 2019 for education and health are 20.5% and 9.6% respectively of the total budget

Figure 3.5: Trends of human capital expenditure in percentage of GDP

Expenditure on Health and Education as a percentage of GDP
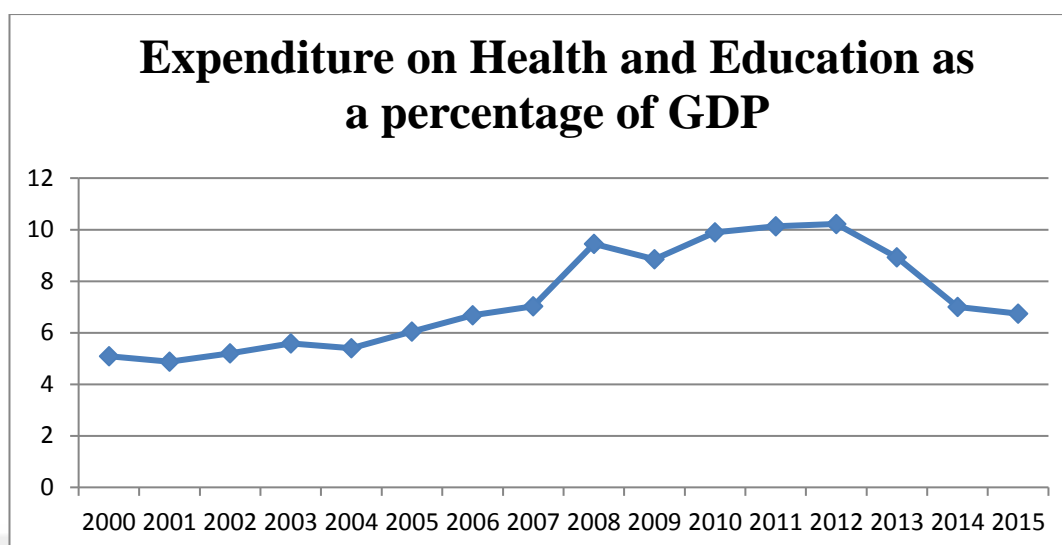
Source: Own compilation based on the World Bank and GBOS data.

As a percentage of GDP total expenditure on health and education has seen improvements over the years and the budget allocations have also been significantly improved. Accordingly, the total enrollment rate for primary education was 71.6% in 1999 and 74.75% in 2016. Additionaly, scope of the health sectore in the community has not developed significantly, and life expectancy has increased from 32.0 in 1960 to 61.1 in 2016 (WB 2017). During the period 1999/2000 to 2005/2006 enrollment in the primary schools increased from 154, 664 to 182, 627 an increase of 18.08%. A significant surge in enrollment has been registered at all school levels from 2017 to 2018. Gross enrollment in Lower Basic Schools increased by 112.7% to 350, 323, Upper Basic Schools by 68.1% to 98, 108 and Senior Secondary School by 47.8% to 64, 957 in 2018.

3.2.3. Export and the Gambian Economy

A significant role has been played by the export sector towards economc growth. However, most countries are dependent on monetization resources in a single product, expecially on agricultural products. The Gambia exports sector is mianly featured by overseas agricultural raw commodities that provides the export earnings of the country. The most exported products include coarse wood, coconut, cashew nuts and peanuts.

The Gambia is the 177th largest export economy in the world. The total export amount was $239 million compared to $1.03 billion of import in the same period, resulting in a negative trade balance of $ 794 million. For the past years exports have decreased at an annualized rate of -1% from $248million in 2011 to $234 million in 2016 (OEC, 2017). In the first quarter of 2018 exports decreased to $5.16 million from $101.4 million in the fourth quarter of 2017 (OED, 2017).

Figure 3.6: Trends of total export as percentage of GDP (1970- 2018)
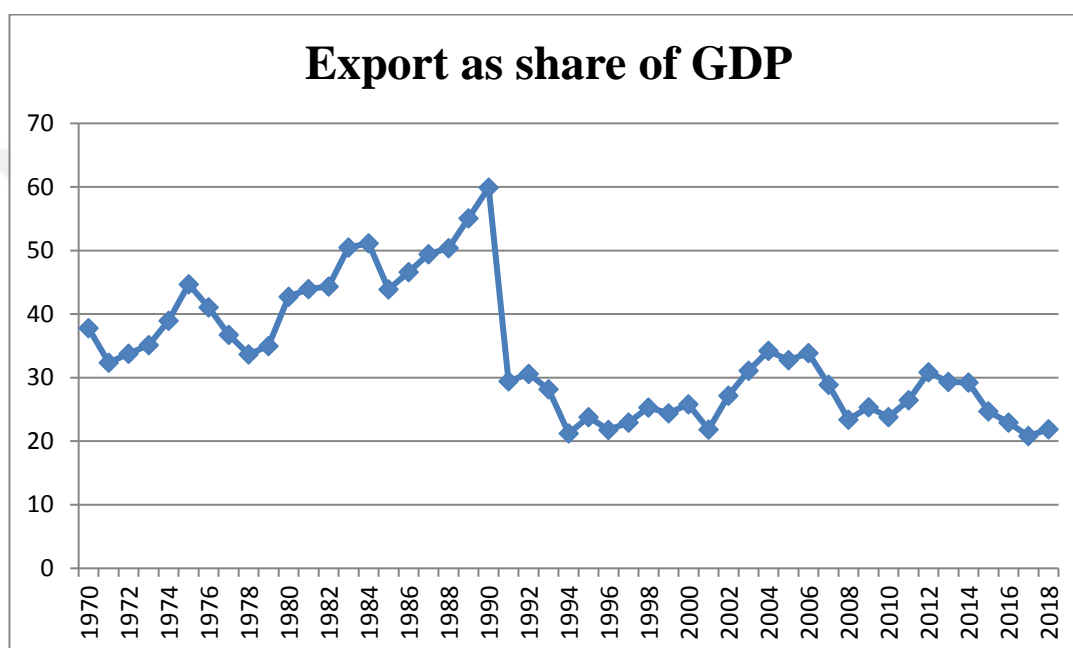
Source: Own compilation based on the Word Bank and AFBD data.

It is expected that export of goods and services will create a positive impact in fastening economic growth. However, the export sector has played a less important role in the growth of the Gambia economy in recent years. The fluctuation in exports of goods and services (see Figure 3.6) has been associated with the export of agricultural products, because agriculture is often unchanged in nature, especially in the case of Gambia, as a result of unbalanced export performance. High concentration in non-traditional export products.

The Gambia export sector is mainly manufactured in limited quantities and exported to semi-finished products, mostly due to a small number of agricultural products. Due to several agricultural products, this structure did not change significantly over time.

3.2.4. Aid and the Gambian economy

The Gambia as we know is one of the poorest countries in the world, which depends its export sector on agriculture primary sector which contributes more than 33% of GDP in 2018 and it also suffers from low domestic savings and insufficient amount of foreign exchange needed to purchase capital goods. Not only that, the country also experiences from deficit in budget that requires foreign aid to boost growth. This problem can be solved by foreign aid by supporting domestic savings or foreign exchange reserves.

Although several externally financed projects and programs were initiated, economic growth and poverty reduction rates have been disappointing. In the Gambia, the overall poverty rate is at 61% despite the numerous aid inflows into the country. The high flow of aid monies during the cold war era led to a dependency syndrome portrayed by many developing countries (IMF, 2018). The donations were made to the Gambia from donations of 91, 580 Million US Dollars in 2016 and increase compared to the starting period of 1, 310 million USD in donation period.

The Gambia has been using foreign aid to finance most of its developement projects. This is because the revenue that is internally raised is not sufficient to take care of the developement needs of the country since most of the revenue goes into finance consumption expenditures.

Figure 3.7: Average Aid share of real GDP and Average real GDP growth rate
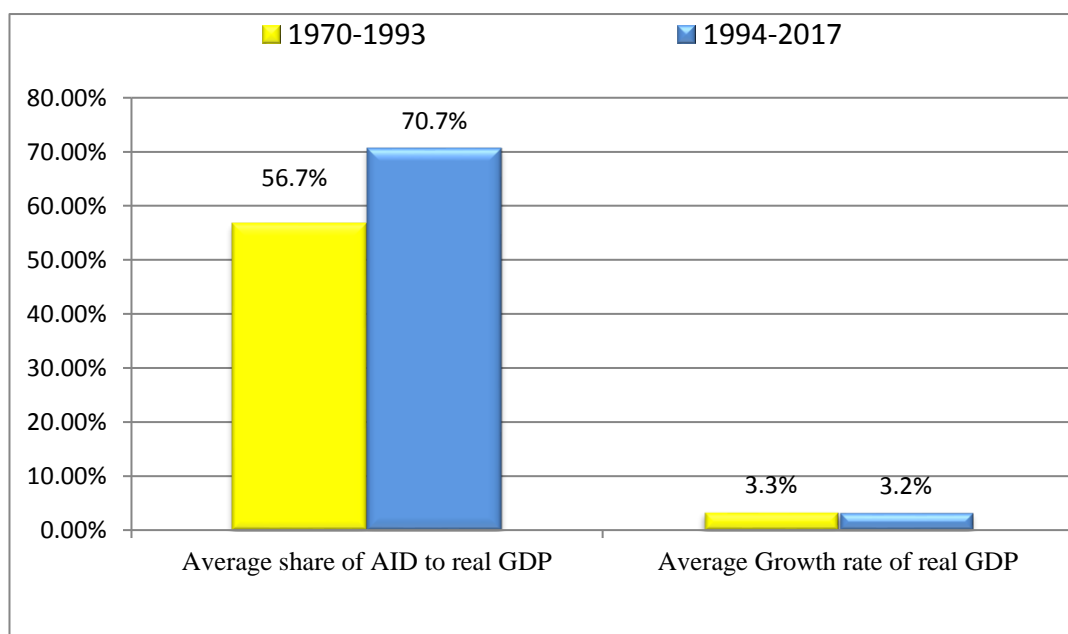
Source: IMF and World Bank data's

3.2.5. External Debt and the Gambian Economy

According to the IMF , the Gambia's external debt has dropped from 0.65 billion or 70.9 percent of GDP in 2006 to 0.62 billion or 45.1 percent of GDP in 2018. While real GDP registered a growth of 5.4 percent in 2018.

The Gambia's public debt stock reached 129% in 2017 or 774% of government revenue, while public interest payment of that year absorbed 42.5% of government revenues, reflecting the untenable public debt burden. External creditors were approached for debt restructuring. The fiscal deficit in 2017 reached -7.9% of GDP, although it is expected to moderate down to -2.9% of GDP in 2019.

The government of the Gambia has been warned to stop borrowing as the level of its debt is currently unsustainable. In the 2018 budget more than GMD 4 billion is allocated for debt serving out of the GMD 28.8 billion budget. In the same budget only GMD 15 billion is raised through taxes, the remaining GMD 10.8 billion will come from loans and aids.

Figure 3.8: Total External Government Debt Stock in Millions of Dollars
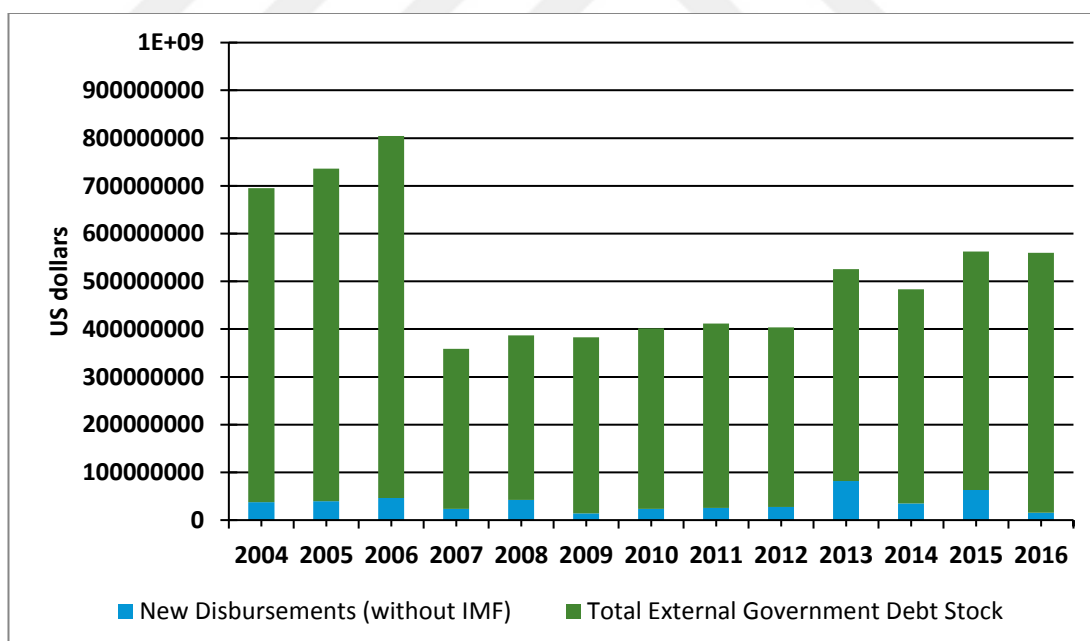
Source: Own compilation based on the World Bank and GBOS data's

The low economic growth of the Gambia may be associated with high external debt. According to IMF, the Gambia is one of the highly indebted poor countries in the world. As we have seen in figure 3.7 above, the external debt continually at increasing rate since 2007.

3.2.6. Trends of Inflation in the Gambia

In recent years, the Gambia has not recorded significant economic growth due to its poor financial and monetary policies. Inflation remained at a reasonable low level compared to other African countries. The inflation rate in 2004 was 14.3 percent and this rate decreased to 6.2 percent in 2018. The inflation rate, in 2004, adversely affected the welfare of people and affected private investments. As a result, general inflation since June 2005 decreased from 14.3 percent to 5 percent in 2004. In general, inflation is quite low in terms of the history of the Gambia, except for the 2004 period, but inflation is significantly detrimental to the Gambia economy. In order to sustain the rate of inflation at a single digit, the government of the Gambia should put in place tight fiscal and monetary policies. Prices should be lowered to avoid the continues raise of the rate of inflation on consumer goods.

3.9: Trend of Inflation and real GDP growth (1980- 2018)
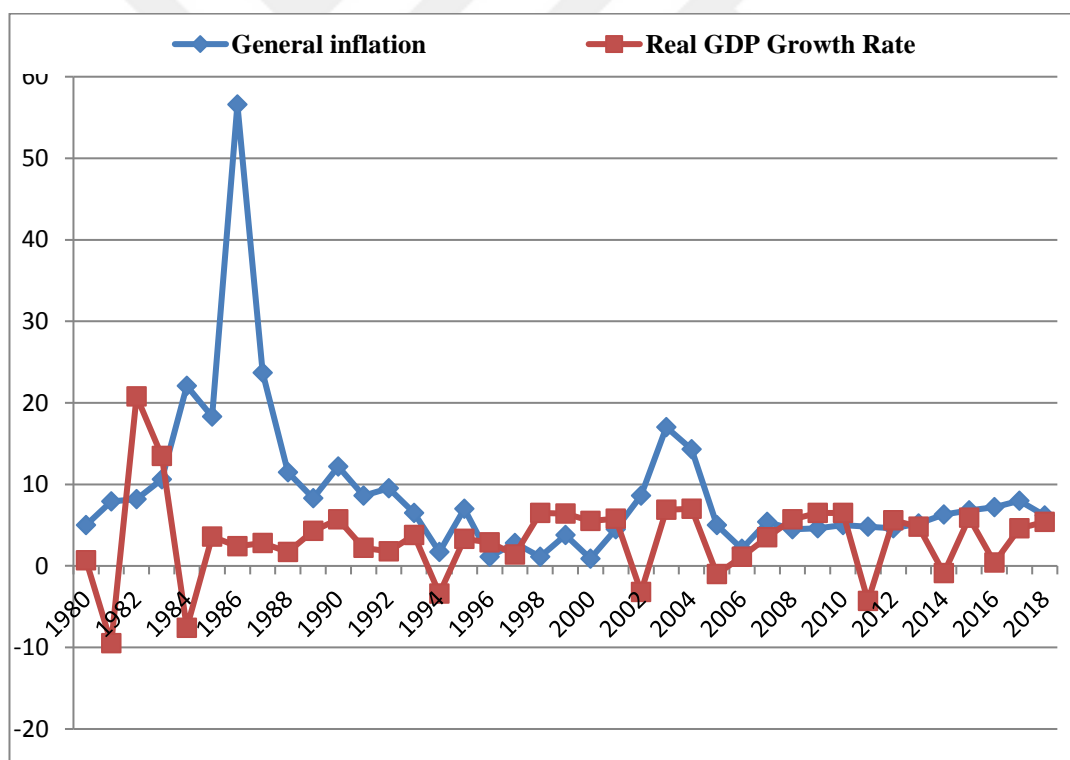
Source: Own computation from World Bank and IMF and CBG data

CHAPTER FOUR
MODEL SPECIFICATION AND METHODOLOGY

4.1. MODEL SPECIFICATION

This chapter presents a simple growth model that seeks to capture some of the major macroeconomic factors affecting economic economic growth in the Gambia. Macroeconomic theory has identified various factors that influence the growth of a country from the classical, neo classical and the new growth theories. These factors include technology, innovation, human capital, natural resources, investment, trade openness, economic policies, foreign aid, foreign direct investment, institutional framework, geography, political factors, socio- cultural factors and many others. Empirical framework that can be applied on a long time frame is required in understanding the determinants and characteristics of economic growth. Most of these factors were considered, in order to examine the empirical evidence of the macroeconomic determinants of economic growth in the Gambia. As discussed in the theoretical literature review, the origin of the econometric model is the extended neo-classical growth model this:

Y= f (Pk, Lf) --- [17]

Where **Pk** and **Lf** represents Physical capital and Human capital respectively.

Following widely the approach of extended neo classical growth model, we specify the economic growth function of the Gambia as follows: Real GDP is a function of physical capital, human capital, export of goods and services, foreign aid, external debt and inflation. Similar studies done by Patrik Enu et al. (2013) and Olawale Oyebanjo (2017) applied similar economic function to analyze the macroeconomic determinants of economic growth in Ghana and Nigeria respectively. Moreover, the variables are preferred based on their relevance and data availability.

The relationship between real GDP and the independent variables is therefore mathematically expressed as :

Y= f(GCF, EHE, EXT, AID, EXD, INF) --- [18]

Researchers convert all the variables that are studied to avoid hetroscedasticity to log data (Gujarati, 2004) and show the flexibility of variables. The growth function of the equation [18] is :

$$\ln Y_t = \beta_0 + \beta_1 \ln GCF_t + \beta_2 \ln EHE_t + \beta_3 \ln EXT_t + \beta_4 \ln AID_t +$$
$$\beta_5 \ln EXD_t + \beta_6 INF_t + \varepsilon$$ -- [19]

Where Y_t represents real GDP at time t; GCF_t represent for physical capital (formally gross investment) at a time t; EHE_t represents for human capital proxies by expenditure on health and education; EXT_t represent for total export; AID_t stand for foreign Aid; EXD_t is for external debt and INF_t stand for general inflation.

The disturbance term ε is assumed to be independently distributed with zero mean and constant variation, which captures all other explanatory variables that influences real gross domestic growth product in a country that are not captured in the model. β_i are the partial elasticity's of real GDP with respect to the macroeconomic variables mentioned above.

4.2. ESTIMATION PROCEDURE

The study use the Autoregressive Distributed Lag (ARDL) Model to test for the long run relationship between the dependent variable (real GDP) and the independent variables (physical capital, human capital, Export, Aid, External debt and Inflation). The time series properties of the data will first be investigated using the Augmented Dickey- Fuller (ADF) and Philip- Perron (PP) tests. The unit root tests will be used to check for the stationarity of the variables and to check if none of the variables are not order two (i.e. I (2)), which is a precondition to apply the ARDL model (Pesaran et al., 2001).

4.3. THE AUTOREGRESSIVE DISTRIBUTED LAG MODEL (ARDL)

To determine the long term relationships between variables of interest, a large number of past studies have used the Engle- Granger causality and Johansen cointegration technique. This remains the technique of choice of many researchers who argue that it is the most accurate method to apply for I (1) variables. However, a series of studies by Pesaran et al. (1999, 2001) and Narayan (2004), have introduced an alternative cointegration technique called ' Autoregressive Distributed Lag (ARDL) bound test. There are numbers of advantages in using ARDL model instead of the conventional Engle- Granger two- step procedure (1987), Maximum likelihood methods of cointegration (Johansen, 1988) and Johansen and Juselius (1990).

First, ARDL model is a more statistically significant approach in determining the cointegration relation in small samples as the case in this study (Pesaran et al., 2001; Narayan, 2004), while large data samples are required for the Johansen co- integration technique for validity. The second advantage of the ARDL approach is that it can be applied whether the regressors are purely order zero I(0), order one I(1) or both while other cointegration techniques require all of the regressors to be integrated at the same order. This means ARDL avoids the pre- testing problems associated with standard cointegration, requiring all variables to be classified into I(1) or I(0) or mixture of both (Pesaran et al., 2001). Thirdly, with the ARDL model it is possible that different variables have different optimal lag numbers, while that is not permitted in Johansen model. Fourthly, another advantage of bound testing approach in the long run and short run parameters of the model in questions are determined simultaneously (Nasiru, 2012 as cited in Tsadkin, 2013). Finally, Applying the ARDL approach we can obtain unbaised and efficient estimators of the model (Narayan, 2004), (Harris and Sollis, 2003; Pesaran, 1995) as cited in Tsadkin 2013.

According to Pesaran *et al*. (2001), the ARDL modelling of unrestricted error correction model using Ordinary Least Square (OLS) can be represent as follows:

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{p} \beta \Delta Y_{t-i} + \sum_{i=1}^{p} \alpha \Delta X_{t-i} + \delta_1 Y_{t-1} + \delta_2 X_{t-1} + U_t \text{ -------------[20]}$$

Where Δ denotes for first difference operation, Y_t is the vector of the dependent variables, X_t is a vector of P determinants of Y_t regressors, U_t is the residual term which is assumed to be a white noise. Basically, the ARDL approach to cointegration (see Pesaran *et al.* 2001) involves estimating of the error correction model (ECM)

version of the ARDL model for the determinants of economic growth:

$$\Delta \ln RGDP_t = \alpha_0 + \sum_{i=1}^{p} \beta_0 \Delta \ln RGDP_{t-i} + \sum_{i=0}^{p} \beta_1 \Delta \ln GCF_{t-i} +$$

$$\sum_{i=1}^{p} \beta_2 \Delta \ln EHE_{t-i} + \sum_{i=1}^{p} \beta_3 \Delta \ln EXT_{t-i} +$$

$$\sum_{i=1}^{p} \beta_4 \Delta \ln AID_{t-i} + \sum_{i=1}^{p} \beta_5 \Delta \ln EXD_{t-i} +$$

$$\sum_{i=1}^{p} \beta_6 \Delta INF_{t-i} + \theta_0 \ln RGDP_{t-1} + \theta_1 \ln GCF_{t-1} +$$

$$\theta_2 \ln EHE_{t-1} + \theta_3 \ln EXT_{t-1} + \theta_4 \ln AID_{t-1} +$$

$$\theta_5 \ln EXD_{t-1} + \theta_6 INF_{t-1} + \cup_t \text{ ------------------------ [21]}$$

Where RGDP is the real GDP at time t, GCF is capital formation (proxies by gross investment), EHE is expenditure on health and education (both recurrent and capital), which is proxy of human capital, EXT is total export of goods and services, AID is foreign Aid, EXD is total external debt and INF is the general inflation rate, u is the residual term, which is assumed to be white noise, **p** is the optimal lag length and **ln** is natural logarithm.

The bound test is mainly based on the joint wald test or F- test which its asymptotics distribution is non- standard under the null hypothesis of no co-integration. The equation for the null hypothesis of non co- integration in the long-run among variables in equation **[22]** is:

$H_0: \theta_0 = \theta_1 = \theta_2 = \theta_3 = \theta_4 = \theta_5 = \theta_6 = 0$ (this means no long run relationship exist among the variables) against the alternative one:

$H_1: \theta_0 \neq \theta_1 \neq \theta_2 \neq \theta_3 \neq \theta_4 \neq \theta_5 \neq \theta_6 \neq 0$. The **F**- test has no standard distribution which depends on (i) whether the variables included in the model are I(0), or I(1), (ii) the number of regressor, and (iii) whether the model contains an intercept and/ or a trend (Narayan, 2004). The existence of long- run relationship among the variables can be estimated by applying OLS. To test the significance of lagged level of the variables under consideration, the appropriate statistics if **F** or wald test as Pesaran *et al.* (2001) proposed for bound test approach will be applied.

According to Pesaran *et al.* (2001), upper critical bound value and lower critical bound value are the two sets of critical value bounds for all classifications of regressors. The critical values for I(1) series are called the upper bound critical values, while the critical values for I(0) series are referred to as lower bound critical values. The null hypothesis of no long- run relationship among variables is rejected if the

calculated **F** statistic is greater than the upper bound critical values. If the calculated **F** statistic is less than the lower bound critical values, we can't reject the null hypothesis rather we accept the null hypothesis of no cointegration among the variables. However, inference is inconclusive if the calculated **F** statistic is between the upper and lower bound critical values and we need to have knowledge on the order of integration of underling variables before we made conclusive inference (Pesaran *et al.*, 2001).

However, in this study we are not going to follow the bound critical value developed by pesaran *et al.* (2001) because the computed critical values are based on large sample size (500 and more). Rather, we will use the critical values developed by Narayan (2004) which was developed based on small sample size between 30 and 80 observations, because of the relatively small sample size in this study of 48 years observation.

If an evidence exist of long- run relationship (cointegration) of the variables, the following long- run ARDL $(P_1, P_2, P_3, P_4, P_5, P_6, P_7)$ model will be estimated.

$$\ln RGDP_t = \alpha_0 + \sum_{i=1}^{p} \beta_0 \ln RGDP_{t-i} + \sum_{i=0}^{p} \beta_1 \ln GCF_{t-i} +$$
$$\sum_{i=1}^{p} \beta_2 \ln EHE_{t-i} + \sum_{i=1}^{p} \beta_3 \ln EXT_{t-i} +$$
$$\sum_{i=1}^{p} \beta_4 \ln AID_{t-i} + \sum_{i=1}^{p} \beta_5 \ln EXD_{t-i} +$$
$$\sum_{i=1}^{p} \beta_6 INF_{t-i} + \varepsilon_t \text{-- [22]}$$

All the variables are previously defined. The orders of the lags in the ARDL Model is selected by either the Akaike Information Criteria (AIC) or the Schwarz Bayesian Criteria (SBC), before the selected model is estimated by ordinary least squares. We use the Akaike Information Criteria (AIC) in the lag selection because of its advantage for small sample sizes (Tsadkhan, 2013) as it is the case in this study. İnorder for us to address the issue of over parameterizations and to save the degree of freedom, the determination of the optimal lag length is so crucial in ARDL model (Taban, 2010) as cited in Tsadkhan (2013). Pesara and Shin (1999) recommend choosing a maximum of 2 lags for annual data. From this, the lag length that minimizes Akaike Information Criteria (AIC) is selected.

In the presence of cointegration, short- run elasticities can also derived by constructing an error correction model of the following form:

$$\Delta \ln RGDP_t = \alpha_0 + \sum_{i=1}^{p} \beta \Delta_0 \, \Delta \ln RGDP_{t-i} + \sum_{i=0}^{p} \beta_1 \, \Delta \ln GCF_{t-i} +$$

$$\sum_{i=1}^{p} \beta_2 \, \Delta \ln EHE_{t-i} + \sum_{i=1}^{p} \beta_3 \, \Delta \ln EXT_{t-i} +$$

$$\sum_{i=1}^{p} \beta_4 \, \Delta \ln AID_{t-i} + \sum_{i=1}^{p} \beta_5 \, \Delta \ln EXD_{t-i} +$$

$$\sum_{i=1}^{p} \beta_6 \, INF_{t-i} + \gamma ECT_{t-1} \text{ ----------------------------------- [23]}$$

Where, ECT_t is the error correction term, Δ is the first difference operator; $\beta's$ are the coefficients relating to the short- run dynamics of the model's convergence to equilibrium, and γ measures the speed of adjustment.

4.4. UNIT ROOT TEST

When dealing with time series data, unit root test is fundamental to test for the statistical properties of variables. Time series data are rarely stationary[8] in level forms. Regression involving non- stationary (I.e., variables that have no clear tendency to return to a constant value or linear trend) time series often lead to a spurious regression problem[9]. This happens when no relationship exist but the regression results show a high and significant relationship among variables. Moreover, Stock and watson (1988) have also shown that the usual test statistics (t, F, DW, and R2) will not posses standard distribution if some of the variables in the model have unit root. The other condition necessary for testing unit root test is to check whether the variables enter in the regression are not order two (I.e. I(2) when applying ARDL model, which is a precondition in ARDL model. Therefore, before running any sort of regression analysis it is necessary to test for the time series variables.

Unit root test was performed to check the stability of the examined variables. Augmented Dickey-Fuller (ADF) test, Phillips Perron (PP) test and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test are used for stability testing. However, the study uses both Augmented Dickey-Fuller (ADF) and Phillips Perron (PP) tests to ensure a

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[8] A type of stochastic process that has received a great deal of attention and scrutiny by time series analysts is the so- called **stationary stochastic progress.** Broadly speaking a stochastic process is said to be stationary if its mean and variance are constant over time and the value of the covariance between the two time periods depends only on the distance or gap or lag between the two periods and not the actual time at which the covariance is computed (Gujarati, 2004)

[9] Spurious regression is a regression result of un related variables but strongly related as per the result

reliable outcome of the stability test. All the variables should be integrated at order one and non should be integrated at order two when applying ARDL model.

The testing procedure for the ADF unit root test is specified as follows:

$$\Delta Y_t = \alpha + \delta t + \gamma Y_{t-1} + \sum_{i=1}^{p} \lambda \Delta Y_{t-i} + \varepsilon_t \text{ --[24]}$$

Where Y_t is a time series variable under consideration in this model at time t, t is a time trend variable; Δ denotes the first difference operator; ε_t is the error term; **p** is the optimal lag length of each variable chosen such that first- differenced terms make ε_t a white noise. Thus, the ADF test the null hypothesis of no unit root (stationary).

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

The null hypothesis (I.e. H_0) is rejected, if the t value or t- statistic is more negative than the critical values and the conclusion is that the series is stationary. Conversely, the null hypothesis is accepted, if the t- statistic is less negative than the critical values and the conclusion is that the series is non- stationary.

4.5. DATA SOURCE AND VARIABLE DESCRIPTION

Real GDP (Y) is the market value of the goods and services produced by an economy over time. It is measured conventionally as the percent rate of increase in real Gross Domestic Product. Since most economists argue that economic growth can be measured as growth in real GDP, it includes in the model as main dependent variable in order to measure economic growth.

Physical capital accumulation (GCF) is defined as Gross capital formation (formerly gross investment) in a country. However, is is difficult to get such a ready-made time series data in the Gambia. Therefore in this study, gross investment was used as a proxy of this variable and have been expected a positive impact on economic growth.

Human capital (EHE) it is difficult to measure human capital in economics. As a result researchers use different proxy of human capital (I.e. school enrollment like primary, secondary and tertiary level; labor force age group from 15 up to 65; life expectancy; literacy rate; expenditure to education and health to indicate as major determinants of economic growth in long term. Therefore the expenditure of health

and education has been used in this study as proxy of human capital and the sign of the coefficient would be expected positive.

Exports of goods and service (EXT) are defined as the exports of good and services to the rest of the world. Export of a country is believed to be one of the macroeconomic determinants of economic growth, for this reason and due to researcher's interest this variable is entered as explanatory in order to analyze its effect on the Gambian economic growth. The expected sign of this variable is expected to be positive.

Foreign Aid (AID) is defined as aid inflows from external assistance. As we know the Gambia is one of the poor countries in the world. As a result the Gambia is getting from external assistance in the form of aid. The variable is chosen as one of the explanatory variables in order to see its effect on the economic growth of the Gambia and expected to have a positive sign.

External Debt (EXD) is defined as net incurrence of government liabilities. The Gambia is financially challenged in financing its mega projects. For this reason the external debt of the Gambia will keep increasing. As a result, its is the interest of researcher's to include in this study in order to analyze its effect on economic growth and would be expected to have a negative sign.

General Inflation (INF) inflation is defined as an increase in the overall price level in a country and measured in percent. In the Gambian history inflation is a problem of economic growth. Therefore to analyze its effect on economic growth, it is the interest of the researcher's, which is included in this study as independent variable. The coefficient of this variable would be expected a negative sign.

This study used annual secondary data from 1970 to 2018 sourced from the World Bank Indicators (WBI), International Monetary Fund (IMF), Central Bank of the Gambia (CBG), Africa Development Bank (AFDB) and the Gambia Bureau of Statistics (GBOS).

4.6. METHODS OF DATA ANALYSIS

During the study period, tables and charts are used to analyze the macroeconomic performance of the Gambia. Standard econometric packages such as STATA 13, E-views 10.0 and Micro-fit 5.5 versions are the econometric software observed in the analysis of the variables used in this study. The econometric packages were used simultaneously to provide an accurate analysis of the variables and the results in one software is compared to the results from another software to improve on the accuracy of the results.

CHAPTER FIVE
RESULTS AND DISCUSSIONS

5.1. THE UNIT ROOT TEST ANALYSIS

Unit root test is used to test for the stationarity of the variables. The standard unit root tests like the Augmented Dickey- Fuller (ADF), Phillips- Perron test statistic (PP) and the Break- Point test statistic (BP) test are used in the test. Unit root test is performed to check that the variables are integrated at order one and non should be integrated at order two, which is a precondition in applying ARDL model..

Table 5.1: Unit root test (Augmented Dickey- Fuller test)

Variable	With Intercept			Trend and Intercept		
	At level	At First Difference	Order of []	At level	At First Difference	Order of []
LRGDP	- 8.802	-5.813	**I[0] at 1%**	-8.807	-5.737	**I[0] at 1%**
LGCF	-2.023	-6.620	**I[1] at 1%**	-2.139	-6.890	**I[1] at 1%**
LEHE	-1.188	-7.173	**I[1] at 1%**	-2.528	-7.069	**I[1] at 1%**
LEXT	-5.051	-4.488	**I[0] at 1%**	-4.942	-4.384	**I[0] at 1%**
LAID	-4.259	-7.102	**I[0] at 1%**	-5.165	-7.006	**I[0] at 1%**
LEXD	-3.725	-5.891	**I[0] at 1%**	-3.857	-5.786	**I[0] at 5%**
INF	-3.774	-2.618	**I[0] at 1%**	-3.537	-2.378	**I[0] at 5%**
MacKinnon (1996) with constant, no trend				With constant and trend		
	1% level		-3.621		1% level	-4.227
Test critical values:	5% level		-2.943	Test critical	5% level	-3.537
	10% level		-2.610	Values :	10% level	-3.200

Source: Eview 10.0 result

As can be seen from table 5.1 above, GDP (LRGDP), export (LEXT), foreign aid (LAID), external debt (LEXD) and inflation (LINF) are integrated at order zero (i.e. I(0)) while capital formation (LGCF) and human capital (LEHE) are integrated of order one (I(1)). Meaning GDP (LRGDP), export (LEXT), foreign aid (LAID), external debt (LEXD) and inflation (LINF) are integrated at level where as capital formation (LGCF) and human capital (LEHE) are stationary in first difference (trend and intercep). Also with intercept, all variables are stationary at level except capital formation (LGCF) and human capital (LEHE).

Table 5.2: Unit root test (Phillips-Perron test statistic test)

Variable	With Intercept			Trend and Intercept		
	At level	At First Difference	Order of []	At level	At First Difference	Order of []
LRGDP	-7.342	-18.070	**I[0] at 1%**	-12.539	-19.981	**I[0] at 1%**
LGCF	-1.972	-6.620	**I[1] at 1%**	-2.025	-6.913	**I[1] at 1%**
LEHE	-1.003	-7.376	**I[1] at 1%**	-2.499	-7.257	**I[1] at 1%**
LEXT	-5.753	-16.885	**I[0] at 1%**	-5.769	-17.522	**I[0] at 1%**
LAID	-4.346	-23.874	**I[0] at 1%**	-5.234	-27.017	**I[0] at 1%**
LEXD	-2.468	-5.893	**I[1] at 1%**	-2.845	-5.782	**I[1] at 1%**
INF	-3.357	-10.629	**I[0] at 5%**	-3.803	-10.305	**I[0] at 5%**

MacKinnon (1996) with constant, no trend			With constant and trend		
	1% level	-3.616		1% level	-4.226
Test critical values:	5% level	-2.941	Test critical	5% level	-3.533
	10% level	-2.609	Values :	10% level	-3.198

Source: Eview 10.0 result

Similary, the PP test shows that there is a mixture of integration order zero I(0) and order one I(1). That is GDP, export, foreign aid and inflation are stationary at level while capital formation, human capital and external debt are stationary at first difference (with intercept only). With trend and intercept GDP, export, foreign aid and inflation are stationary at level while capital formation, human capital and external debt are stationary at first difference.

Table 5.3: Unit root test (Break- Point test statistic test)

Variable	With Intercept			Trend and Intercept		
	At level	At First Difference	Order of []	At level	At First Difference	Order of []
LRGDP	-11.329	-16.725	**I[0] at 1%**	-11.245	-13.663	**I[0] at 1%**
LGCF	-2.913	-7.687	**I[1] at 1%**	-5.261	-6.913	**I[1] at 1%**
LEHE	-3.902	-7.376	**I[1] at 1%**	-3.791	-7.635	**I[1] at 1%**
LEXT	-6.240	-10.656	**I[0] at 1%**	-6.691	-10.726	**I[0] at 1%**
LAID	-11.338	-13.815	**I[0] at 1%**	-7.413	-13.128	**I[0] at 1%**
LEXD	-3.614	-7.174	**I[1] at 1%**	-3.626	-6.967	**I[1] at 1%**
INF	-10.281	-8.629	**I[0] at 5%**	-9.832	-10.539	**I[0] at 5%**
MacKinnon (1996) with constant, no trend				With constant and trend		
	1% level		-4.949		1% level	-5.719
Test critical values:	5% level		-4.444	Test critical	5% level	-5.176
	10% level		-4.194	Values :	10% level	-4.984

Source: Eview 10.0 result

The break- even point test further support the results of the ADF and PP test. The results indicates that all the variables are integrated at order one and non of the variables is integrated at order two.

From table 5.1, 5.2 and 5.3 above, we can conclude that none of the variables entered in the regression is integrated at order two, which is not desired in applying ARDL model. So as proposed by Pesaran *et al.* (2001) ARDL cointegration technique is the most appropriate method for estimation or to check the long run relationship among variables.

5.2.   MODEL STABILITY AND DIAGNOSTIC TEST

In order to check the verifiability of the estimated long run model, some diagnostic test is undertaken. As a priority in doing any analysis, it is required to check the standard property of the model. In this study we carried a number of model stability and diagnostic checking, which includes Serial correlation test (Brush & Godfray LM test). Functional form (Ramsey's RESET) test, Normality (Jaque- Bera test), and Hetroscedasticity test. In addition to the above diagnostic tests, the stability of the long run estimates has been tested by applying the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) test. Such tests are recommended by Pesaran et al. (2001). The decision to reject or accept the null hypothesis can be by looking at the p-values associated with the test statistics. That is the null hypothesis is accepted when the p-value is higher than the standard significance level (I.e. 5%) and the null hypothesis is rejected if the p-value is smaller than the standard significance level of 5%.

Table 5.4: Diagnostic test for the Long run ARDL (2, 0, 2, 1, 2, 0, 2)

Test Statistics	LM Version	F Version
A: Serial Correlation	CHSQ(1)= .6503 [.420]	F(1, 22)= .3831 [.542]
H_0: No Serial Correlation		
B: Functional Form	CHSQ(1)= 1.6743 [.196]	F(1, 22)= 1.0140 [.325]
H_0: No omitted variables bias		
C: Normality	CHSQ(2)= .8313 [.660]	Not applicable
H_0: Residuals are normally distributed		
D: Hetroscedasticity	CHSQ(1)= .4503 [.502]	F(1, 36)= .4318 [.515]
H_0: No Hetroscedasticity		
	$R^2 = 0.900$ $\bar{R}^2 = 0.839$ DW= 2.17	

A: Lagrange multiplier test of residual serial correlation

B: Ramsey's RESET test using the square of the fitted values

C: Based on a test of skewness and kurtosis of residuals

D: Based on the regression of squared residuals on squared fitted values

Source: Microfit 5.5 result

The table above indicates that the long run ARDL model estimated in this study passes all the diagnostic tests. This is because the p-value associated with both the LM version and the F version of the statistic was unable to reject the null hypothesis specific to each test. Therefore based on the result of the test:

A. We failed to reject the null hypothesis of no serial correlation (Brush & Godfray LM test), this is because the p-values associated with the test statistic is greater than the standard significance level (I.e. 0.420> 0.05). The LM test for testing serial correlation is applied because unlike the traditional Durbin Watson test statistic which is totally inapplicable when the lagged dependent variable appear as a regressors, LM test avoid such limitation of DW test.

B. The null hypothesis for Ramsey's RESET test could not be rejected, which tests whether the model suffers from omitted variables bias or not. The test result indicates that we cannot reject the Ramsey's test, which means that the model is correctly specified.

C. The residual test is the third diagnosis test. From the results we could not reject the null hypothesis which says that the residuals are normally distributed, for that reason, that the p-value associated with the Jaque-Berra normality test is larger than the standard significance level (I.e. 0.660> 0.05).

D. Hetroscedasticity test is the last diagnostic test. As can be seen from the table above, we can reject the null hypothesis at 5% significant level as the p-value associated with the test statistics are greater than the standard significance level (I.e. 0.502> 0.05).

Moreover, the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of square of recursive residuals (CUSUMSQ) tests are used to detect the stability of the model for long run and short run relationship. The test finds serious parameter instability if the cumulative sign goes outside the area (never returns back) between the two critical lines.

Figure 5.1: Testing parameters stability using CUSUM and CUSUMSQ test

Plot of Cumulative Sum of Recursive Residual (A)
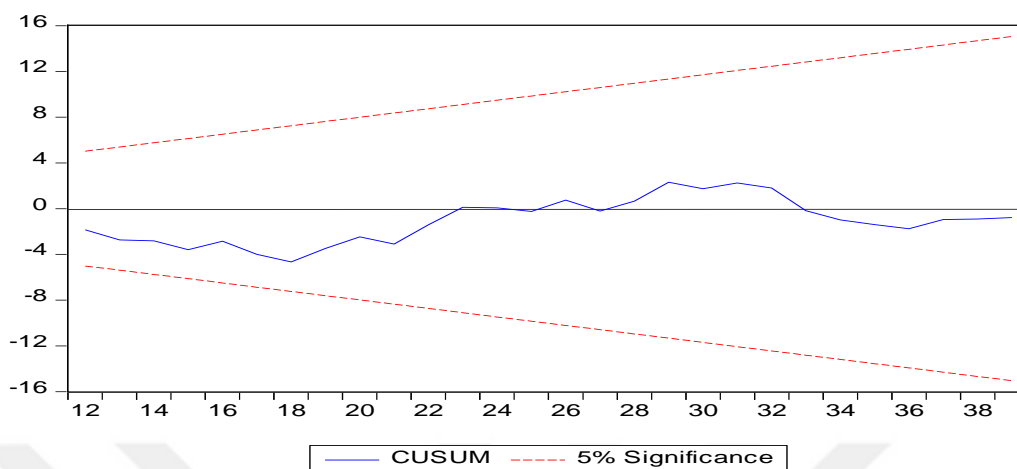
Plot of Cumulative Sum of Squares of Recursive Residual (B)
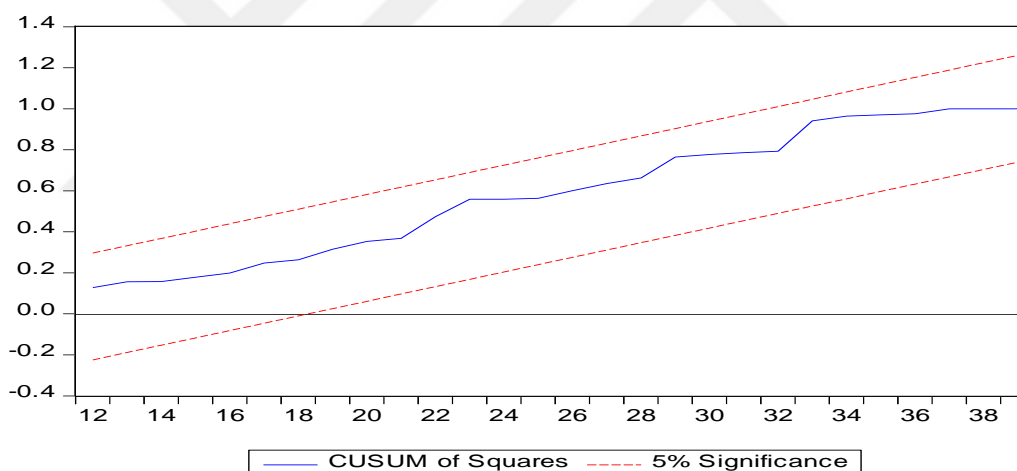
As can be seen from the first figure, the plot of CUSUM test did not cross the critical limits. Similarly, the CUSUMSQ test shows that the graphs do not cross the lower and upper critical limits. So, we can conclude that the long run estimates are stable and there is no structural break. In addition to the stability of the model 99.7 percent of the model have been explained by the regressors. Hence the results of the estimated model are reliable and efficient.

5.3. LONG RUN ARDL BOUNDS TESTS FOR CO-INTEGRATION

After determining the stationary nature of the variables, the next task is the bounds test approach of cointegration in estimating the ARDL model specified in equation (23) using an appropriate lag-length selection criteria. According to Pesaran and Shine (1999), as cited by Narayan (2004) it is recommended to use a maximum of two lag lengths for annual data. From this, a lag lenth that minimize AIC is 2. In addition, AIC was used to determine the optimal lag because it is a better choice for smaller sample size as this study. Apart from that, AIC is also found to produce the least probability of under estimation among all criteria available (Liew et al., 2004) as cited in Tsadkhan (2013).

As discussed earlier on in this study, the F- test through the Wald test (bound test) is performed to check the join significance of the coefficients specified in equation (23). The Wald test is conducted by imposing restrictions on the estimated long run coefficients of real GDP, gross capital formation, human capital, export, foreign aid, external debt and inflation. The computed F- statistic value is compared with the lower and upper bound critical values provided by Pesaran *et al.* (2001) and Narayan (2004). The null hypothesis of no cointegration will be rejected if the F- statistic is higher than the upper bound critical value. We will fail to reject the null hypothesis of no cointegration if the F- statistic is lower than the lower bound critical value.

Table 5.5: Calculated F- Statistic

Lag Length	Value of calculated F- statistic
2	18.414 [0.000]

Source: Microfit 5.5 result

As can be seen from table 5.4 above , the calculated F- statistic is strongly significant at 1 percent significant level. We now compare the computed F- statistic value with the lower bound and upper bound critical values to determine the nature of cointegration as provided by Pesaran *et al.* (2001) and Narayan (2004).

Table 5.6: The Upper and Lower critical values

Critical value	Pesaran *et al*. (2001)		Narayan (2004)	
	Lower bound value	Upper bound value	Lower bound value	Upper bound value
1 percent	5.15	6.36	4.770	6.333
5 percent	3.79	4.85	3.435	4.523
10 percent	3.17	4.14	2.833	3.730

Source: Pesaran *et al.* (2001) and Narayan (2004) critical values

The critical values reported for Pesaran *et al.* (2001) are the case with unrestricted intercept and no trend. We have used Narayan (2004) in this study which is developed based on 30 to 80 observations as we earlier discussied in this study. As seen in Table 5.4 and 5.5 above, with intercept and trend the calculated F- statistics (18.414) is higher than both the Pesaran *et al.* (2001) and Narayan (2004) upper bound critical values at 1% significance level. This implies that the null hypothesis of no long- run relationship is rejected, rather we accept the alternative hypothesis (there is long- run relationship) based on the Pesaran *et al.* (2001) and Narayan (2004) critical values at 1% significance level. Therefore, we can conclude that there is cointegration relationship among the variables in the long run.

5.4. LONG RUN ARDL MODEL ESTIMATION

Since we jointly confirm cointegration, we now use the ARDL model in order to estimate the long run coefficients. The long run estimate is done differently in the two different political regimes and a joint estimate will also be done. This is because there exist a structural break between the two regimes that the study is mainly focused on.

Table 5.7: Estimated Long Run Coefficients using the ARDL Approach

ARDL (2, 0, 2, 1, 2, 0, 2) selected based on Akaikae Information Criterion from the period 1970 to 1993.

Dependent variable is LRGDP			
Regressors	Coefficient	Standard Error	T- Ratio [Prob]
LGCF	0.0012	0.0224	0.0536 [0. 655]
LEHE	0.0015	0.0814	0.0184 [0.783]
LEXT	0.1378***	0.0356	3.8724 [0.000]
LAID	0.0102	0.0596	0.1695 [0.902]
LEXD	-0.0705***	0.0186	-3.7905 [0.001]
INF	-0.0253***	0.0076	-3.3504 [0.004]
C	2.1302	0.5014	4.0487 [0.000]

Note: *** denotes significance at 1% which indicates rejection of null hypothesis at 1%

Source: Microfit 5.5 result

As the long run estimated result of the table above showed, the gross capital formation which is proxied by gross investment has a positive effect on the Gambian economic growth but it is statistically insignificant at 1 percent significance level. This is because investment was low during the first regime leading to its insignificant effect on economic growth. Gross capital formation coefficient (GCF) is 0.0012. This shows that any percentage change in gross capital formation, keeping all other conditions constant brings about 0.0012 percent change in real GDP in the long run during the study period.

The result found that human capital which is proxied by total expenditure on health and education has a positive impact on the economic growth of the Gambia in the long run but it is not significant at the one percent statistical significance level. This is because during the period expenditure in the health and education sector has been low resulting to a lower level of human capital growth. From the results, holding

all other conditions constant human capital which is proxied by total expenditure on health and education leads to 0.0015 percent growth of real GDP for every one percent increase.

According to the above results, total export of goods and services have a positive impact on the economic growth of the Gambia and are statistically significant at a significance level of one percent. The result may be related to agricultural productivity, since agriculture is the main driving force of the Gambian economy and it is a major part of the export of the country from agricultural products. These results, is in parallel with the research conducted by Sanyang, Muhammed L. (2018), indicated that the export of goods and services had a positive effect on the economy of Gambia and was statistically significant.

Although, Foreign aid is not statistically significant at the 1 percent significant level but it has a positive impact on the growth of the Gambian economy. There is a reason in my opinion that might lead to the insignificance result. Most of the foreign aid inflows are mainly used for consumption rather than investment, which is a pillar of economic growth as it accelerates growth. Since consumption does not add any impact on economic growth the insignificance will happen. Foreign aid should be used to finance investment projects that will help in accelerating the growth cycle of the Gambian economy.

According to the findings of this study, it was found that the debt burden was negatively correlated with real GDP but was statistically significant at 1% significance level. The Gambia is one of the poorest and indebted countries in the world and has a lot of debt hanging around its neck. As a result, keeping all other conditions constant, an increase in external debts, leads to an decrease of 0.0705 in real GDP. The low level of domestic savings may lead to the negative impact of external debt on the Gambian economy. The government will need to borrow from different external sources to finance government projects. As a result, due to the increase in debt burden, the government will be forced to increase taxes to service the debt burden and to maintain state spendings.

The effects of inflation are statistically significant at the 1% significance level but inflation has a negative impact on the economic growth of the Gambia. This is due to the fact that inflation in the Gambia was relatively high during the first

regime. The results of this study showed that 1 percent increase in inflation led to a decrease of 0.0253 percent in the growth of the Gambian economy. The study also revealed that inflation did significantly damage the Gambian economy during the first regime.

Table 5.8: Estimated Long Run Coefficients using the ARDL Approach

ARDL (2, 0, 2, 1, 2, 0, 2) selected based on Akaikae Information Criterion from the period 1994 to 2017.

Dependent variable is LRGDP			
Regressors	Coefficient	Standard Error	T- Ratio [Prob]
LGCF	0.0115	0.1552	0.0741 [0. 495]
LEHE	0.0248***	0.0076	3.2791 [0. 001]
LEXT	0.1135***	0.0309	3.6712 [0.000]
LAID	0.0023	0.0494	0.0466 [0.570]
LEXD	-0.0841***	0.0250	-3.3623 [0.000]
INF	-0.0012	0.0521	-0.0230 [0.972]
C	3.3521	0.6173	5.4304 [0.000]

Note: *** denotes significance at 1% which indicates rejection of null hypothesis at 1%

Source: Microfit 5.5 result

As shown in Table 5.7, all variables in the regression have the expected markings despite their importance. As stated in the literature review section, while the physical capital, human capital, export and foreign aid variables have a positive effect on the growth of the Gambia economy, the importance of external debt and inflation negatively affect the economic growth of the Gambia.

The results indicates that in the long run gross investment which is a proxy of gross capital formation has a positive effect on the growth of the Gambian economy dispite it has a statistically insignificant effect at 1 percent significance level. As stated

by Keynesian gross capital formation is a major determinant of economic growth and that has been confirmed by the empirical results in the table above.

Gross capital formation coefficient (GCF) is 0.0127. This shows that any percentage change in gross capital formation, keeping all other things fixed in the long term, brings about 0.0127 percent change in real GDP during the study period.

The result found that human capital which is proxied by total expenditure on health and education has a positive impact on the economic growth of the Gambia in the long run and it is significant at the one percent statistical significance level. The findings of the study is in line with the endogenous growth theory which states that an improvement in human capital will lead to the growth of total factor productivity. From the results, holding all other conditions constant human capital which is proxied by total expenditure on health and education leads to 0.0327 percent growth of real GDP for every one percent increase.

According to the above results, total export of goods and services have a positive impact on the economic growth of the Gambia and are statistically significant at a significance level of one percent. The result may be related to agricultural productivity, since agriculture is the main driving force of the Gambian economy and it is a major part of the export of the country from agricultural products. These results, is in parallel with the research conducted by Sanyang, Muhammed L. (2018), indicated that the export of goods and services had a positive effect on the economy of Gambia and was statistically significant.

Although foreign aid is statistically insignificant at the 1 percent significant level but it has a positive impact on the growth of the Gambian economy. There is a reason in my opinion that might lead to the insignificance result. Most of the foreign aid inflows are mainly used for consumption rather than investment, which is a pillar of economic growth as it accelerates growth. Since consumption does not add any impact on economic growth the insignificance will happen. Foreign aid should be used to finance investment projects that will help in accelerating the growth cycle of the Gambian economy.

There is an excellent sign of debt that reduces economic growth. According to the findings of this study, it was found that the debt burden was negatively

correlated with real GDP but was statistically significant at 1% significance level. The Gambia is one of the poorest and indebted countries in the world and has a lot of debt hanging around its neck. According to the findings of the study. As a result, keeping all other conditions constant, an increase in external debts, leads to an decrease of 0.0918 in real GDP. The low level of domestic savings may lead to the negative impact of external debt on the Gambian economy. The government will need to borrow from different external sources to finance government projects. As a result, due to the increase in debt burden, the government will be forced to increase taxes to service the debt burden and to maintain state spendings.

Although the effects are statistically insignificant, inflation has a negative impact on the economic growth of the Gambia. This is due to the fact that inflation in the Gambia remains relatively low in the history of the country. The results of this study showed that 1 percent increase in inflation led to a decrease of 0.0012 percent in the growth of the Gambian economy. The study also revealed that inflation did not significantly damage the Gambian economy during the period.

After analysing the long run estimate of the period 1970 to 1993 and 1994 to 2017, we now analyse the join long run estimate from the period 1970 to 2018. This will enable policy makers and other researchers to better understand the growth path of the Gambian economy. The two political regimes that has been analyzed in the study used different economic approaches and market systems thereby creating a structural break in analysing the overall performance of the economy from 1970 to 2018.

Table 5.9: Estimated Long Run Coefficients using the ARDL Approach

ARDL (2, 0, 2, 1, 2, 0, 2) selected based on Akaikae Information Criterion from the period 1970 to 2018.

Dependent variable is LRGDP			
Regressors	Coefficient	Standard Error	T- Ratio [Prob]
LGCF	0.0127	0.0564	0.2251 [0. 495]
LEHE	0.0327* * *	0.0103	3.1782 [0. 001]
LEXT	0.1309* * *	0.0362	3.6194 [0.000]
LAID	0.0119	0.0135	0.8836 [0.386]
LEXD	-0.0918* * *	0.0267	-3.4410 [0.000]
INF	-0.0023	0.0646	-0.0352 [0.972]
C	3.5060	0.3496	10.0287 [0.000]

Note: *** denotes significance at 1% which indicates rejection of null hypothesis at 1%

Source: Microfit 5.5 result

As discussed in the theoretical and empirical literature parts, physical capital, human capital, exports of goods and services, foreign aid have positive effect on the Gambian economic growth while external debt and inflation have a negative impact on the Gambian economic growth regardless of significance.

As the long run estimated result of the table above showed, the gross capital formation which is proxied by gross investment has a positive effect on the Gambian economic growth but it is statistically insignificant at 1 percent significance level.

This result is in consistence with the theory of economic growth which states that gross capital formation is a major determinant of economic growth (Keynesian theory of growth, solow's theory of growth). Moreover, the result of this study is also in consistence with the study of Biswas and Saha (2014) in India, Iqbal and Zahid (1998) in Pakistan, Ndambiri H.K. *et al*, (2012) and Patrick Enu *et al.* (2013) in Africa, Weeks et al. (2014) and Tadese (2011) in Ethiopia, and Sanyang, Muhammed L.

(2018) in the Gambia.

Since we have specified the growth model in a log- linear form, the coefficients can be interpreted as elasticity with respect to real GDP. The coefficient of gross capital formation (GCF) is 0.0149. This indicates that, holding all other things constant, in the long run, a one percent change in gross capital formation which is a proxy of gross investment brought 0.0149 percent change to real GDP during the study period.

Human capital which is proxied by expenditures on health and education has a long run impact on growth of the Gambian economy and statistically significant at 1 percent significance level. The findings of this research concerning the long run positive impact on the human capital on the Gambian economic growth, are in line with the endogenous growth theories (mainly developed by Lucas (1988), Romer (1990)) which argue that improvement in human capital (skilled and healthy workers) leads to productivity improvement that enhances output. Additionally, this research is similar with the results found by Haldar and Mallick (2008), Ndambiri H.K *et al*. (2012) and Tadesse (2011). As a result holding all other conditions constant a one percent increase in human capital which is proxied by expenditure on health and education has resulted in 0.0402 percent change in real GDP under the study period.

The result of this research revealed that the impact of total export of good and services on the Gambian economic growth during the study period, though the relationship is positive and statistically significant. The significant result might be associated with agriculture primary product (as we discussed earlier on, a large percent of import level in the country comes from agricultural primary product), which suffered from international price shock. Huge resource gap might lead to the insignificance but that those not affect the Gambia, which indicates that export of goods and services have a significant effect on the Gambian economic growth. Moreover, this result is in line with the research conducted in the Gambia by Sanyang, Muhammed L. (2018), he found that, total exports of goods and services was significant on the Gambian economic growth and there exist a positive impact between economic growth and export volatility.

From table 5.9 above foreign aid has a positive impact on the Gambian economic growth. But it is statistically insignificant during the study period, which is

in consistent with the study of E.M. Ekanayake and Dasha Chatrna (1980- 2007) conducted in 85 developing countries including Africa. An empirical result provided in the literature review also report a mixed results. In my opinion, there might be two possible reasons behind the insignificant result. In the first case, the inflow of foreign aid might be used to finance consumption than investment, which is used to accelerating economic growth. If so, it will not have any impact on economic growth because consumption does not add value to macroeconomic growth. The second reason behind the insignificance may be associated with the data inconsistency, which we took from two organization (World Bank and IMF) to solve the problem of no long time series data availability for this variable only.

The debt burden, which is measured by total external debt has a negative relationship with real GDP and statistically significant at 1 percent significance level. The result indicates the existence of debt overhang problem in the country during the study periods and the Gambia is one of the highly indebted poor countries in the world as IMF (2018) stated. Moreover, this result is in line with the findings of IMF (2017) working paper for 93 developing countries, Boboye *et al.* (2013) for Nigeria, Hailemariam (2011), Teklu *et al.* (2014) and Wessene (2014) for Ethiopia. The result showed that a one percent increase in external debt will result in 0.0918 percent decline in real GDP during the study periods. In my opinion, the negative impact of external debt on economic growth might be linked to the low domestic saving rate in the country. As a result, to finance government investment especially for mega projects, the Gambia government will borrow from different external financial institutions and governments. This goes to imply that the government with heavy debt burden may be forced to increase taxes in the future in order to pay to service her debt and maintaining government expenditures.

As showed in table 5.6 above, general inflation has a negative impact on the Gambian economic growth, even though statistically insignificant. In the Gambia's history, inflation remained at a reasonable low level rate. The significant effects of inflation on the Gambian economic growth might be associated with the reasonable high level inflation rate until 2005 as we discussed in chapter three of this study. From the descriptive and econometric result we can understand that inflation does harm the economic growth of the Gambia significantly for the study period. The result of this

study indicates that 1 percent increase in inflation leads to 0.0023 decline in economic growth during the period under study.

5.5. SHORT RUN ERROR CORRECTION MODEL

The short- run ECM model is estimated after accepting the long- run coefficients of the growth equation. The error correction term (ECM), as discussed earlier, indicated the speed of adjustment to restore equilibrium in the dynamic model. It is a one lagged period residual obtained from the estimated dynamic long run model. The coefficient of the error correction term indicates how quickly variables coverge to equilibrium. Moreover, it should have a negative sign and statistically significant at a standard significant level (I.e. p-value should be less than 0.05).

Table 6.0: Error Correction Representation for the Selected ARDL (2, 0, 2, 1, 2, 0, 2) selected based on Akaike Information Criteria from the period 1970 to 1993

Dependent variable is LRGDP			
Regressors	Coefficient	Standard Error	T- Ratio [Prob]
dLGCF	0.0175* * *	0.0057	3.0942 [0. 023]
dLEHE	0.0163* * *	0.0060	2.7309 [0.022]
dLEHE1	0.0272* * *	0.0082	3.3342 [0.012]
dLEXT	0.1254* *	0.0343	3.6521 [0.010]
dLAID	-0.0176* * *	0.0067	-2.6219 [0.021]
dLAID1	-0.0161* * *	0.0063	-2.5476 [0.043]
dLEXD	-0.0152* * *	0.0373	-2.4075 [0.015]
dINF	0.0341* * *	0.0096	3.5379 [0.001]
dINF1	0.2001*	0.0437	4.5789 [0.000]
ecm (-1)	-0.9100*	0.1275	-7.1371 [0.000]
R- Squared = 0.9921		R- Bar- Squared = 0.9485	
F- stat. F (6, 7) = 41.7818 [0.000]		DW- statistic = 2.7970	

Note: ***, **, * denotes statistical significance at 1%, 5% and 10% respectively.

Source: Microfit 5.5 result

The result have the perfect ECM significance level of -0.9100 with the correct negative sign. -0.9100 indicates the speed of adjustment to equilibrium and it also confirm the stability of the long run relationship. From the table above it can be noted that the deviation from the long run equilibrium level of real GDP is corrected by 91% in the next period to get back to the equilibrium level.

About 99% of the variation in the real GDP is as a result of the variations in the independent variables in the model denoting that the coefficient of determination (R- squared) is high. Furthermore, autocorrelation does not exist as seen from the value of the DW statistic and the F-statistic show robust.

The ECM revealed the long- run effect of the model. In that regard, the explanatory variables granger cause real GDP showing an undirectional causality. Nevertheless, granger causality is not require when applying the ARDL model since endogenity problem is considered in the model.

From the results above physical capital (GCF) which is a proxy of gross investment has a siginificant effect on economic growth unlike the long run estimate that exhibit an insignificant efffect.

From the above table 6.0, human capital (GCF) has a positive impact on the economic growth of the Gambia in the short- run, where health and education expenditures are fully emphasized, and its impact is statistically significant in both 1 percent and 10 percent levels of significance. This result is not similar to the long-run estimates were an insignificant effect was revealed. As a result, in the short- run, keeping all other conditions constant, a one percent increase in physical capital led to a 0.0163 percent increase in real GDP.

Unlike the long run estimate, foreign Aid has a negative effect on economic growth in the short run but it is statistically significant at the 1% level of significance. The result revealed that holding all other conditions constant a percentage increase in foreign aid will decrease real GDP by 0.0176 percent.

As in the long- run, there is still a significant positive effect in the short- run between export of goods and services and real GDP. The result is in line with the findings of previous studies that found positive correlation between exports and GDP.

Just like the long- run estimates external debt has a negative effect on the growth of the Gambian economy and its effect is statistically significant at the 1% level of significance leading to a decrease of 0.0152 of real GDP at every percentage increase.

From the result above, with a positive relationship, inflation does significantly effect economic growth during the period under study. It can be seen that in the short- run general inflation rate have a significant effect on the economic growth of the Gambia.

Table 6.1: Error Correction Representation for the Selected ARDL (2, 0, 2, 1, 2, 0, 2) selected based on Akaike Information Criteria from the period 1994 to 2017

Dependent variable is LRGDP			
Regressors	Coefficient	Standard Error	T- Ratio [Prob]
dLGCF	0.0257* * *	0.0123	2.0917 [0. 021]
dLEHE	1.5540*	0.3292	4.7203 [0.000]
dLEHE1	1.1202*	0.2528	4.4317 [0.013]
dLEXT	0.0773* *	0.0301	2.5716 [0.025]
dLAID	-0.0082	0.0061	-1.3519 [0.732]
dLAID1	-0.0073	0.0055	-1.3202 [0.710]
dLEXD	-0.0632* *	0.0728	-2.4670 [0.034]
dINF	0.0116* * *	0.0358	2.3240 [0.018]
dINF1	0.1503*	0.0519	3.4960 [0.043]
ecm (-1)	-0.4106*	0.4852	-3.8463 [0.000]

R- Squared = 0.9285	R- Bar- Squared = 0.7376
F- stat. F (11, 11) = 7.0777[0.002]	DW- statistic = 2.8794

Note: ***, **, * denotes statistical significance at 1%, 5% and 10% respectively.

Source: Microfit 5.5 result

The result have the perfect ECM significance level of -0.4106 with the correct negative sign. -0.4106 indicates the speed of adjustment to equilibrium and it also confirm the stability of the long run relationship. From the table above it can be noted that the deviation from the long run equilibrium level of real GDP is corrected

by 41% in the next period to get back to the equilibrium level.

About 92% of the variation in the real GDP is as a result of the variations in the independent variables in the model denoting that the coefficient of determination (R- squared) is high. Furthermore, autocorrelation does not exist as seen from the value of the DW statistic and the F-statistic show robust.

The ECM revealed the long- run effect of the model. In that regard, the explanatory variables granger cause real GDP showing an undirectional causality. Nevertheless, granger causality is not require when applying the ARDL model since endogenity problem is considered in the model.

From the results above physical capital (GCF) which is a proxy of gross investment has a siginificant effect on economic growth and contributes 0.0257 percent to GDP for every 15 increase unlike the long run estimate that exhibit an insignificant efffect.

From the above table 6.1, human capital (GCF) has a positive impact on the economic growth of the Gambia in the short- run, where health and education expenditures are used as proxies, and its impact is statistically significant in both 1 percent and 10 percent levels of significance. This result is not similar to the long-run estimates were an insignificant effect was revealed. As a result, in the short- run, keeping all other conditions constant, a one percent increase in physical capital led to a 1.5540 percent increase in real GDP.

Unlike the long run estimate, foreign Aid has a negative effect on economic growth in the short run but it is statistically significant at the 1% level of significance. The result revealed that holding all other conditions constant a percentage increase in foreign aid will decrease real GDP by 0.0082 percent.

As in the long- run, there is still a significant positive effect in the short- run between export of goods and services and real GDP. The result is in line with the findings of previous studies that found positive correlation between exports and GDP.

Just like the long- run estimates external debt has a negative effect on the growth of the Gambian economy and its effect is statistically significant at the 1% level of significance leading to a decrease of 0.0632 of real GDP at every percentage increase.

From the result above, with a positive relationship, inflation does significantly effect economic growth during the period under study. It can be seen that in the short- run general inflation rate have a significant effect on the economic growth of the Gambia.

After analysing the short run error correction estimate of the period 1970 to 1993 and 1994 to 2017, we now analyse the join short run error correction estimate from the period 1970 to 2018. This will enable policy makers and other researchers to better understand the growth path of the Gambian economy. The two political regimes that has been analyzed in the study used different economic approaches and market systems thereby creating a structural break in analysing the overall performance of the economy from 1970 to 2018.

Table 6.2: Error Correction Representation for the Selected ARDL (2, 0, 2, 1, 2, 0, 2) selected based on Akaike Information Criteria from the period 1970 to 2018

Dependent variable is LRGDP			
Regressors	Coefficient	Standard Error	T- Ratio [Prob]
dLGCF	0.0300* * *	0.0110	2.7302 [0. 001]
dLEHE	1.6322*	0.3006	5.4306 [0.000]
dLEHE1	1.0392*	0.2188	4.7490 [0.000]
dLEXT	0.1064* *	0.0285	3.7342 [0.044]
dLAID	-0.0256* * *	0.0098	-2.6063 [0.020]
dLAID1	-0.0254* * *	0.0101	-2.5097 [0.043]
dLEXD	-0.0399* * *	0.0138	-2.8954 [0.040]
dINF	0.0488* * *	0.0165	2.9607 [0.032]
dINF1	0.1670*	0.0419	3.9890 [0.007]
ecm (-1)	-0.9831*	0.2156	-4.5596 [0.000]
R- Squared = 0.9314			R- Bar- Squared = 0.8897
F- stat. F (10, 27) = 31.2286 [0.000]			DW- statistic = 2.1690

Note: ***, **, * denotes statistical significance at 1%, 5% and 10% respectively.

Source: Microfit 5.5 result

The error correction coefficient, estimated at -0.9831 is highly significant, has the correct negative sign, and imply a very high speed of adjustment to equilibrium. According to Bannerjee *et al.* (2003) as cited in Kidanemarim (2014), the highly significant error correction term further confirms the existence of a stable long- run relationship.

Furthermore, the coefficient of the error term (ECM (-1)) implies that the deviation from the long- run equilibrium level of real GDP in the current period is corrected in the next period by 98% to bring back equilibrium when there is a shock to a steady state relationship.

The coefficient of determination (R- squared) is high explaining that about 93% of variation in the real GDP is attributed to variations in the explanatory variables in the model. Additionally, the DW statistic does not suggest autocorrelation and the F- statistic is robust.

As Chandran et al. (2010), as quoted by Tsadkan (2013), the long run effect of the model can be captured by error term (ECM). Thus, in the long run LGCF, LEHE, LEXT, LAID, LEXD and INF granger cause LRGDP (i.e. unidirectional causality). Not only that but also in applying autoregressive distributed lag (ARDL) model, does not require testing for granger causality since it considers an endogenity problem in the model (Wessene, 2014).

From table 6.2 above, similar to the long run result, gross capital formation (gross investment) and human capital (expenditure on health and education) have a positive impact on the Gambian economic growth and statistically significant at 1 and 10 percent significance level respectively in the short term. As a result a one percent increase in gross capital formation will lead to 0.03 percent increase in real GDP in the short run. Similarly, a percentage increase in human capital expenditure will result in 1.63 percent increase in real GDP.

Like the long- run, export of goods and services is still significant with a positive coefficient, which indicates the positive relationship between export and the growth of the Gambian economy.

Unlike the long run, foreign aid significantly effects economic growth at 1 percent significance level. Even though the sign is negative.

Similar to the long run effect, external debt is found to have a negative relationship with real GDP. The result is significant at 1 percent significance level. As a result, in the short run a percentage increase in external debt will lead to 0.03 decline in real GDP. The reason behind the negative impact of external debt on economic growth in the short run might be associated with the improper management of external debt, which might also be the case in this study.

As can be seen from table 6.2 above, with a positive relationship, inflation does significantly affect economic growth during the period under study. We can understand from this that during the study period, in the short run, general inflation rate does have a significant impact on the growth of the Gambian economy.

CHAPTER SIX
CONCLUSION AND POLICY RECOMMENDATION

6.1. CONCLUSION

The main objective of this study is to analyze the determinants of economic growth in the Gambia during the specified period. Autoregressive Distributed Lag (ARDL) model was applied to determine the long run and short run relationship among the variables. All the variables are tested for their time series properties (stationarity properties) using the ADF, PP and BP tests, before applying the ARDL model. As a result, GDP, export, foreign aid, external debt and inflation are integrated at order zero while capital formation and human capital are integrated of order one. Meaning GDP, export, foreign aid, external debt and inflation are integrated at level where as capital formation and human capital are stationary in first difference (trend and intercept). Also with intercept, all variables are stationary at level except capital formation and human capital.

Next, the stability of the model was done by testing the diagonal testing techniques. The result revealed that no evidence of serial correlation, no functional form problem (the model is correctly specified), the residual is normally distributed and no evidence of hetroscedasticity problem. As stated above, this study applied the methodological approach called ARDL model also know as the bound test approach. The result indicated the bound test (F- statistic) value is larger than the upper bound critical value, which reveals that there exist a long run relationship between real GDP and its determinants in the long run during the study period.

The empirical result indicated that both human capital (expenditure on health and education), and export of goods and services are found to have a positive impact on the growth of the Gambian economy during the study period and statistically significant at 1 percent significance level. A one percent increase in human capital

(expenditure on health and education) result in 0.04 and 1.63 percent increase in real GDP in the long run and short run, respectively. Likewise, a one percent increase in export of goods and services result in 0.13 and 0.12 percent increase in real GDP in the long run and short, respectively. External debt has a negative impact on economic growth in both the long run and short run during the study period. A one percent increase in external debt results in 0.09 and 0.04 percent decline in real GDP in the long run and short run, respectively. However, the study found that human capital and foreign aid have statistically insignificant impact on economic growth though with positive sign in the long run.

6.2. POLICY RECOMMENDATION (S)

From the fiundings of this study, the below policy recommendation(s) are put forward for consideration by policy makers.

- In order to enhance the contribution of physical capital formation, the government of the Gambia has to set policies geared to increase in domestic saving which is a back bone of economic growth. This includes increase saving mobilization like selling government Bonds, expanding financial institutions and by strenthening existing saving tool (strengthening both private and government workers social security scheme, strengthening saving for housing program, saving for investment equipment scheme).

- In order to enhance the contribution of human capital to economic growth, the government of the Gambia should allocate adequate finance to help in improving the quality of education and providing basic health services to the community. Thus education and health societies will bring technology and innovation, which can be a spring board to economic growth.

- The government of the Gambia should strengthen the existing strategies in export development and promoting investment particularly in the agricultural sector for export and import substitution. Moreover, the researcher recommends that policies that facilitate flexibility in production for export be formulated.

- As debt negatively affects the economic growth of the Gambia, allocating resources on productive investment areas, that can return back the debt burden and together with basic infrastructure construction that facilitate the productivity of other sectors is decisive. In addition, to avoid misallocation and mismanagement of external debt problem, there should be a close monitoring and consistent debt management strategies.

- Even though inflation generally those not affect the growth of the Gambian economy significantly, the government of the Gambia should work to reduce its rate if possible, otherwise, it should sustain the existing inflation rate (with single digit) by tight fiscal and monetary policies, financing of budget deficit from non- inflationary sources and implementation of price stabilization program by subsidizing basic food items.

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APPENDICES

APPENDIX A: Diagnostic Tests

```
           Autoregressive Distributed Lag Estimates
        ARDL(2,0,2,1,2,0,2) selected based on Akaike Information Criterion

*******************************************************************************
****
*    Test Statistics *        LM Version       *          F Version          *
*******************************************************************************
*                      *                          *
* A: Serial Correlation*CHSQ (1) =  .65032[.420]*F (1, 22) =   .38305[.542]
*                      *                          *
* B: Functional Form   *CHSQ (1) =  1.6743[.196]*F (1, 22) =   1.0140[.325]
*                      *                          *
* C: Normality         *CHSQ (2) =   .83128[.660]*      Not applicable
*                      *                          *
* D: Heteroscedasticity*CHSQ (1) = .45034[.502]*F (1, 36) =   .43175[.515]*
*******************************************************************************

   A: Lagrange multiplier test of residual serial correlation
   B: Ramsey's RESET test using the square of the fitted values
   C: Based on a test of skewness and kurtosis of residuals
   D: Based on the regression of squared residuals on squared fitted values
*******************************************************************************
 R-Squared                 .90033   R-Bar-Squared                    .83967
 S.E. of Regression        3.4971   F-Stat.   F (14, 23)    14.8409[.000]
 Mean of Dependent Variable 4.9147  S.D. of Dependent Variable       8.7336
 Residual Sum of Squares    281.2787  Equation Log-likelihood     -91.9531
 Akaike Info. Criterion   -106.9531   Schwarz Bayesian Criterion -119.2350
 DW-statistic              2.1690
*******************************************************************************
```

APPENDIX B.1: Estimated Long Run Coefficients using the ARDL Approach

ARDL (2,0,2,1,2,0,2) selected based on Akaike Information Criterion

```
***************************************************************************
```

Dependent variable is LRGDP

23 observations used for estimation from 1970 to 1993

```
***************************************************************************
```

Regressor	Coefficient	Standard Error	T-Ratio [Prob]
LGCF	.001275	.022495	.05562[.655]
LEHE	.001558	.081444	.01848[.783]
LEXT	.13784	.035672	3.8724[.000]
LAID	.010241	.059625	.16952[.902]
LEXD	-.070512	.018610	-3.7905[.001]
INF	-.0253711	.007657	-3.350479[.004]
C	2.1302	0.5014	4.0487[.000]

```
***************************************************************************
```

APPENDIX B.2: Estimated Long Run Coefficients using the ARDL Approach

ARDL (2,0,2,1,2,0,2) selected based on Akaike Information Criterion

```
***************************************************************************
```

Dependent variable is LRGDP

22 observations used for estimation from 1994 to 2017

```
***************************************************************************
```

Regressor	Coefficient	Standard Error	T-Ratio [Prob]
LGCF	.011512	.155210	.07412[.495]
LEHE	.024814	.007604	3.2791[.001]
LEXT	.11353	.030904	3.6712[.000]
LAID	.002317	.049420	.04662[.570]
LEXD	-.084110	.025011	-3.3623[.000]
INF	-.0021177	.052145	.023041[.972]
C	3.3521	0.6173	5.4303[.000]

```
***************************************************************************
```

APPENDIX B3: Estimated Long Run Coefficients using the ARDL Approach

ARDL (2,0,2,1,2,0,2) selected based on Akaike Information Criterion

****

 Dependent variable is LRGDP

 48 observations used for estimation from 1970 to 2018

****

Regressor	Coefficient	Standard Error	T-Ratio [Prob]
LGCF	.012750	.056415	.22512[.495]
LEHE	.032718	.010322	3.1782[.001]
LEXT	.13094	.036220	3.6194[.000]
LAID	.011901	.013525	.88362[.386]
LEXD	-.091812	.026710	-3.4410[.000]
INF	-.0023711	.064657	.035179[.972]
C	3.5060	0.3496	10.0287[.000]

APPENDIX C: Error Correction Representation for the Selected ARDL Model
ARDL (2,0,2,1,2,0,2) selected based on Akaike Information Criterion

```
**************************************************************************
 Dependent variable is dLRGDP
 48 observations used for estimation from 1970 to 2018
**************************************************************************
Regressor          Coefficient      Standard Error      T-Ratio [Prob]
 dLRGDP1               .51765            .12269           4.2191[.000]
 dLGCF                .030016            .30061           2.7302[.001]
 dLEHE                 1.6322            .30055           5.4306[.000]
 dLEHE1                1.0391            .21883           4.7409[.000]
 dLEXT                .10642            .028512           3.7342[.044]
 dLAID               -.025644           .009805         -2.6063[.020]
 dLAID1              -.025395           .010121         -2.5097[.043]
 dLEXD               -.039945           .013825         -2.8954[.040]
 dINF                 .048841           .016512          2.9607[.032]
 dINF1                .16708            .041901          3.9890[.007]
 ecm(-1)             -0.9831            .21562          -4.5596[.000]
**************************************************************************
ecm = LRGDP  -.014875*LGCF  -.040158*LEHE -.13354*LEXT  -.011951*LAID -.019
795*LEXD + .0022711*INF
**************************************************************************
 R-Squared                  .93140   R-Bar-Squared                  .88965
 S.E. of Regression         3.4971   F-Stat.  F (10, 27)    31.2287[.000]
 Mean of Dependent Variable 1.5358   S.D. of Dependent Variable     10.5272
 Residual Sum of Squares 281.2787    Equation Log-likelihood       -91.9531
 Akaike Info. Criterion -106.9531    Schwarz Bayesian Criterion  -119.2350
 DW-statistic              2.1690
**************************************************************************
```

R-Squared and R-Bar-Squared measures refer to the dependent variable dLRGDP
and in cases where the error correction model is highly restricted, these
measures could become negative.

VITAE

Muhammed L. Sanyang was born in Janjangbureh, the Gambia on the 23rd January, 1992. He graduated from the University of the Gambia, Department of Economics in December, 2014 with a Bachelor's of Science degree in Economics and Finance. He also hold a Master's of Science degree in Economics in the Department of Economics at Gaziantep University in May, 2019. He has two articles published in the Journal of Economics and Sustainable Development about "The Determinants of the Growth Cycle of the Gambian Economy using ARDL and Forecasting Techniques and in the European Journal of Business and Economics about "Does Agriculture have an Impact on Economic Growth? Empirical Evidence from the Gambia. He has a presentation submitted at the 1st International Economics and Business Symposium about "Relationship between Sector Shares and Economic Growth: Comperative Study of the Gambia, Senegal and Ghana. He also has a presentation submitted at the 3rd Africa Conference on Succession Crises across Africa about "Economic Stability a Major cause of underdevelopment and low growth in Sub- Saharan Africa. He has five (5) years of teaching experience mainly focused on Mathematics and Economics. He also has a year experience working as a Banker with the First International Bank the Gambia. He has an Advanced Diploma in Information Technology and is very conversant with Econometrics softwares like STATA, E- views, Microfit etc. He is proficient in English language and Turkish.

ÖZGEÇMİŞİ

Muhammed L. Sanyang, 23 Ocak 1992'de Gambiya Janjangbureh'te doğdu. Gambiya Üniversitesi Ekonomi Bölümünden Aralık 2014'te Ekonomi ve Finans bölümünden mezun oldu. Ayrıca, 2019 Mayıs ayında Gaziantep Üniversitesi İktisat Bölümünde İktisat Yüksek Lisans derecesine sahiptir. Ekonomi ve Sürdürülebilir Kalkınma Dergisi'nde "ARDL ve Tahmini Tekniği Kullanarak Gambiya Ekonomisinin Büyüme Döngüsünün Belirleyicileri" ve "Avrupa Ticaret ve Ekonomi Dergisi" nde "Tarımın Ekonomik Büyüme Üzerindeki Etkisi Var mı? Gambiya'dan Ampirik Kanıtlar" başlıklı iki makalesi bulunmaktadır. 1. Uluslararası Ekonomi ve İşletme Sempozyumu'nda "Sektör Payları ve Ekonomik Büyüme Arasındaki İlişki: Gambiya, Senegal ve Gana İşbirliği Çalışması" konulu bir sunum yaptı. Ayrıca, Afrika'nın dört bir yıllık Ardışık Krizler Konferansı'nda "Sahra Altı Afrika'nın az gelişmişliği ve düşük büyümenin önemi birincisi, ekonomik bir İstikrar" konulu bir sunum yaptı. Temel olarak Matematik ve İktisat odaklı beş (5) yıllık öğretim tecrübesine sahiptir. Ayrıca, First International Bank Gambia ile Bankacı olarak çalışmakta olan bir yıllık tecrübeye sahiptir. Bilgi Teknolojisi alanında İleri Diploma derecesine sahiptir ve STATA, E-views, Microfit vb. Ekonometri yazılımları ile çok deneyimlidir. İngilizce ve Türkçe bilmektedir.