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RELATIONSHIP BETWEEN FISCAL DEFICITS AND ECONOMIC GROWTH: ACCOUNTING FOR NON-LINEARITIES AND INTERACTION EFFECTS

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ABSTRACT: Available evidence shows that over the years the Gambia fiscal deficits trend has been on the increase. It has recorded more than 40 years of deficits since 1980. Deficits are meant to accelerate economic activities during depressions through induced variables or aggregates. Despite the fact that The Gambia economy has been operating deficits for these periods and also operated in a situation of less than full employment, it has been in distress which runs contrary to the essence of deficits. Thus, the main objective of this study is to examine whether the relationship between deficits and growth is non-linear, and investigating the interactive effect of deficits and investment on economic growth.

The study employs the Auto Regressive Distributed Lag (ARDL) bounds test and estimates the coefficients of the variables from the unrestricted error correction model in examining the relationship between budget deficit and economic growth. The Phillip–Perron (PP) unit root test results show that PP test indicates that lnGDP, lnINF and lnFD are stationary at their levels which mean they are *I* (0) series (integrated of order zero) while lnT and lnINV are stationary at their First Difference which mean they are *I* (1) series (integrated of order one).

The overall findings indicate that deficit positively affects growth rate in the short run and negatively in the long run. Deficit square is also negatively and significantly related to economic growth. The result also indicates there is a negative nonlinear relationship between deficit and growth. The interaction effect of deficit and investment has a positive and insignificant effect on economic growth of The Gambia. This is in conformity with the neoclassical theory which holds that fiscal deficits lead to a fall in real GDP growth.

Since deficits have a negative effect in the short run, the government should reduce its recurrent expenditure and spend the deficit on economically viable and productive sectors that will boost economic activities and create more jobs for the youth of The Gambia. This will reduce unemployment. The high fiscal deficit will undermine growth prospects and thus will put an additional burden on fiscal sustainability.

I. INTRODUCTION

There exists an interesting debate in the literature on the relationship between budget deficit and economic growth. The debate is inconclusive: researchers found positive, negative or no relationship between deficit and growth.

Government revenue generated is mostly not enough to take care of government expenditures. This gap between revenue and expenditure is defined as fiscal deficit. To achieve growth, the deficit needs to be financed. Financing the deficit is done through borrowing (domestic or foreign) or printing more money. Over the years, public debt has been an important source of funding the growth and development projects for several countries (Ouedraogo, 2015). In particular, sub-Saharan African countries' public debt levels have reached unprecedented levels in recent decades, thereby making the debate on its role in the growth process particularly important (Drine and Nabi, 2010).

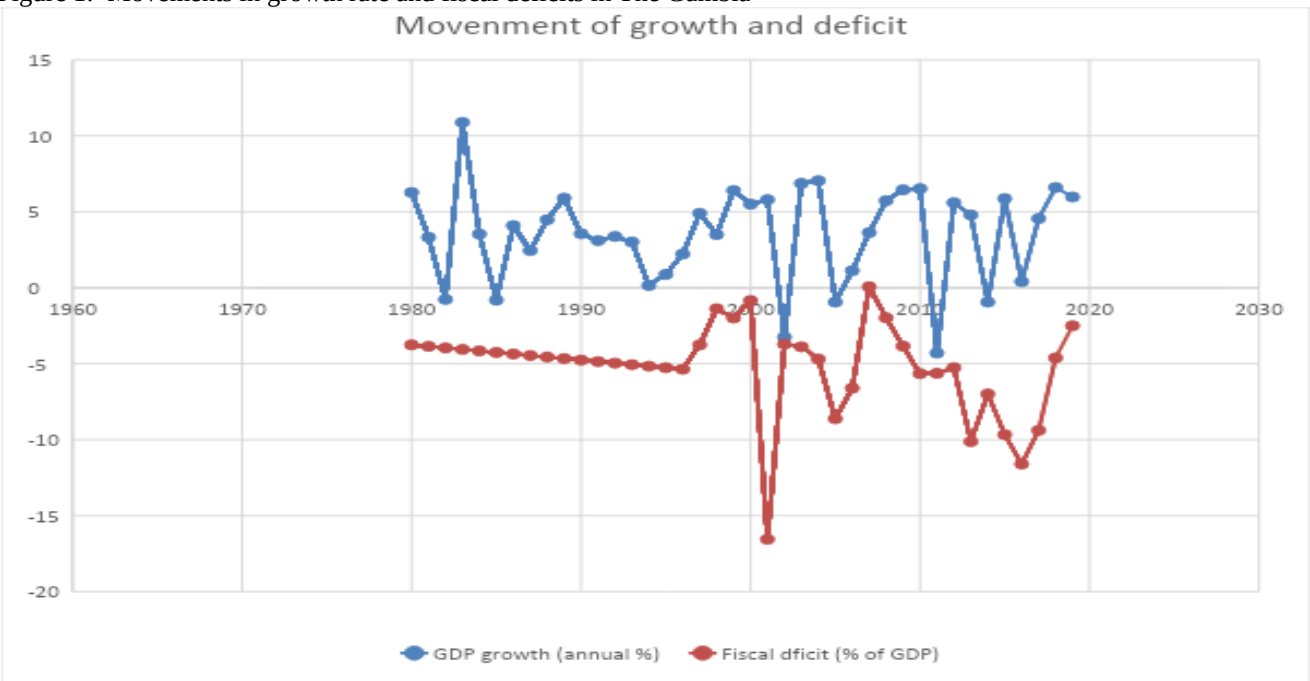
Economies of different nations have experienced extraordinary fiscal inequities. Such fiscal inequities have also affected the magnitude of challenges and gave rise to new developments in the global economy concerning fiscal actions of various nations. Shojai (1999) postulated that the controversial nature of budget deficits has puzzled many economic planners. Such apprehensions about budget deficits have triggered disruptive disproportions or movements in all sectors of the economy. The implications of fiscal deficits on economic growth have remained one in every of the focal Macroeconomic debates among policy makers and researchers (Georgantopoulos&Tsamis, 2011).

This research is set out to explore the non-linearity of the relationship between fiscal deficit and investment on economic growth in The Gambia from 1980-2019. Economic growth rate is likely to have a linear negative impact on the fiscal deficits-to-GDP ratio; high levels of fiscal deficits are likely to be harmful for growth. Potentially, this effect is non-linear in the sense that it becomes relevant only after a certain threshold has been reached. The paper further addresses the possible growth effects of increasing fiscal deficits through its interaction effect with investment.

The Gambia has experienced positive, although highly volatile, growth in recent years, fluctuating from -4.3 per cent in 2011 to 5.9 per cent in 2012 and back to 0.9 per cent in 2014. The economy of the Gambia is mainly dependent on rain-fed agriculture and services. Exogenous factors such as climate change and the recent outbreak of Ebola virus disease in West Africa are endangering stability in the country. In countries facing fiscal imbalances and high debt burdens, this has prompted wide-ranging fiscal consolidation programs to reduce government spending (IMF, 2003). Fiscal policy has been loose for the past many years, which was especially visible in 2013, when the budget deficit was 10.2 percent of GDP. This posed challenges to the economy, as growth in public expenditure continues to outpace growth in revenue mobilization. Numbers from the Ministry of Finance and Economic Affairs show that, after running a surplus budget balance in 2007, the fiscal conditions deteriorated, with the budget deficit remaining at a high 7.4 per cent of GDP in 2015 and overall debt reaching more than 100 per cent in 2014. The deficit is forecasted to grow by another 7 per cent in 2016 (Kolley, 2015).

It is well established in the macroeconomic literature that maintaining macroeconomic stability is an essential prerequisite for robust and long-term growth. Economic theory highlights that there is a link between fiscal deficits and economic growth. An increased fiscal deficit leads to an increase in interest rate, which in turn increases interest rate and reduces investment and as a result slows down growth of capital stock and economic activities. Therefore, when fiscal deficits show a continuously increasing trend over the period, it can considerably reduce a country's capacity to produce goods and services (Saleh, 2003). Further, an upsurge in interest rate would cause an exchange rate appreciation, which in turn can create lower net exports, and resulting in trade deficits and a slowdown in economic activities. Policy uncertainty created by macroeconomic instability affects growth through the volatility of returns on investment and misallocation of resources as price signals become distorted (Fischer, 1993; and Fatas and Mihov, 2013). Although instruments of fiscal policy are widely being used to maintain price stability and to achieve better financial management (Jayasundara, 1986), a persistence in increasing high levels of fiscal deficits have created several repercussions in maintaining macroeconomic stability and emphasised the importance of managing fiscal sustainability in most of the developing economies. As large fiscal deficits reduce aggregate savings and may lead to high inflation, high interest rates, and balance of payments pressures, with negative growth consequences, extensive attention has been devoted to the impacts of fiscal deficits on growth in both developed and emerging economies in the recent past.

Figure 1: Movements in growth rate and fiscal deficits in The Gambia



The questions that arise from our discussion is whether the deficits-growth relationship is nonlinear in The Gambia, and the interactive effect of deficits and investment on economic growth. Thus, the main objective of this study is to examine whether the relationship between deficits and growth is non-linear, and investigating the interactive effect of deficits and investment on economic growth

Available evidence shows that over the years the Gambia fiscal deficits trend has been on the increase. It has recorded more than 40 years of deficits since 1980. Deficits are meant to accelerate economic activities during depressions through induced variables or aggregates. Despite the fact that The Gambia economy has been operating deficits for these periods and also operated in a situation of less than full employment, it has been in distress which runs contrary to the essence of deficits.

Budget deficit's impact on poverty, balance of payments, public debt, foreign reserve, savings, and inflation has been unfavourable. One would then ask if the budget deficit no longer stimulates economic growth. Do we then accept the Keynesian economists that budget deficit crowds-in private investment through its impact on macroeconomic variable or do we accept the neoclassical economists that budget deficit crowds-out private investment through its impact on interest rate and other variables or do we accept the Ricardian economists that budgets does not have positive or negative impact on aggregate demand? Much studies have been conducted on the impact of deficit on growth, this paper further explores the nonlinear effect and the interactive effect of deficit and investment on economic growth.

The specific objectives of the study are;

1. To examine the relationship between fiscal deficits and economic growth in the Gambia (Debt overhang hypothesis)
2. To examine the nonlinear relationship between deficit and growth (the Debt Laffer Curve theory)
3. To examine the interaction effect of deficit and investment on economic growth of The Gambia.

The following hypotheses are tested:

1. There is no relationship between budget deficit and economic growth in The Gambia
2. There is no non-linear relationship between budget deficit and economic growth in The Gambia
3. The interaction of deficit and investment does not have a significant effect on growth in The Gambia.

II. LITERATURE REVIEW

2.1 Theoretical Review

The theoretical literature on the relationship between deficit and economic growth is discussed using three different views; neo-classical theory, Keynesian theory and Ricardian Equivalence.

Neoclassical theory

The neo-classicalists believe that there is an inverse relationship between budget deficit and economic growth. According to them, a reduction in national savings can have a negative impact on economic growth if the reduction in government savings is not fully compensated by a rise in private savings. As this could place a pressure on domestic interest rates, it can ultimately undermine the level of output in the economy. Bluatia (2010) Argued that a neoclassical group of economists proposed an adverse relationship between budget deficits and macroeconomic aggregates. They maintained that budget deficits lead to higher interest rates which discourages the issue of private bonds, private investment, private spending and increases inflation level and creates a similar increase in current account deficits and slows the growth rate of the economy through resources crowding-out. This school of thought considers individuals planning their consumption over their entire cycle by shifting taxes to the future generations. Budget deficits increase current consumption by ensuring full employment of resources. The neoclassical maintains that increased consumption means a decrease in savings. Interest rates must rise to bring about equilibrium in the capital market. Higher interest rates in turn bring about a decrease in private investment, domestic production and an increase in the aggregate price level.

Keynesians

Keynesian economists argued in favour of the positive impacts of fiscal deficits on economic growth, in particular through public expenditure multiplier which in turn emphasised as a key policy variable to stimulate growth. More specifically, it asserts that fiscal deficits can enhance savings and investment even when the interest rate rises. This is largely due to the creation of employment opportunities or the utilisation of unutilised human and other resources which can enhance the productive capacity of the economy. However, at full employment, deficits would lead to crowding out even in the Keynesian paradigm. According to Salen (2003) as stated by Wosowie (2013), this group of economists proposed a positive relationship between budget deficit and macroeconomic aggregates. They maintained that budget deficits result in an increase in the domestic production, increases aggregate demand, increases savings and private investment at any given level of interest rate.

Ricardian Equivalence Hypothesis

The Ricardian equivalence hypothesis advanced by Barro (1989) emphasizes that fiscal deficits are immaterial and claims it is neutral in terms of its impact on growth. It argues that changes between taxes and

fiscal deficits do not affect real interest rate, level of investment, and the current account balance. Further, this approach implies that the government's financing decisions do not matter. In this context, the theory emphasizes that policy makers only need to be concerned with the size and composition of public expenditure and revenue to establish the growth effects of fiscal deficits.

This model was initially proposed by the 19th century economist David Ricardo. This theory simply denotes that the government may either finance their spending by taxing current taxpayers, or they may borrow money. If funds are borrowed, the government must eventually repay this fund by raising taxes above what they would otherwise have been in the future; the choice therefore is between "tax now" and "tax later". David Ricardo argued that although taxpayers would have more money or funds now, they would realize that they would pay higher tax in future and save the extra money in order to pay the future tax. The extra savings by consumers would offset the extra spending by the government; therefore, overall demand would remain unchanged. Recently economists such as Barro (1990) have developed sophisticated variations on this idea by using the theory of rational expectations. Ricardian equivalence suggests that the government's attempt to influence demand by using fiscal policy will prove fruitless. He maintained that an increase in budget deficits as a result of an increase in government spending must be paid for either now or later, with the total present value of receipts fixed by the total present value of spending. Which suggests that a cut in today's taxes must be matched by an increase in future taxes leaving real interest rates and thus private investment and the current account balance, exchange rate and domestic production unchanged. Therefore, budget deficits do not crowd-in nor crowd out macroeconomic variables, that is no positive or negative relationship exists.

2.2 Empirical Literature.

The literature reviewed different studies on budget deficit and economic growth. The empirical evidence on deficit-growth nexus is mixed. The empirical review revealed positive, negative, no relation and mixed results.

Studies supported the Neoclassical theory of aninverse relationship between budget deficit and economic growth. Cebula (1995) examined the impact on per capita real economic growth in the United States of federal budget deficits with quarterly data over the 1955-1992 periods. The empirical findings indicated that federal budget deficits, over time, reduce the rate of economic growth. Mohanty (1997) studied the relationship between fiscal deficit and growth both in the long and short run in India. He observed a negative relationship between deficit and growth in the long run and stated that high fiscal deficits lead to lower growth. Huynh (2007) concluded a negative impact of fiscal deficits on the GDP growth while simply analysing the trends in budget deficits and economic growth in Vietnam over the period of 1990 to 2006. A study conducted by the International Monetary Fund (IMF) during the mid-1980s among groups of developing countries also concluded that countries with high fiscal deficits had significantly lower economic growth than countries with low to medium fiscal deficits. Brender and Drazen (2008) found that a high budget deficit recorded by a country will give negative signals to the citizens that the government authorities did not perform well in managing the funds of a country. As a result, there is a probability of a re-election process to be conducted in order to replace the authorities. Indirectly, the authorities who did not perform well may not be able to bring the country to the upper level. Hence, it will not contribute to high economic growth due to lack of confidence among citizens, investors and other neighbouring countries. Avila (2011) analysed the relationship between fiscal deficit, macroeconomic uncertainty and growth of Argentina for the period 1915-2006, and concluded that the deficit hampered on per-capita income growth in Argentina through the volatility in relative prices. Fatima et al (2012) again investigated the impact of the fiscal deficits on economic growth in Pakistan using time series data over the period 1978 to 2009. The findings showed a negative impact of fiscal deficits on economic growth and suggested that the government should avoid certain levels of the fiscal deficits in order to achieve the desired level of economic growth. Fatima et al, (2011) studied the impact of government fiscal deficits on investment and economic growth using time series data from 1980 and 2009 in Pakistan. The study showed the negative impacts of fiscal deficits on economic growth. They also found that fiscal deficits create many problems such as high levels of inflation, current account deficits, and high levels of debt in the economy. Ezeabasili, Tsegba and Wilson (2012) studied economic growth and fiscal deficits in Nigeria using data over the period 1970 — 2006. The study adopted a modelling technique that incorporates cointegration and structural analysis and concluded that fiscal deficit affects economic growth negatively, with an adjustment lag in the system and a one percent increase in fiscal deficit is capable of diminishing economic growth by about 0.023 percent. The negative impact of fiscal deficits on long-run growth has been empirically documented in several studies, such as Fischer (1993), Easterly and Rebelo (1993), Easterly, Rodriguez, and Schmidt-Hebbel (1994), Bleaney, Gemmell, and Kneller (2001). Fisher (1993) found that larger budget surpluses were strongly associated with more rapid growth through greater capital accumulation and greater productivity. Easterly and Rebelo (1992) also found a consistent negative relation.

The Keynesian theory postulated a positive relationship between budget deficit and economic growth. Eisner and Pieper (1987) reported a positive impact of cyclically and inflation-adjusted budget deficits on economic

growth in the United States and other Organization for Economic Cooperation and development (OECD) countries. Bose et al (2007) also found similar results using panel data for the period 1970 to 1990 for 30 developing countries. They suggested that fiscal deficits had a positive impact on growth rate and in particular they highlighted that it was mainly as a result of increases in productive expenditure such as education, health and capital expenditure. Buscemi and Yallwe (2012) analysed the effects of fiscal deficits on sustainability of economic growth for three emerging countries: China, India and South Africa using the reduced form of Generalized Method of Moment's (GMM) method for dynamic panel data over the period 1990-2009. They found that the coefficients for fiscal deficits results are significant and positively correlated to economic growth. In a time series analysis on the US economy, Taylor et al (2012) analyses the relation between fiscal deficit, debt and growth. Using the VEC framework and quarterly data starting from 1961 to 2011, the authors argued that primary fiscal deficit has a significant positive effect on growth. They found that higher debt affects growth adversely but causality results proved that a higher debt-GDP ratio is the consequence but not the cause of low growth. The total expenditure had a positive relation while tax revenue moved in a reverse direction with GDP. The authors strongly argue that higher fiscal deficit stimulates the economy during recession.

Studies supported the Ricardian Equivalence Hypothesis of no relationship between budget deficit and economic growth. Vuyyuri et al, (2004), examined the relationship between fiscal deficits of India with other macroeconomic variables such as nominal effective exchange rate, GDP, consumer price index and money supply (M3) using cointegration approach and Vector Error Correction Models (VECM) over the period 1970 to 2002. The author concludes that there is a bi-directional causality between fiscal deficits and nominal effective exchange rates. However, the study did not find any significant relationship between fiscal deficits and other variables namely GDP, Money supply and consumer price index. In addition, the Author found that despite the fiscal deficits, Granger was caused by GDP, but the fiscal deficits did not have any reciprocal relationship. Tan (2006) examined both the long and short run relationship between fiscal deficit, inflation and economic growth in Malaysian economy during 1966-2003. They found the absence of a long run relationship among these variables and also found that fiscal deficits appeared to have neither long nor short run links with income. Dalyop (2010) examined the effectiveness of fiscal deficits on the growth rate of the Real Gross Domestic Product and found that the fiscal deficit in the Nigerian economy is Ricardian. Fiscal deficits therefore had little effect on the level of economic activity. Rehman (2010) studied the relationship between deficit and growth and observed that there is no relationship between deficit and growth while productive expenditure has a positive relation with economic growth. Rahman (2012) investigated the relationship between budget deficit and economic growth from Malaysia's perspective by using quarterly data from 2000 to 2011. It was found that there is no long-run relationship between budget deficit and economic growth of Malaysia, consistent with the Ricardian equivalence hypothesis.

Studies give mixed results. Nelson and Singh (1994) used data on a cross section of 70 developing countries during two time periods, 19701979 and 1980-1989, to investigate the effect of budget deficits on GDP growth rates. This study concludes that the budget deficit had little or no significant effect on the economic growth of these nations in the 1970s and 1980s. Adam and Bevan (2002) examined the relation between fiscal deficits and growth for a panel of 45 developing countries and found a possible non-linearity in the relation between growth and the fiscal deficit for a sample of developing countries. Osinubi et al. (2006) synthesized a relationship between budget deficits and external debt in Nigeria between 1970 and 2003. The results of the econometric analysis confirmed the existence of the debt Laffer curve and the nonlinear effects of external debt on growth in Nigeria. Keho (2010) examined the causal relationship between budget deficits and economic growth for seven West African countries over the period 1980-2005. The empirical evidence showed mixed results. In three countries, it did not find any causality between budget deficit and growth. In the remaining four countries, deficits had adverse effects on economic growth.

The empirical evidence on the relationship between fiscal deficit and GDP is mixed. There is no conclusive proof on how fiscal deficit affects GDP growth. There is also no detailed long term analysis to study the relation between fiscal deficit and growth. This paper makes an additional contribution to the existing literature by modelling the fiscal deficit composition and its impact on GDP. Methodologically also the present paper adopts advanced econometric tools like vector error correction methods, which include a system of equations unlike a normal single equation approach. This paper tries to solve the puzzle in the Indian context at a macro level using long-term data.

Despite the numerous studies on the deficits-growth relationship, little has been done to examine if the relationship is non-linear particularly in the developing region of Africa. Given that the movement in deficits and growth is not clear (as we pointed out in the introduction) it is possible that the relationship between them is non-linear, and any estimated relationship between them may vary. This study extends the literature by examining whether the deficits-growth relationship is non-linear in The Gambia.

III. RESEARCH METHODOLOGY

As we stated in the introductory section, the movement in deficits and growth suggests that their relationship may be non-linear and vary over time. Therefore, an attempt is made to ascertain whether non-linearity holds for the variables. To this end, we introduce a deficits-square variable or quadratic term (FD*FD or FD^2) in the model to capture the non-linearity between deficits and growth. Empirical studies generally prefer the non-linear approach when analysing the effect of fiscal deficit on economic growth. Against this backdrop, the study adopts a standard quadratic relationship between fiscal deficit and economic growth which can be written as:

$$GDP_t = \gamma_0 + \gamma_1 Inf_t + \gamma_2 T_t + \gamma_3 FD_t + \gamma_4 FD_t^2 + \gamma_5 INV_t + \gamma_6 (FD_t * INV_t) + X_{kt}\beta' + \varepsilon_{i,t} \ldots \ldots (1)$$

Where $GDP_t$is theGross Domestic Product growth which is a proxy for economic growth and is measured by annual GDP growth (%). Fiscal or budget deficit (FD_t), is fiscal debt–to-GDP ratio measured as the difference between revenue and grant from expenditure and net lending (%), Openness (T_t**),** is the sum of imports and exports of goods and services over GDP (Trade as a percentage of GDP), Investment (INV_t), is the purchase of goods that are not consumed today but are used in the future to create wealth (measured by Gross fixed capital formation as % of GDP), Inflation (Inf_t), is GDP deflator (annual %) and $FD_t^2$is FD_t squared. $X_{kt}$is the set of control variables, the subscripts t represent time period and $\varepsilon_{i,t}$is the error term.

In the debt–growth dynamics literature there are theoretical reasons suggesting that such a linear specification might be insufficient to identify the actual impact of debt on growth, as the relation is likely to be nonlinear, i.e. the effect of debt could be positive at low levels of debt and turns out to be negative when the public indebtedness become excessive. The study investigates the nonlinearity of the debt–growth relationship by considering a specification that accounts for the polynomial trend of the debt to GDP variable which introduces the smooth transition around a turning point in debt to GDP level. This is captured by the FD_t^2term in the model**.** Following the modeling approach of the previous studies such as, Checherita and Rother (2010), and Eberhardt and Presbitero (2015), equation (1) is transformed to the following quadratic specification by introducing a debt squared term, FD_t^2 as an additional explanatory variable:

To make the model amenable to OLS we linearized by taking the natural log of both sides of (1), as follows:

$$ln\, lnGDP_t = \alpha + \phi\, ln\, lnGDP_{t-1} + \beta_1 lnInf_t + \beta_2 lnT_t + \beta_3 lnFD_t + \beta_4 lnFD_t^2 + \beta_5 lnINV_t + \beta_6 ln(FD_t * INV_t) + X_{k,t}\beta' + \varepsilon_t \ldots \ldots (2)$$

Where log GDP is $ln\, lnGDP_t$, the lagged value of log of GDP ($ln\, lnGDP_{t-1}$) measures log of conditional convergence (endogenous regressor) and X is a vector of standard control variables including: the log of the investment rate ($lnINV_t$), log of openness (lnT_t), log of inflation ($lnInf_t$), log of budget deficit ($lnFD_t$), log of budget deficit squared ($lnFD_t^2$**)** and log of interaction between deficit and investment ($FD_t *$ *INVt).*

The main focus of this study is to determine the significance and magnitude of β_3, and β_4. The hypothesized relationship between fiscal deficit and economic growth to be linear or nonlinear depends on the coefficients and statistical significance of β_3, and β_4**.**

IV. ANALYSIS OF THE RESULTS AND DISCUSSION OF FINDINGS

4.1 Descriptive Statistics

From Table 1, on average The Gambia economy GDP growth rate has been around 3.333 per cent, with a minimum growth rate of -8.130 percent and a maximum growth rate of 10.883 per cent. The standard deviation has not been very large, implying most of the values (GDP growth rates and FD) have been around the mean growth rate. GDP has a skewness of -0.963 and FD -1.584 which are less than 0, meaning it is perfectly symmetrical around the mean. The Kurtosis measures the peakedness or flatness of the distribution of the series. GDP and FD have a kurtosis of 4.650 and 6.747 respectively showing they are leptokurtic (peaked-curve) indicating that they have higher values than the sample mean. The Jarque-Bera measure the difference between the skewness and the kurtosis of the series with those from the normal distribution. The null hypothesis is the distribution is normal. GDP and FD hasJarque-Berastatistics of 10.727 and 40.139 with a probability of 0.00468 and 0.000 we reject the null hypothesis at 5% showing the distribution is not normal.

Table 1: Descriptive Statistics

	GDP	INF	T	FD	INV
Mean	3.333168	12.80642	68.88672	-5.166696	14.32154
Median	3.547068	5.207169	57.81831	-4.635553	14.82580

Maximum	10.88323	134.0359	131.4854	0.069083	25.59700
Minimum	-8.130444	-5.969119	39.08910	-16.55037	4.562497
Std. Dev.	3.479909	25.54980	27.56545	3.028695	6.082596
Skewness	-0.963356	3.630033	0.895325	-1.584739	-0.046569
Kurtosis	4.650367	16.12698	2.253920	6.746746	2.193669
Jarque-Bera	10.72655	375.0435	6.271774	40.13950	1.098073
Probability	0.004686	0.000000	0.043461	0.000000	0.577506
Sum	133.3267	512.2569	2755.469	-206.6678	572.8615

4.2 Unit Root test

Unit root test is important in order: to evaluate the behaviour of series over time, determine how series respond to shocks and test for market efficiency. Stationary tests on variables are conducted to know whether the time series data have a unit root or not. Data having a unit root means it follows a pattern that is unpredictable. In essence, for predictability, data must be normally distributed.

Cointegration is important to check long-run equilibrium relationships between variables. To analyse cointegration or long-run equilibrium relationship between the time series variables, it is necessary to check the order of integration of the variables. A time series is said to be stationary or integrated of order zero; ***I (0),*** if it has no unit root at level or else it is referred to as non-stationary; for instance, integrated of first order difference or second order difference; ***I (1) / I (2).*** Thus, with the purpose of determining order of integration, this study applied the Phillip–Perron (PP) test. The decision rule for PP is that if the P value is less than 5% significant level rejects the null of a unit root.

Table 2: Unit Root Test Results Using Phillip–Perron (PP) Test Statistics

Null Hypothesis: the variable has a unit root						
	At Level					
		lnGDP	**lnINF**	**lnT**	**lnINV**	**lnFD**
With Constant	t-Statistic	-4.7898	-5.3789	-1.6801	-2.2810	-5.1102
	Prob.	***0.0004***	***0.0001***	***0.4332***	***0.1829***	***0.0001***
		***	***	n0	n0	***
With Constant & Trend	t-Statistic	-4.8869	-5.8078	-1.6926	-2.1319	-5.0522
	Prob.	***0.0017***	***0.0001***	***0.7356***	***0.5126***	***0.0011***
		***	***	n0	n0	***
Without Constant & Trend	t-Statistic	-2.2445	-1.7842	-0.7136	-0.5579	-1.9419
	Prob.	***0.0256***	***0.0709***	***0.4011***	***0.4691***	***0.0508***
		**	*	n0	n0	*
	At First Difference					
		d(LNGDP)	d(LNINF)	d(LNT)	d(LNINV)	d(LNFD)
With Constant	t-Statistic	-16.6924	-11.6263	-7.6706	-7.2671	-27.4910
	Prob.	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***0.0001***
		***	***	***	***	***
With Constant & Trend	t-Statistic	-15.3124	-11.7726	-8.0372	-7.5090	-26.9427
	Prob.	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***0.0000***
		***	***	***	***	***
Without Constant & Trend	t-Statistic	-16.8656	-11.9897	-7.6807	-7.3627	-28.0630
	Prob.	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***0.0000***
		***	***	***	***	***
Notes:						
a: (*)Significant at the 10%; (**)Significant at the 5%; (***) Significant at the 1% and (no) Not Significant						
b: Lag Length based on AIC						
c: Probability based on MacKinnon (1996) one-sided p-values.						
This Result is The Out-Put of Program Developed By:						

Dr.ImadeddinAlMosabbeh				
College of Business and Economics				
Qassim University-KSA				

The result from the unit root test in table 2 indicates that some of the variables are integrated of order zero I (0) and others order one I (1). PP test indicates that lnGDP, lnINF and lnFD are stationary at their levels which mean they are *I* (0) series (integrated of order zero) while lnT and lnINV are stationary at their First Difference which mean they are *I* (1) series (integrated of order one). In this case performing a Cointegration test is necessary to establish long run relationships. The use of the Johansen Cointegration test is no longer valid. The appropriate Cointegration test is performed using the Autoregressive Distributed Lag Model (ARDL) and Bound test proposed by Pesaran, Shin & Smith (2001).

4.3 ARDL Model

Econometric literatures provide several Cointegration techniques which can be applied to identify the long-run associations between the variables such as residual based Engle and Granger (1987) test, the maximum likelihood-based Johansen (1991,1995); and Johansen and Juselius (1990) tests. These Cointegration tests are not appropriate when the sample size is small and variables are integrated at different orders (Shahbaz et al. 2015). Since the variables are integrated at different levels the researchers use ADRL and the Bound test.

Table 3: Autoregressive Distributed Lag (ARDL) Model Results

Dependent Variable: lnGDP				
Method: ARDL				
Date: 10/25/20 Time: 05:58				
Sample (adjusted): 1982 2019				
Included observations: 38 after adjustments				
Maximum dependent lags: 2 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (2 lags, automatic): lnINFlnTlnINVlnFDlnFD				
*lnFDlnFD*lnINV				
Fixed regressors: C @TREND				
Number of models evalulated: 1458				
Selected Model: ARDL(2, 1, 1, 2, 1, 1, 1)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
lnGDP(-1)	-0.044340	0.172292	-0.257356	0.7994
lnGDP(-2)	-0.275201	0.165499	-1.662860	0.1112
lnINF	0.265970	0.209771	1.267907	0.2187
lnINF(-1)	0.155081	0.134027	1.157084	0.2602
lnT	1.646945	0.961342	1.713173	0.1014
lnT(-1)	-2.062494	1.333578	-1.546587	0.1369
lnINV	0.556749	0.811978	0.685670	0.5004
lnINV(-1)	-0.607957	1.106569	-0.549407	0.5885
lnINV(-2)	-0.762950	0.424838	-1.795864	0.0869
lnFD	0.581581	1.215850	0.478333	0.6374
lnFD(-1)	-3.486837	1.754519	-1.987346	0.0601
lnFD*lnFD	-0.153508	0.109962	-1.396011	0.1773
lnFD(-1)*lnFD(-1)	-0.148630	0.091895	-1.617394	0.1207
lnFD*lnINV	-0.290614	0.504918	-0.575566	0.5710
lnFD(-1)*lnINV(-1)	1.300033	0.731562	1.777065	0.0900
C	5.140970	5.326969	0.965084	0.3455
@TREND	0.032481	0.025890	1.254590	0.2234
R-squared	0.637177	Mean dependent var		1.180073
Adjusted R-squared	0.360741	S.D. dependent var		0.858572
S.E. of regression	0.686460	Akaike info criterion		2.387134
Sum squared resid	9.895761	Schwarz criterion		3.119739
Log likelihood	-28.35555	Hannan-Quinn criter.		2.647789
F-statistic	2.304971	Durbin-Watson stat		1.991856
Prob(F-statistic)	0.037165			

***Note: p-values and any subsequent tests do not account for model selection**

This study employed ARDL Bounds test to investigate whether Cointegration relationship exists between Budget Deficits (FD_t) and Economic Growth (GDP_t). Since ARDL bounds testing approach is highly sensitive to lag length selections, this study chooses ARDL (2, 1, 1, 2, 1, 1, 1) and Akaike Information Criterion (AIC) as benchmark specifications.

4.4 Bound Test

The results of the ARDL bounds testing for Cointegration reveal (see Table 4) that F-statistics exceeds the upper critical bound at 1% level of significance. Thus, according to decision criteria, this study confirms the existence of long run Cointegration in the model.

Table 4: ARDL Bounds Test

ARDL Bounds Test				
Date: 10/24/20 Time: 09:20				
Sample: 1982 2019				
Included observations: 38				
Null Hypothesis: No long-run relationships exist				
Test Statistic	Value	k		
F-statistic	11.25370	4		
Critical Value Bounds				
Significance	I0 Bound	I1 Bound		
10%	3.03	4.06		
5%	3.47	4.57		
2.5%	3.89	5.07		
1%	4.4	5.72		

4.5 Estimated Short Run Coefficient Based on Error Correction Model

Table 5 shows the short-run coefficients using the Error Correction Model (ECM). The speed of adjustment parameter is relatively large with the right negative sign, indicating that there is a greater rate of convergence toward equilibrium. By this finding, it is concluded that any disequilibrium in the short run is adjusted and converged back to equilibrium in the long run. Hence, the model combines flexibility in dynamic specification with desirable long-run properties.

Table 5: Short Run Coefficient Results

ARDL Cointegrating And Long Run Form				
Dependent Variable: LNGDP				
Selected Model: ARDL(2, 1, 1, 2, 1, 1, 1)				
Date: 10/25/20 Time: 06:10				
Sample: 1980 - 2019				
Included observations: 38				
Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGDP(-1))	0.275201	0.165499	1.662860	0.1112
D(LNINF)	0.265970	0.209771	1.267907	0.2187
D(LNT)	1.646945	0.961342	1.713173	0.1014

D(LNINV)	0.556749	0.811978	0.685670	0.5004
D(LNINV(-1))	0.762950	0.424838	1.795864	0.0869
D(LNFD)	0.581581	1.215850	0.478333	0.6374
D(LNFD ^ 2)	-0.153508	0.109962	-1.396011	0.1773
D(LNFD * LNINV)	-0.290614	0.504918	-0.575566	0.5710
D(@TREND())	0.032481	0.025890	1.254590	0.2234
CointEq(-1)	-1.319541	0.239428	-5.511226	0.0000
Cointeq = LNGDP - (0.3191*LNINF -0.3149*LNT -0.6170*LNINV -2.2017*LNFD -0.2290*LNFD*LNFD + 0.7650*LNFD*LNINV + 3.8960 + 0.0246*TREND				

The coefficient of the Error correction term equal to -1.319541 implied a correct sign, which measures the speed of adjustment back from the short-term to the long-term equilibrium, the speed of adjustment parameter is relatively large with the right negative sign, indicating that there is a greater rate of convergence toward equilibrium. By this finding, it is concluded that any disequilibrium within the fiscal deficit of The Gambia in the short run is adjusted and converged back to equilibrium in the long run. The result also indicated that speed of adjustment is quite fast from the short-term to the long-term equilibrium because the probability is significant.

In the short-run, the deficit is positively related with growth and deficit square is negatively related with growth but they are insignificant.

4.6 Estimated Long Run Coefficients

Table 6: Result for the Estimated Long Run Coefficient

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNINF	0.319089	0.184245	1.731875	0.0980
LNT	-0.314920	0.779403	-0.404052	0.6903
LNINV	-0.617001	0.588197	-1.048970	0.3061
LNFD	-2.201716	1.191629	-1.847652	0.0788
LNFD*LNFD	-0.228972	0.092174	-2.484126	0.0215
LNFD*LNINV	0.764977	0.497782	1.536773	0.1393
C	3.896028	3.796637	1.026179	0.3165
@TREND	0.024616	0.020359	1.209076	0.2401

The results show in the long run fiscal deficit has a negative effect on economic growth in the Gambia. Deficit square is also negatively and significantly related to economic growth.

The result also indicates there is a negative nonlinear relationship between deficit and growth.

The interaction effect of deficit and investment has a positive and insignificant effect on economic growth of The Gambia.

4.7 Model Diagnosis Tests

This will require verifying whether the estimates from the error correction model are reliable. The most relevant post -estimation tests for dynamic model include Linearity Test (using Ramsey Reset Test), Serial Correlation test (using the LM test), Normality Test (using Jarque-Bera test) and Stability test (using CUSUM test and CUSUM Square test). These tests are all residual based and they are performed on the preferred model.

Autocorrelation test is used to find out if our specification exhibits autocorrelation problems (see Annex 1 for results). The Breusch-Godfrey LM test is one of the prominent tests. The null hypothesis is that there is no serial correlation. Both statistics indicate that there is no presence of serial correlation in the model. The Ramsey Reset Test is used if there is a linear relationship between the dependent. Variable (GDP) and the independent

variables (see Annex 2). The null hypothesis is that the model under consideration is linear and the model is correctly specified. The null hypothesis for linearity cannot be rejected since the test statistics (t-statistic, F statistic and likelihood ratio statistic) are statistically significant. The Jarque-Bera test statistic for normality is 1.025807 and P value of 0.598755 which indicates that the model's residuals are normally distributed (see Annexe 3). The CUSUM test for stability is meant to determine the appropriateness and the stability of the model (see Annex 4). Put differently, the CUSUM test is used to show whether the model is stable and is suitable for making long run decisions. The CUSUM and CUSUM of squares plots explain the stability of coefficients and find the long-run relationship among variables. The results show the plot of CUSUM and CUSUMSQ stays within the 5% critical bounds that we do not reject the null hypothesis of existence of long-run relationships among variables and thus parameters of the model do not suffer from any structural instability over the period of study. That is, all the coefficients in the error correction model are stable.

V. CONCLUSION AND RECOMMENDATION

5.1 Conclusion

This paper investigates the relationship between fiscal deficits and economic growth in the Gambia, the nonlinear relationship between deficit and growth (the Debt Laffer Curve theory) and the interaction effect of deficit and investment on economic growth. The ARDL bounds testing was applied to investigate the cointegrating relationship among the variables. This result indicates a rejection of the null hypothesis of no cointegration and confirms that there is a long-run association among the variables at 5% level of significance.

The results show in the long run fiscal deficit has a negative effect on economic growth in the Gambia. Deficit square is also negatively and significantly related to economic growth. But interestingly the interaction effect of deficit and investment has a positive and insignificant effect on economic growth of The Gambia. The result also indicates there is a negative nonlinear relationship between deficit and growth. The findings are in support of the neoclassical theory.

5.2 Recommendation

Since deficits have a negative effect in the short run, the government should reduce its recurrent expenditure and spend the deficit on economically viable and productive sectors that will boost economic activities and create more jobs for the youth of The Gambia. This will reduce unemployment. The high fiscal deficit will undermine growth prospects and thus will put an additional burden on fiscal sustainability.

However, the key issue is the response of private investment to a change in the fiscal deficits. The interaction effect of deficit and investment has a positive and insignificant effect on economic growth of The Gambia. If private investment rises by the same amount as fiscal deficits rise, then there is no change in national savings and no further adjustments would be required. Further, while revenue measures should focus on minimizing distortions, expenditure reforms should primarily address inefficiencies in spending. Such policies would not only provide fiscal space but also contribute directly to medium to long term growth.

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ANNEXES

Annex 1: Breusch-Godfrey Serial Correlation LM Test for Autocorrelation:

F-statistic	2.007332	Prob. F(2,19)	0.1619
Obs*R-squared	6.628696	Prob. Chi-Square(2)	0.0364

Test Equation:
Dependent Variable: RESID
Method: ARDL
Date: 10/25/20 Time: 06:13
Sample: 1982 2019
Included observations: 38
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGDP(-1)	-0.127296	0.233358	-0.545497	0.5918
LNGDP(-2)	0.285106	0.217091	1.313304	0.2047
LNINF	0.015653	0.201469	0.077693	0.9389
LNINF(-1)	0.045133	0.131929	0.342103	0.7360
LNT	-0.386988	0.954778	-0.405317	0.6898
LNT(-1)	0.538185	1.329380	0.404839	0.6901
LNINV	-0.333624	0.804351	-0.414774	0.6830
LNINV(-1)	0.372695	1.074032	0.347006	0.7324
LNINV(-2)	-0.196238	0.419771	-0.467490	0.6455
LNFD	0.105558	1.162629	0.090792	0.9286
LNFD(-1)	-0.122400	1.693610	-0.072271	0.9431
LNFD*LNFD	-0.060377	0.109918	-0.549293	0.5892
LNFD(-1)*LNFD(-1)	-0.038060	0.090243	-0.421754	0.6779
LNFD*LNINV	-0.010407	0.482342	-0.021576	0.9830
LNFD(-1)*LNINV(-1)	0.052737	0.705448	0.074756	0.9412
C	-0.641465	5.098543	-0.125813	0.9012
@TREND	0.012517	0.026070	0.480135	0.6366
RESID(-1)	0.017937	0.312926	0.057320	0.9549
RESID(-2)	-0.708026	0.358673	-1.974015	0.0631

R-squared	0.174439	Mean dependent var	2.27E-15
Adjusted R-squared	-0.607671	S.D. dependent var	0.517159
S.E. of regression	0.655726	Akaike info criterion	2.300705
Sum squared resid	8.169551	Schwarz criterion	3.119498
Log likelihood	-24.71339	Hannan-Quinn criter.	2.592025
F-statistic	0.223037	Durbin-Watson stat	1.965507
Prob(F-statistic)	0.998773		

Annex 2: Ramsey RESET Test for Linearity
Equation: UNTITLED
Specification: LNGDP LNGDP(-1) LNGDP(-2) LNINF LNINF(-1) LNT LNT(
-1) LNINV LNINV(-1) LNINV(-2) LNFD LNFD(-1) LNFD*LNFD LNFD(
-1)*LNFD(-1) LNFD*LNINV LNFD(-1)*LNINV(-1) C @TREND
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	1.802248	20	0.0866
F-statistic	3.248099	(1, 20)	0.0866

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	1.382582	1	1.382582
Restricted SSR	9.895761	21	0.471227
Unrestricted SSR	8.513178	20	0.425659

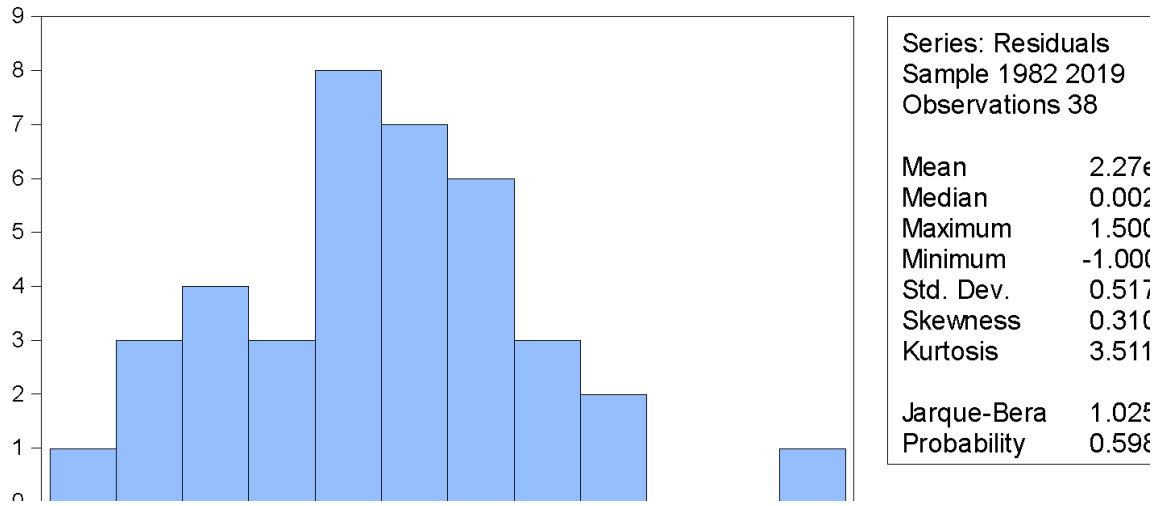
Unrestricted Test Equation:
Dependent Variable: LNGDP
Method: ARDL
Date: 10/25/20 Time: 06:15
Sample: 1982 2019
Included observations: 38
Maximum dependent lags: 2 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic):
Fixed regressors: C @TREND

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNGDP(-1)	0.038097	0.170019	0.224073	0.8250
LNGDP(-2)	-0.372780	0.166351	-2.240924	0.0365
LNINF	0.286855	0.199707	1.436376	0.1664
LNINF(-1)	0.288356	0.147291	1.957725	0.0644
LNT	2.088818	0.946004	2.208045	0.0391
LNT(-1)	-2.150127	1.268392	-1.695159	0.1056
LNINV	1.177476	0.845090	1.393315	0.1788
LNINV(-1)	-1.455450	1.152048	-1.263359	0.2210
LNINV(-2)	-0.721936	0.404415	-1.785135	0.0894
LNFD	1.872162	1.359460	1.377136	0.1837
LNFD(-1)	-5.088706	1.889618	-2.692981	0.0140
LNFD*LNFD	-0.272891	0.123735	-2.205453	0.0393
LNFD(-1)*LNFD(-1)	-0.221172	0.096167	-2.299867	0.0324
LNFD*LNINV	-0.857924	0.573912	-1.494870	0.1506
LNFD(-1)*LNINV(-1)	1.903117	0.771626	2.466371	0.0228
C	4.606135	5.071551	0.908230	0.3746
@TREND	0.066313	0.030949	2.142636	0.0446
FITTED^2	-0.314308	0.174398	-1.802248	0.0866

R-squared	0.687869	Mean dependent var	1.180073
Adjusted R-squared	0.422558	S.D. dependent var	0.858572
S.E. of regression	0.652425	Akaike info criterion	2.289275
Sum squared resid	8.513178	Schwarz criterion	3.064973
Log likelihood	-25.49622	Hannan-Quinn criter.	2.565262
F-statistic	2.592687	Durbin-Watson stat	2.128765
Prob(F-statistic)	0.021891		

*Note: p-values and any subsequent tests do not account for model selection

Annex 3: JaqueBera Test for Normality



Annex 4: Stability Test (CUSUM Residual Test and CUSUM Square Residual Test)