An Empirical Estimation of the Optimal Level of Fiscal Deficit in Guinea

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Abstract

Excessive deficits, irrespective of the mode of financing, are assumed to be growth retarding. The conventional wisdom is that high budget deficit is a source of economic instability. Empirical research, however, does not conclusively support this conventional wisdom; results are mixed and controversial across countries (see Fischer, 1993; Nelson and Singh, 1994; Ghura and Hadjimichael, 1996 and Kneller et al., 2000). These conflicting results have raised the important question of heterogeneity and also underscored the usefulness of time series data for country specific studies in order to address heterogeneity. This paper sought to ascertain the relationship between fiscal deficits and economic growth in Guinea and to find the threshold level of fiscal deficit that is conducive for growth. The empirical results indicate that there exist a positive relationship between fiscal deficit and economic growth in Guinea albeit with a one year lag. The threshold level of fiscal deficit conducive for economic growth for Guinea was identified at 3.0 per cent. The findings of this paper provide ample evidence in support of the proposition that fiscal deficit beyond certain threshold is detrimental to growth. This suggests that the Guinean authorities should endeavour to implement policy measures aimed at reducing fiscal deficits to levels below or equal to 3.0 per cent (levels consistent with economic growth).

Keywords: *Fiscal deficit, economic growth, threshold, Guinea*

JEL Classification: *C2, E1, E2, O4, O5*

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I. Introduction

Excessive deficits, irrespective of the mode of financing, are assumed to be growth retarding. For instance, deficits financed through arrears amounts to the imposition by the government of an illegal and unexpected tax on its local creditors. This will lead to abrupt reduction in the profitability of local investors, dent relationship between the private and the public sectors, or perhaps create a crisis of confidence and, thus, dampened private initiative. Even when the accumulation is limited to domestic arrears, the damage done to the profitability of national ventures (including foreign affiliates) could be considerable and the country's credibility could be thoroughly dented. With respect to deficit financing through monetary expansion which amounts to imposition of an inflation tax that erodes the real value of private claims on the government, Beaugrand (2004) noted that the negative effects on economic

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activity and social peace of continued (even if eventually unsuccessful) attempts to impose the inflation tax will involve creating uncertainty and, in particular, real interest rates and real exchange rates instability. The external financing option of deficits through the issue of foreign liabilities or accumulation of external arrears, could through the market perception of the risk of future debt-servicing difficulties, push up the country's risk premium, thereby raising the country's cost of borrowing in the world financial markets.

The effect of fiscal deficit on economic growth is one of the vastly disputed issues in economics. Clearly, the concern about crowding-out is closely related to the concept of intergenerational equity. Indeed, there is no consensus among economists on this issue either theoretically or empirically. The conventional wisdom is that high budget deficit is a source of economic instability. Empirical research, however, does not conclusively support this conventional wisdom as results are mixed and controversial across countries, data and methodologies (see Fischer, 1993; Nelson and Singh, 1994; Ghura and Hadjimichael, 1996 and Kneller et al., 2000). These conflicting results have raised the important question of heterogeneity and also underscored the usefulness of time series data for country specific studies in order to address heterogeneity.

On the other hand, one strand of the argument, following Keynes, is that high fiscal deficits accelerate capital accumulation and growth (Krishnamurthy 1984, Chandrasekhar 2000, and Shetty 2001). The accent here is that enlarged fiscal deficit as a result of public sector investment, particularly in infrastructure, encourages growth in the private sector. Increasing public investment within an appropriate policy framework, gives the private sector adequate poise and incentives to invest on a massive scale leading to overall economic growth.

The magnitude of deficit spending has important implications on macroeconomic stability. In all probability, the decision to run deficits is guided by public understanding and conviction about the overall impact of deficit, that is, if on balance, deficits provide benefits to some individuals at little or no detriment to others, or if deficit simply reallocate income. The theoretical debate regarding the prudency and the probability of governments persistently operating an unlimited budget deficit is inconclusive. However, in real life the long-run government expenditures and taxes are endogenously determined so as to avoid a catastrophe. If the current deficits are not sustainable, in the long run the government will be forced to repudiate its debt, either explicitly or through inflation depreciation. In a growing economy, the government deficit may be regarded as well as controlled if the deficit grows at a rate slower than the growth rate of the economy. If the real interest rate is less than the economic

growth rate, deficits could continue forever without an increase in the ratio of debt to GDP. In such a case the deficit need not be zero in the long run.

In the light of the controversy that has arisen in recent times regarding the impact of deficit financing in on economic growth, where some authors have found positive relationship between the two variables while others have reported negative relationship, it is germane to empirically ascertain two critical issues for Guinea: the relationship between fiscal deficit and economic growth and the level of fiscal deficit that is beneficial to economic growth In Guinea. The assumption is that there is a level of fiscal deficit beyond which economic growth could be retarded.

This paper seeks to ascertain the relationship between fiscal deficits and economic growth in the Guinea and to determine the threshold level of fiscal deficit that is conducive for economic growth. Determining the appropriate threshold for this significant indicator is critical in the overall economic management as it would inform policy in Guinea. The remaining part of the paper is organized as follows: Part II reviews theoretical and empirical literature while part III contains analytical framework. The results are presented in Part IV. Part V contains the summary and some concluding remarks.

II. Theoretical and Empirical Review

At the theoretical plane, there are three schools of thought regarding the economic impacts of fiscal deficits: Neoclassical, Keynesian, and Ricardian. The Neoclassical paradigm anticipates perceptive individuals planning consumption over their own life cycles. Fiscal deficits hoist total lifetime consumption by shifting taxes to succeeding generations. If economic resources are fully employed, increased consumption inevitably implies diminished saving. Interest rates must then increase to equilibrate the capital markets. Accordingly, unrelenting deficits "crowd out" private capital accumulation.

Within the Keynesian analysis, a considerable proportion of the population is thought of as either narrow-minded or liquidity constrained. The propensities to consume out of current disposable income of these individuals are assumed to be very high. A momentary tax cutback, therefore, has an instantaneous and quantitatively momentous impact on aggregate demand. If the economy's resources are at the outset underemployed, national income increases, in so doing generating second round effects and the renowned Keynesian multiplier. Given that deficits motivate both consumption and national income, saving and capital accumulation need not be negatively affected. Thus, aptly timed deficits have advantageous consequences on economic growth.

In the Ricardian analysis, succeeding generations are associated through intentional, selflessly goaded resource transfers. Within definite circumstances, this implies that consumption is determined as a function of dynastic resources, to be precise, the total resources of a taxpayer and all of his descendants. In view of the fact that deficits simply shift the payment of taxes to upcoming generations, the current discounted values of taxes and expenditures must be equal, and in so doing it leaves dynastic resources unchanged. Thus, deficit financing neither enhances nor retards economic growth.

Two diverse views subsist on the effects of increased government expenditure on investment. The conventional view argues that government expenditure crowds out private investment. Higher government expenditure, whether financed with taxes or debt, increases the demand for goods and services, raising interest rates, making capital more expensive and, as such, reducing private investment. The non-conventional view sees government expenditure stimulating private investment. The 'crowding in' of investment occurs when the economy's resources are unemployed/under-employed (Ahmed and Miller, 2000). In a developing country like Guinea, government expenditure on infrastructure can induce private investment. One of the major channels through which fiscal deficits impacts on the real economy is the 'crowding in' and 'crowding out' effects.

The neoclassical school considers individuals planning their consumption over their entire life cycle. By shifting taxes to future generations, fiscal deficits increase current consumption. By assuming full employment of resources, the neoclassical school argues that increased consumption implies a decrease in saving. Interest rates must rise to restore equilibrium in the capital markets. Higher interest rates, in turn, result in a decline in private investment. However, the Keynesians provide a counter argument to the 'crowding-out' effect by making reference to the expansionary effects of fiscal deficits. They argue that usually fiscal deficits result in an increase in domestic production, which makes private investors more optimistic about the potential direction of the economy encouraging them to invest more. This is known as the "crowding in" effect. Indeed, the traditional Keynesian view differs from the standard neoclassical paradigm in two basic ways. It presupposes that some economic resources are unemployed and the existence of a large number of liquidity constrained individuals. The latter assumption guarantees that aggregate consumption is very sensitive to changes in disposable income.

One of the earliest formal studies on the effects of fiscal deficits was by Diamond (1965), who contended that a permanent increase in the proportion of nationally held debt to national income depresses the steady state capital-labor ratio. At

the original rate of interest, consumers are unwilling to hold the original volume of physical capital and bonds, plus the new bonds. Rising interest rates motivate additional saving and reduce investment until capital market equilibrium is reestablished. Thus, unrelenting government deficits crowd out private capital accumulation. Diamond's study however, centered on permanent changes in deficits, and does not shed light on the effects of temporary changes.

Motivated by the gap in Diamond's analysis and desirous to bring to the fore the outcome of the same analysis based on temporary changes in deficits, Auerbach and Kotlikoff (1987) carried out policy simulations within a more complex neoclassical model. The authors noted that the immediate impact of a temporary fiscal deficit may be exceptionally minute, and perhaps vicious, a temporary deficit might motivate saving in the short run. This result echoes a number of contemplations. At the outset, economic lives are fairly long, so that the effect of an augmentation to lifetime wealth on current consumption, the "wealth effect" is minuscule. Besides, if government spending is held unchanged, then temporary deficits mirror tax reductions. Characteristically, this implies lower marginal tax rates. Reduced capital income tax rates motivate saving unswervingly by raising the after tax rate of return. Momentarily reduced labor income tax rates encourage inter-temporal substitution, raising current income, and consequently saving. For rational parameter values, these effects may dominate the wealth effect. Therefore, the neoclassical paradigm means that transitory deficits should have very little effect or even a negative consequence on economic variables in the short run. Nonetheless Auerbach and Kotlikoff acknowledged that wealth effects cumulate over time, as a result even temporary deficits eventually crowd out private capital formation.

Barro (1989) advanced the 'crowding out' and 'crowding in' argument within the framework of the Ricardian equivalence. He argued that an increase in fiscal deficits, say due to an increase in government deficit spending, has to be paid for either now or later, with the total present value of receipts fixed by the total present value of spending. Consequently, a reduction in today's taxes ought to be harmonized by an increase in future taxes, leaving interest rates, and hence private investment, unchanged.

Following Premchand (1984), Yellen (1989) underscored that in standard neoclassical macroeconomic models, the technique selected by the government to finance its spending programme impinges on the levels of consumption, investment and net exports. Such representation assumes that cumulative consumption is higher and national saving lower, provided a given government-spending programme is financed by issuing bonds rather than through current taxation. If resources are fully employed, so that output is fixed,

higher current consumption implies an equal and offsetting reduction in other forms of spending. Thus, investment and/or net exports must be fully "crowded out". She underlined the need to distinguish between "financial" crowding out and "resource" crowding out which occurs when the government competes with the private sector in the purchase of certain resources, including skilled labour and raw materials. When the government sector expands the private sector will contract because of the increase in prices on these resources due to an excess demand by the government, hence this leads to a fall in investment and consumption by the private sector. Thus, the government sector's expansion crowds out the private sector. It is useful to note that resource crowding out is an imperative issue to take into account particularly in developing countries where resources are scarce even occasionally to the private sector, so any excess demand for these resources by the government will severely encroach on the private sector productivity.

Ball and Mankiw (1995) in their contribution maintained that in the long run an economy's output is determined by its productive capacity, which is fundamentally determined by its stock of capital. When deficits shrink investment the capital stock grows more slowly than it otherwise would. Over a year, or two, this crowding out of investment has a negligible effect on the capital stock. But if deficits persist for a decade or more, they can significantly decrease the economy's capacity to produce goods and services. Furthermore, fiscal deficits by reducing national saving must reduce either investment or net exports. As a result, they must lead to some combination of a lesser capital stock and greater foreign ownership of domestic assets. If fiscal deficits crowd out capital, national income falls because a smaller fraction is produced; if fiscal deficits lead to trade deficits, just as much is produced, but less of the income from production accrues to domestic residents.

Devereux and Love (1995) investigated the impact of government deficit spending in a two-sector endogenous growth model developed by King and Rebelo (1990). They extended the model to accommodate an endogenous consumption leisure decision. The authors concluded that there is a positive relationship between lump sum financed government deficit spending and growth rates. They explained that, as in many "endogenous growth" models, the rate of growth are positively related to the rate of return on human and physical capital accumulation. The return on human capital accumulation is higher the greater the fraction of time spent working, in either sector. A higher rate of government deficit spending generates negative wealth effects, leading to a reduction in leisure and a rise in hours worked. Consequently, the rate of growth rises. Although government spending raises the long-run growth rate; it reduces

welfare since government deficit spending is a less than perfect substitute for private spending.

The notion of the existence of a systematic non-linear relationship between government deficit and economic growth has been reformulated and popularized in several studies. Armey and Armey (1995), developed the 'Armey Curve', and introduced the notion of an optimal size of deficit to the debate. They opined that, the non-existence of government causes a state of anarchy and low levels of output per capita, because there is no rule of law, and no protection of property rights. Consequently, there is little incentive to save and invest, because the threat of expropriation exists. Similarly, where all input and output decisions are made by government, output per capita is also low. However, where there is a mix of private and government decisions on the allocation of resources, output should be larger. Accordingly, the output-enhancing features of government should dominate when government is very small, and expansions in governmental size should be associated with expansions in output. Nevertheless, at some point growth-enhancing features of government should diminish and further expansion of government should no longer lead to output expansion. Specifically, as spending rises, additional projects financed by government become increasingly less productive and the taxes and borrowing levied to finance government impose increasing burdens. At some point, the marginal benefits from increased government spending become zero.

Similarly, Yavas (1998) shown that an increase in the size of fiscal deficit will increase the steady-state level of output if the economy is at a low steady-state (i.e. underdeveloped), and will decrease the steady-state level of output if the economy is at a high steady-state (i.e., developed). He argued that in the underdeveloped countries, a significant portion of the deficits is directed to the building of the infrastructure of the economy and this type of expenditure will have a stimulating effect on private sector production. In contrast, the developed countries already have most of their infrastructure built and a major part of their deficit spending is on welfare programmes and various social services. Accordingly, the positive effect of spending on these programmes on private output will not be as great as that of expenditures on infrastructure.

Barro (1990) pointed out that different sizes of fiscal deficits have two effects on growth rate. Specifically, an increase in taxes reduces growth rate through disincentive effects, but an increase in government spending raises marginal productivity of capital, which raises growth rate. He argued that the second force dominates when the government is small, and the first force dominates when the government is large. Consequently, the effect of increased government spending on economic growth should be non-monotonic and

various optimal size of government should exist. He showed that the government services are 'optimally' provided when their marginal product equals unity, 'called the Barro rule'. Interestingly, based on empirical findings Barro plotted an inverted U-shaped curve showing the relationship between growth rate and government deficit- expenditure ratio.

Fischer (1993) noted that large fiscal deficits and growth are negatively related. Among other variables such as inflation and distorted foreign exchange markets, he emphasized the importance of a stable and sustainable fiscal policy, to achieve a stable macroeconomic framework. Easterly and Rebelo (1993) supported these findings as they reported a consistent negative relationship between growth and fiscal deficits.

Ndung'u (1995) studied the link between budget deficit, the rate of inflation and money supply growth on the one hand, and money printing and the rate of inflation on the other. Using multivariate Granger Non-Causality tests, he reported that, at least in the case of the Kenyan economy, fiscal deficits affect monetary base growth. It was also found that there are both direct and indirect links between money printing and the rate of inflation. He concluded that fiscal deficits affect growth in the monetary base, money printing affects the rate of interest and hence, the rate of inflation and in addition, excess money printing affects the rate of inflation.

Al-Khedair (1996) studied the relationship between budget deficit and economic growth in the seven major industrial countries (G-7). The data utilized covered the period 1964 to 1993. The variables included in the model were, budget deficit, the money supply, nominal exchange rate, and foreign direct investment. He found that budget deficit has a significant positive impact on economic growth in France, Germany, and Italy. Overall his results showed that budget deficit seems to positively and significantly affect economic growth in all the seven major industrial countries.

Carolyn (1997) motivated by the persistent deficits in Zimbabwe, examined public sector deficits and macroeconomic stability in Zimbabwe. The author identified an intense debt problem, drought and terms of trade shocks coupled with the government's unwillingness to engage in fiscal adjustment as fundamental macroeconomic setbacks in Zimbabwe. Findings of the study showed that uncertainty caused by the growing public-sector debt reduced private investment and further resulted in a decline in growth. The macroeconomic model explored by the researcher showed that the variable with the greatest influence on overall growth was agricultural output. However, the budget deficit had an unambiguously negative impact on exports. It also reduced private

welfare, worsened income distribution and reduced employment. The author concluded that the growth of government resulted in a drain on the economy, rather than facilitate economic growth and development.

Anyanwu (1998) deviated markedly from past studies that focused more on the effects of deficits and concentrated on the impact of deficits financing. He applied regression analysis to pooled cross-section and time series data for Nigeria, Ghana and the Gambia. The results did not reveal a significant positive association between overall fiscal deficits (and its foreign financing) and domestic nominal deposit interest rates. However, the author reported a significant positive relation between domestic financing of the fiscal deficits and domestic nominal deposit rates. He concluded that the concern of economists in the Sub-region should shift from the deficits itself to the manner of financing the deficit.

Mugume and Obwona (1998), concerned about the role of fiscal deficits in the reform programme of Uganda, investigated public sector deficits and macroeconomic performance in Uganda. The study set out to provide a more systematic modelling framework to explain the interrelationships between fiscal deficits, current account deficits and real exchange rate depreciation. Another focus of the research was to analyse the behaviour of important aggregate variables such as the price level, current account balance, external sector and money stock as influenced directly and indirectly by changes in fiscal deficits. A small macroeconomic model that captured the interactions between exports, imports, real exchange rate, government expenditure, price, and money supply was specified. The empirical strategy attempted to build an integrated model linking the public sector with the financial market and then generate implications for the conduct of fiscal policy. A distinct finding of the estimations was the observed interaction of the public sector and financial sector.

Ahmed and Miller (2000) examined the effects of disaggregated government expenditure on investment using OLS, fixed-effect, and random effect methods. Their empirical results produced several conclusions. First, the openness variable has a significantly positive effect on investment only for developing countries. For developed countries, openness does not significantly affect investment. Second, expenditure on transportation and communication, crowds in investment for developing countries only. Third, tax-financed government expenditure, in general, crowds out investment more frequently that debt-financed government expenditure. That finding may suggest the existence of liquidity constraints within the economy. Finally, expenditure on social security and welfare crowds out investment for both tax and debt-financed increases and in both developing and

developed countries. This is the only category of government expenditure that had such a consistent (negative) effect across all specifications.

A plethora of studies have emerged in recent times regarding the impact of fiscal deficits on economic growth. As the debate on fiscal deficits and growth progressed, more elegant models and empirical strategies have been explored in the analysis of the subject. Prominent among these include, Adams and Bevan (2002), Korsu (2009) and Keho (2010). Their findings are divergent.

Adams and Bevan (2002) assessed the relationship between fiscal deficits and growth in a panel of forty five (45) developing countries. An overlapping generation's model in the tradition of Diamond (1965) that incorporated high-powered money in addition to debt and taxes was specified. The estimation strategy involved a standard fixed effect panel data estimation and bi-variate linear regression of growth on the fiscal deficits using pooled data. An important contribution of the empirical analysis is the existence of a statistically significant non-linearity in the impact of budget deficits on growth. However, this non-linearity, the authors argued, reflected the underlying composition of deficit financing. In effect, Adams and Bevan posited that for a given level of government spending, a shift from a balanced budget to a (small) deficit may temporarily reduce distortions especially if the distortions impact growth rather than output. Based on a consistent treatment of the government budget, the authors found evidence of a threshold effect at a level of the deficit around 1.5 percent of GDP. While there appeared to be a growth payoff to reducing deficits to the identified level of 1.5 per cent of GDP, this effect disappeared or reversed itself for further fiscal contraction. The magnitude of this payoff, but not its general character, necessarily depended on how changes in the deficit were financed (through changes in borrowing or seigniorage) and on how the change in the deficit was accommodated elsewhere in the budget. The authors also found evidence of the interaction effects between deficits and debt stock, with high debt stocks exacerbating the adverse consequences of high deficits.

Moreover, Gale and Orszag (2002) summarized the conclusions of almost 60 studies: of these fifty percent found a "predominantly insignificant" effect of fiscal deficits on interest rates and the other fifty percent a 'mixed 'or 'predominantly insignificant' effects. They argued that even when interest rates do not increase as a result of fiscal expansion (e.g., because of foreign capital savings replacing domestic savings) economic performance may still be negatively affected by persistent imbalances as capital stock accumulation declines, either because of a fall in domestic or foreign net investment. The authors indicated that a projected rise in the fiscal deficits-GDP ratio of 1 one percentage results in an increase in the long term interest rates by 0.4 to 0.6 percentage points. In the

same manner, Dai and Singleton (2003) findings indicated that a one (1) percentage point increase in the deficits increases 10- year (interest) rate by 41 basis points. Furthermore, Laubach (2003) reported that fiscal deficit has a significant effect on interest rate. A one per cent increase in the projected deficit-to-GDP ratio is estimated to raise long term interest rates by approximately 25 basis points. Similarly, interest rate rises by about 4 basis points in response to a percentage point in the projected debt-GDP ratio.

Obi and Nurudeen (2009) examined the effects of fiscal deficits and government debt on interest rates in Nigeria, by applying the Vector Auto-regression approach. The results of the estimation show that the explanatory variables account for approximately 73.6 per cent variation in interest rate in Nigeria. The estimation also shows that fiscal deficits and government debt are statistically and economically significant. For instance, a one (1) percentage increase in government debt-GDP ratio raises interest rate by approximately 2.47 per cent. The results indicate that fiscal deficits and government debt have positive impact on interest rates, but inflation and international interest rate were found to have negative effect on interest rates. The authors concluded that deficits financing leads to huge debt stock and tends to crowd-out private sector investment, by reducing the access of investors to adequate funds, thereby raising interest (and/or lending) rates. The rise in interest rate reduces investment demand and output of goods and services. These, in turn, reduce national income as well as employment rate, and the overall welfare of the people would decline.

Korsu (2009)'s finding supported the arguments of Carolyn (1997) and Mugume and Obwona (1998) who worked on Zimbabwe and Uganda, respectively. They argued that fiscal deficits were inimical to macroeconomic performance as a whole and advocated for fiscal restraint as a pathway to improving other sectors of the economy and welfare. Korsu (2009)'s work recognised economic growth, low and stable prices and healthy external balance as the macroeconomic policy objectives of the economy of Sierra Leone. These he argued have been hampered by the persistence of fiscal deficits following some background analysis and historical records. To provide empirical support to the background information, aggregate annual data for the period 1971 to 2005 were used in an econometric estimation. Predicated on an open economy model, equations for money supply, price level, real exchange rate and the overall balance of payments were specified. The empirical models were estimated using a 3-stage least square estimation technique. The estimated results showed that fiscal restraint improved the external sector of Sierra Leone by reducing money supply and the price level. The important contribution of Korsu's paper rests on the simulation experiments which differ from previous studies reviewed. The results

pointed to the need for fiscal restraint and improved revenue generation to meet the expenditure requirements of the government.

In his contribution to the debate, Keho (2010) investigated the causal relationship between budget deficit and economic growth in seven member countries of the West African Economic and Monetary Union (WAEMU). One specific objective was pursued which was to examine if fiscal deficits were really bad for economic growth in all countries of the WAEMU. The study employed the granger causality test developed by Toda and Yamatoto (1995). Annual time series data on real GDP growth, ratio of gross fixed capital formation and public deficit or surplus as a percentage of GDP were used. Unlike most empirical works on granger causality tests, the empirical analysis was undertaken in a multivariate form using gross fixed capital formation as a control variable. This mediating variable related meaningfully to economic growth in traditional growth models and mitigated the possibility of distorting the causality inferences due to omission of relevant variables. A striking feature of the descriptive statistics of the variables was that low levels of economic growth were associated with persistent fiscal deficits. In addition, the correlation coefficients showed that deficit and economic growth were positively related. The empirical results were mixed across countries. In three cases the author found no causality evidence between fiscal deficits and growth. The findings also indicated a two-way causality in three countries, deficits having adverse effects on growth. Overall the author argued that the results gave support to the WAEMU budgetary rule aimed at restricting the size of fiscal deficits as a prerequisite for sustainable growth and real convergence.

Separate set of studies have attempted to determine the level of government spending at which the growth rate is optimized. Peden (1991) estimated that the optimal size of U.S. government was at 20.0 percent of GDP. A similar conclusion was obtained by Scully (1994) who estimated that optimal growth-maximizing average rate for federal, state and local taxes combined was between 21.5 per cent and 22.9 per cent of the gross national product in the United States in the period 1929-1989.

Vedder and Gallaway (1998) estimated that the optimal size of federal government spending based on the Armey Curve in the United States in the period 1947-1997 was 17.45 per cent of gross domestic product, meaning that federal spending of about 22.0 per cent at the beginning of 1990s was roughly 20.0 per cent larger from the standpoint of growth optimization, considering general government spending. In addition, Chao and Grubel (1998) estimated that in the period 1929-1996, the optimal size of government spending in Canada was about 27 per cent, which is about 20 percentage points less than the actual government spending in 1996. In a somewhat different context, by examining

socio-economic indicators, Tanzi and Schuknecht (1998) and Afonso, Schuknecht and Tanzi et al (2003) suggest that general government spending in excess of 30.0 per cent of national output reduces economic growth and produces practically no additional improvement in social measures of well-being.

It can be concluded from the empirical studies reviewed that there are some similarities and differences between these studies dealing with the impact of public investment on private investment and economic growth. The similarities are that some of them focus either on cross-section or static analysis, and use the same estimation technique. For example Barro (1991); Arora and Dua (1993); Nelson and Singh (1994)25; Kelly (1997); among others estimated their economic model by using the OLS method. Furthermore, many other studies resulted in a similar conclusion in both developed and developing countries and lent support to the existence of a significant crowding-in effect of private investment by public investment, through the positive impact of infrastructure on private investment productivity (e.g. Aschauer (1989); Kelly (1997); Miller and Russek (1997); Argimon, et al. (1997); Ghali and Al-shamsi (1997); Bahmani (1999); Ahmed and Miller (2000)).

In contrast, other studies suggest different conclusions. Studies including Barro (1991), Ghali (1998), among others, found support for a negative relationship between fiscal deficits and economic growth. Thus, overall results from the empirical literature with respect to the impact of fiscal deficits and growth are ambiguous. Another important argument emerging from the review is that the exact impact of deficits on economic growth is difficult to measure. Most of the existing empirical analyses in this area assume that the relation between deficits and growth is linear[1] and even the two studies that assumed non-linearity and attempted to establish threshold are not country specific. From this point of view, this study will be the first to apply the threshold model using time series data for the WAMZ member countries as well as for the individual member countries of the Zone.

II.1 Fiscal Deficit, Inflation and Output in Guinea: Recent Developments

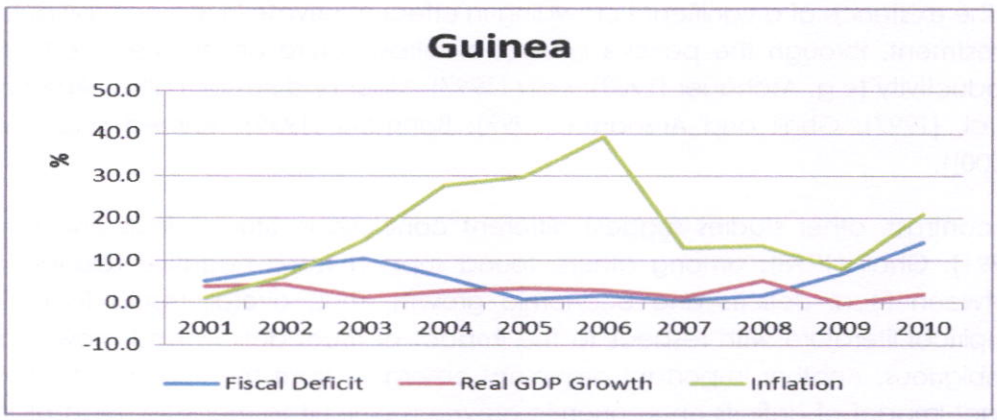
Fiscal operations of government persistently resulted in deficits in the last ten (10) years. The level of deficits as a ratio of GDP deteriorated progressively from 5.2 per cent in 2001 to 10.5 per cent in 2003, but moderated to 5.9 per cent in 2004. Between 2005 and 2008, the ratio was less than 2.0 per cent. However, in 2009 and 2010, deficit/GDP ratios of 6.8 and 14.4 per cent were recorded. This was as a result of the policy embarked upon by the new authorities, including rebuilding of

[1] *With the exception of Giavazzi et al (2000) and Christopher Adams and David Bevan (2002); and Onwioduokit (2012).*

military barracks, improving water and electricity supply in Conakry city and improving some road trunks within the country. With the absence of an approved budget for 2009, these projects were undertaken without strict adherence to public procurement rules and fiscal management guidelines.

With the exception of external debt service and externally-funded capital expenditure, all the other expenditure items recorded an increase in 2009 and 2010, the major ones being the domestic investment expenditure and other current expenditure on goods and services.

Figure 1: Fiscal Deficit/GDP, Output and Inflation



The inflation rate that peaked at 39.1 per cent in 2006 decelerated markedly to lower double digit of 13.5 per cent in 2008. In 2009, the rate declined by 5.6 percentage points from the level in 2008 to 7.9 per cent. The freezing of retail petroleum prices at below market levels and extension of subsidy on some key basic commodities contributed to the price stability. However, in 2010 due to fiscal profligacy and excessive borrowing from the central bank, inflation rate rose significantly to 20.8 per cent.

The growth rate of real GDP in the last ten (10) years has consistently been below 4.0 per cent with the exception of 2002 and 2008, when respective rates of 4.2 and 4.9 per cent were recorded. In 2009, the rate deteriorated significantly to negative 0.3 per cent. This was attributed partly to the international global financial crisis that had a significant effect on the value and output of the country's extractive industries. Also, the freezing of all nonessential expenditure by the interim military government since December 2008 contributed to the sharp contraction in the real GDP growth. The rate, however, improved marginally to 1.9 per cent in 2010 on account of the resumption of constitutional democracy.

III. Analytical Framework and Empirical Methodology

The analytical framework adopted for this study follows essentially the Keynesian framework. Recall that in a simple Keynesian framework, desired aggregate demand relationship is specified in the goods market as:

$$Y = C + I + G + (X - M) \quad (1)$$

With the following behavioural equations:

$$C = a + bY^d, \quad b > 0$$
$$Y^d = Y - T$$
$$I = \delta + \gamma i, \quad \gamma < 0$$
$$G = \bar{G}$$
$$X = s + \sigma e, \quad \sigma > 0$$
$$M = m + \phi Y^d, \quad \phi > 0$$

Where *Y* is output; *C*, consumption; *I*, investment; *G*, government spending which is assumed to be exogenous; *X*, exports; *M*, imports; Y^d, disposable income; *T*, tax revenue; *i*, interest rate; *e*, exchange rate.

In equilibrium (after substituting behavioural equations into the desired aggregate demand equation (1)), output will be given by

$$\bar{Y} = \frac{A}{\theta} + \frac{1}{\theta}\left(\gamma i + \sigma e + G - (b - \phi)T\right) \quad (2)$$

Where $\theta = 1 - b + \phi, \quad A = a + \delta + s - m$

From equation (2), increasing taxes will reduce output, while increasing government spending will increase output.

But fiscal deficit (*FD*) is given by

$$FD = G - T \approx G - (b - \phi)T \quad (3)$$

Fiscal deficit is the excess of government expenditure over its revenue. Assuming that the government derives its total revenue from tax sources (which is quite realistic), G-T gives the deficit position of the government. Since individuals do not spend all their income, the total revenue that could be generated from consumption expenditure is $(b - \phi)T$. Thus, subtracting this from government expenditure will give approximate position of the fiscal balance.

Putting (3) into (2) gives

$$\bar{Y} = \frac{A}{\theta} + \frac{1}{\theta}(\gamma i + \sigma e + FD) \quad (4)$$

Given that Guinea is essentially a small-open economies economy (without the ability to influence international price developments) and for holistic treatment of the economy, the model is extended to incorporate the money monetary sector as well as the external sector. The money market in an open economy can be represented by the following equations:

Money Demand Function: $\frac{M^D}{P} = kY + \lambda i, \qquad k > 0, \ \lambda < 0 \quad (5)$

Money Supply Function: $\frac{M^S}{P} = m_1 \frac{B}{P} + m_2 i, \qquad m_1, m_2 > 0 \quad (6)$

Equilibrium Condition: $M^D = M^S \quad (7)$

where $P \equiv$ is the general price level, $B \equiv$ international reserves held by the central bank and m_1, m_2 are coefficients. From the above money market model, the LM schedule[2] can be specified as

LM Schedule: $i = \psi \frac{B}{P} + \varphi Y, \qquad \psi < 0, \ \varphi > 0 \quad (8)$

Given the importance of the external sector in Guinea, the influence of the sector is incorporated through the balance of payments schedule. The balance of payments schedule is given as

BP Schedule: $B = A_2 - \theta_0 Y + \theta_1 e + \theta_2 i, \qquad \theta_0, \theta_1, \theta_2 > 0 \quad (9)$

where A_2 is the aggregate of exogenous components in the net export function and $\theta_0, \theta_1, \theta_2$ are coefficients.

Putting equation (8) into (3) gives

$$Y = A_1 + \beta_1 \frac{B}{P} + \beta_2 Y + \sigma e + FD \quad (10)$$

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[2] *The LM curve is used to determined equilibrium in the money market. The L stands for liquidity and M for Money.*

where $\beta_1 = \frac{\psi\gamma}{\theta}$ and $\beta_2 = \frac{\phi\gamma}{\theta}$

Putting equation (9) into (10) produces

$$Y = A_1 + \frac{\beta_1}{P}\left(A_2 - \theta_0 Y + \theta_1 e + \theta_2 i\right) + \beta_2 Y + \sigma e + FD \tag{11}$$

Isolating like terms and re-arranging equation (11) gives

$$Y = C + \frac{1}{P}\left(\alpha_1 e + \alpha_2 i\right) + \alpha_3 e + \alpha_4 FD \tag{12A}$$

where

$$1 + \beta_1\theta_0 - \beta_2 = \varphi, \quad C = \frac{A_1 + \beta_1 A_2}{\varphi}, \quad \alpha_1 = \frac{\beta_1\theta_1}{\varphi}, \quad \alpha_2 = \frac{\beta_1\theta_1}{\varphi}, \quad \alpha_3 = \frac{\sigma}{\varphi}, \quad \alpha_4 = \frac{1}{\varphi}$$

Recasting the second term on the right-hand side of equation (12) in logarithmic generic term gives

$$Y = C + \lambda e + \alpha_2 i - \pi + \alpha_4 FD \tag{12B}$$

where $\pi \equiv$ the rate of inflation and $\lambda = \alpha_1 + \alpha_3$.

In equation (12B), equilibrium output is positively related to fiscal deficit.

In a time series context, output is influenced by its own past level (output dynamics) which is consistent with accelerator principle. Equation (12B) can be restated as

$$Y_t = c + \varpi Y_{t-1} + \alpha_2 i_t + \lambda e_t + \alpha_4 FD_t - \pi \tag{13}$$

Recasting (13) gives

$$y_t = c + \delta_1 i_t + \delta_2 e_t + \delta_3 FD_t + \delta_4 \pi \tag{14}$$

where $y_t = Y_t - Y_{t-1}$ which captures the change in GDP (growth rate of GDP) and $\delta_1, \delta_4 < 0$. Equation (14) is essentially an output (GDP) growth model which gives the long-run relationship between output growth (change in output) and fiscal deficit. This relationship is positive; implying that widening of the fiscal deficit will improve growth. However, some empirical studies document the negative relationship between growth and fiscal deficits, while some others establish a positive relationship as given by the simple Keynesian framework. This ambiguity

of the relationship between growth and fiscal deficits suggests a threshold effect of fiscal deficits on growth. This will inform the empirical modelling of growth-deficit relationship in this study.

From the supply-side of the economy, output is a function of capital stock and labour. A simple Cobb-Douglas production function generates a growth model of the form

$$y = \omega_0 + \omega_1 \Delta \ln K + \omega_2 \Delta \ln L \qquad (15)$$

where K refers to capital stock, L refers to labour force growth, Δ is a change notation and $\omega_0, \omega_1, \omega_2$ are coefficients.

III.1 Specification of the Empirical Model

In specifying the empirical model, the study relies on the theoretical framework. From both the demand and supply sides of the economy, variables such as interest rate, exchange rate, inflation, fiscal deficit, investment (change in capital stock) and labour are identified as the key variables explaining growth. However, it is appropriate to include in the empirical model those reform variables that also influence economic growth. In Guinea, financial sector reforms have been undertaken, while trade liberalization policies have also been implemented. Hence, it is appropriate to include financial reforms variable and trade openness variable in the empirical model. The key variables in the empirical model are defined as follows:

Dependent variable

Y_{it} = $GDPG_t$ = Growth rate of real GDP

Independent variables

INV_t = Gross fixed capital formation as a ratio of GDP as a proxy for growth in capital stock.

Lab = Secondary school enrolment as a proxy for labour force.

Def_t = FD/GDP = Fiscal Deficit/GDP, excluding grants

Inf_t = Inflation rate

Int_t = Interest Rate = Lending Rate

M_2GDP_t = M_2/GDP ratio – measuring financial depth

Dep_t = Exchange Rate expressed as a given amount of local currency per US dollar (Depreciation/ appreciation)

OPN_t = Degree of openness of the economy, measured as $\left[\frac{Imports+Exports}{GDP}\right]$

Besides investment, labour force and fiscal deficit; other control variables included in the model are, namely, interest rate (int), exchange rate depreciation/ appreciation (dep), inflation (inf), financial deepening M2/GDP and openness index (OPN). Interest rate has an important role in economic growth. Higher interest rates reduce the growth of consumer spending and economic growth. This is because with higher interest rate, savings becomes more attractive while investment becomes more expensive. more incentive to save in a bank rather than spend, more expensive to borrow, therefore less spending Reduction in investment impacts growth negatively, thus, on credit and less investment; increase cost of mortgage repayments, therefore, reduce disposable income and, therefore, consumer spending. Consequently, an inverse relationship is expected between interest rate and economic growth.

Exchange rate development impacts on the economic growth process. On balance we expect a positive relationship between depreciation and economic growth.

Inflation is another significant variable influencing output growth rate. This variable is especially significant in Guinea, where food prices and other exogenous factors including high imports of food and intermediate products play very important role. In general, very high levels of inflation may undermine economic growth. However, if the inflation rate is low, stable and sustainable, it may be interpreted as an indicator of macroeconomic stability that would enhance growth. And if the economy is at equilibrium higher inflation should impact adversely on growth. Hence, we expect to get an inverse relationship with output growth.

Financial deepening measured by the ratio of M_2 to GDP essentially seek to capture the role of the financial sector development in economic growth. The conventional theory predicts a positive correlation between the level of financial deepening and economic growth. In modern economic theory, the role of the financial sector is seen to be catalytic to the growth of the economy. Also, the index of openness proxy by the ratio of the sum of imports plus and exports over GDP is expected to positively influence growth, all things being equal, the more open the economy the more access to foreign capital that is expected to increase investment and economic growth. Thus, the level of openness of the economy is expected to positively impact on economic growth.

Budget deficit is another significant variable influencing output growth rate. This variable is especially significant for most developing countries including the Guinea, where fiscal discipline plays a very important role. In general very high levels of fiscal deficit may undermine economic growth. However, if the budget deficit is low, stable and sustainable, it may be interpreted as an increased demand for goods and services. And if the economy is below its equilibrium on the Keynesian cross, higher fiscal deficit, that is increased government expenditures, should stimulate growth. Consequently, we expect to a get positive relationship with output growth.

Based on the general framework provided and the foregoing variables identified, the linear growth equation is explicitly specified as follows:

$$GDPG_t = \alpha_0 + \alpha_1 INV_t + \alpha_2 Def_t + \alpha_3 \inf_t + \alpha_4 \text{int}_t + \alpha_5 M2GDP_t + \alpha_6 Dep_t + \alpha_7 OPN_t + \alpha_8 Lab_t + \mu_t \quad (16)$$

Where, $\alpha_1, \alpha_2, , \alpha_5, \alpha_6, \alpha_7, \alpha_8 > 0$ and $\alpha_3, \alpha_4 < 0$.

III.2 Specification of Threshold Autoregressive (TAR) Model

The TAR model specifies that individual observations can fall into discrete classes based on the value of an observed threshold variable (Lee and Wong, 2005). Following the framework of Li (2005), we specify the threshold model for the Guinea as follows:

$$GDPG_t = \alpha_0 + \alpha_1 GDP_{t-1} + \alpha_2 Def_t\left[DM_t\left(Def_t < K^*\right)\right] + \alpha_3 Def_t\left[DM_t\left(Def_t > K^*\right)\right] + \alpha_4 INV_t + \alpha_5 \inf_t + \alpha_6 \text{int}_t + \alpha_7 M2GDP_t + \alpha_8 Dep_t + \alpha_9 OPN_t + \alpha_{10} Lab_t + \mu_t \quad (17)$$

Where DM_t = Dummy variable with values 1 if Def_t > K* or 0 otherwise[3].

Def_t = Annual fiscal deficit - GDP ratio.

K* = The threshold level of fiscal deficit/GDP which is to be calculated.

α_2 = The effect of fiscal deficit below the threshold level.

α_3 = The effect of fiscal deficit above the threshold level.

Other variables are as previously defined.

[3] For ease of presentation in the empirical presentation of results in section IV.4, α_2 is defined as D_{it} = effect of deficits lower than the threshold; and α_3= effects of deficits higher than the threshold.

All the variables are as defined above. From the above equation, *a priori* expectations of a threshold effect of deficit on growth are that $\alpha_2 > 0, \alpha_3 < 0$. If the threshold effect holds then the turning point can be calculated using the relation[4]: $InDef_t = \frac{\alpha_2}{2\alpha_3}$. Taking the antilog of this will give optimal level of fiscal deficit that will maximize real GDP growth.

III.3 Data Sources and Estimation Methodology

GDP growth data, gross capital formation as well as secondary school enrolment data were obtained from the World Bank's World Development Indicators; Fiscal Deficit data were obtained from the Ministries of Finance of Guinea. Imports, Exports, Interest rates, exchange rate, and broad money growth data were sourced from the Central Bank of Guinea, while inflation rates were obtained from the National Bureau of Statistics of Guinea. All variables are measured either in growth rate terms or as ratios.

Different models specified are estimated using different appropriate econometric techniques. For the linear growth model, the study employs the Classical Ordinary Least Squares Technique (OLS) as suggested by Li (2005). For the non-linear model, the study uses the non-linear least square (NLLS) method as suggested by Khan and Senhadji *et al.* (2001). As explained by Khan and Senhadji Khan *et al.* (2001), the method involves the following procedures: for any K*, the model is estimated by OLS, yielding the Residual sum of Squares (RSS) as a function of K*. The least square estimate is found by selecting the value of K* that minimizes the sum of squared residuals. However, for completeness, we specify an alternative threshold model in the spirit of Pollin and Zhu (2006). An extensive and systematic analysis of the data was carried out to ensure conformity with basic properties of the OLS estimate. In particular, the stationarity test using the Augmented Dickey Fuller (ADF) and the co-integration test, using the Engle-Granger Two-Step procedure (EGTS) were applied. The use of EGTS is informed by the large number of the explanatory variables and the fact that not all the series are integrated at of order one to warrant the use of the Johanssen Technique.

III.4 Diagnostic Tests for Optimal Level of Deficit

After identifying the threshold level for deficit, it is important to determine whether the threshold effect is statistically significant. In this regard, this study conducted

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[4] $\frac{\partial GDP}{\partial Def} = \alpha_1 + 2\alpha_3 Def = 0; Def = \frac{\alpha_2}{2\alpha_3} = \frac{\alpha_2}{2\alpha_3}, when\ \alpha_2 > 0, \alpha_3 < 0$

the normality test (J-Qtest); serial correlation (LM test); Heteroscedasticity (ARCH) and Stability (Cusum square).

IV. Analysis of Results

IV.1 Unit Root Test Results

The Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) tests for the stationarity of the variables are presented in Tables 1 and 2.

Table 1: ADF Unit Root Test Results

VARIABLE	ADF-STATISTIC AT LEVEL	ADF-STATISTIC AT 1ST DIFFERENCE	CONCLUSION
DEF	-3.595026**	-	I(0)
DEP	-4.309824***	-	I(0)
INF	-3.225334*	-	I(0)
INV	-4.309824	-4.323979***	I(1)
LENDR	-4.323979	-3.580623**	I(1)
M2GDP	-4.309824	-4.323979***	I(1)
OPEN	-4.309824	-4.339330***	I(1)
RGDPG	-3.221728*	-	I(0)

Source: Author's Computation *** Significant at 1%, ** Significant at 5%,* Significant at 10%

The results of the unit root tests (ADF) show that all the variables with the exception of (lending rate, broad money as a ratio of GDP, Investment and openness,) failed the unit root test at 10.0 per cent level of significance in their level form (see Table 1). All the variables, however, passed the test for stationarity in their first difference form. The results obtained when the test for unit root was conducted using variables in their first difference, are also reported in Table 1. As indicated in the said Table 1, investment, lending rate, broad money as a ratio of GDP and the openness variable were stationary at first difference. Similar results were recorded when we applied the Phillip Perron (PP)test to test for the existence of unit roots in the variables (Table 2).

Table 2: Phillips-Perron Unit Root Test Results

VARIABLE	PP-STATISTIC AT LEVEL	PP-STATISTIC AT 1ST DIFFERENCE	CONCLUSION
DEF	-4.309824***	-	I(0)
DEP	-4.309824***	-	I(0)
INF	-3.225334*	-	I(0)
INV	-4.309824	-4.323979***	I(1)
LENDR	-4.309824	-3. 225334*	I(1)
M2GDP	-4.309824	-4.323979 ***	I(1)
OPEN	-4.309824	-4.323979***	I(1)
RGDPG	-3.221728*	-	I(0)

Source: Author's Computation *** Significant at 1%, ** Significant at 5%,*significant at10%

IV.2 Co-integration Test Results

The ADF tests on the residuals from the static regression at level confirm that the calculated ADF statistic (-4.010059) is greater (in absolute sense term) than the tabulated critical value (-3.574244) at 5.0 per cent level of significance. Thus, the null hypothesis of non-stationarity of the residuals is rejected. The clear conclusion from these results is that the variables used in this study are co-integrated. That is, there is a stable long run relationship between them although there might be some deviations in the short-run.

Table 3 Cointegration-Engel Granger First & Second Steps Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LENDR	0.864538	0.197875	4.369122	0.0002
M2GDP	-0.565468	0.278997	-2.026791	0.0531
OPEN	-0.053668	0.109378	-0.490662	0.6278
C	17.06523	4.811406	3.546828	0.0015
R-squared	0.467845	Mean dependent var		25.58333
Adjusted R-squared	0.406442	S.D. dependent var		4.926103
S.E. of regression	3.795203	Akaike info criterion		5.628919
Sum squared resid	374.4927	Schwarz criterion		5.815745
Log likelihood	-80.43378	Hannan-Quinn criter.		5.688686
F-statistic	7.619307	Durbin-Watson stat		1.513152
Prob(F-statistic)	0.000816			

Table 4: Engle-Granger Second Step Results (Null Hypothesis: Residual has a unit root)

			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-4.010059	0.0197
Test critical values:	1% level		-4.309824	
	5% level		-3.574244	
	10% level		-3.221728	

IV.3 Presentation and Analysis of Estimation Results for Linear Growth Equation

The paper adopted a general-to-specific modeling approach in the estimation process. This process imposes lag structures of all the variables in the cointegrated equation. Moreover, this technique makes it possible to deal with irrelevant variables rather than omitting relevant ones (Thomas 1993), using the Akaike information criterion[5], the significance of the individual variable, and the adjusted R^2 as a guide. The results of the parsimonious deficit–growth model are presented in table 5. The equation represents the formulation of the hypothesis that the growth in real output in Guinea depends on the growth rate of fiscal deficit as a ratio of GDP, real investment (INV_t), money stock (M_2) to GDP ratio (measure of financial depth), the lending rate ($LENDR_t$), the rate of depreciation of the domestic currency vis-a-vis the US dollar, rate of inflation (INF_t) and the degree of openness of the economy ($OPEN_t$).

Table 5: Parsimonious Deficit -Growth Model Results

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-2.244796	2.705632	-0.829675	0.4282
RGDPG(-1)	0.654587	0.184965	3.538980	0.0063
RGDPG(-2)	1.684405	0.303576	5.548536	0.0004
DEF	-0.505408	0.094489	-5.348873	0.0005
DEP	0.080814	0.021709	3.722623	0.0048
INV	-0.251842	0.060445	-4.166486	0.0024
LENDR	0.274184	0.150953	1.816352	0.1027
M2GDP	0.994809	0.191447	5.196251	0.0006

[5] The AIC often is often used in model selection for non-nested alternatives—smaller values of the AIC are preferred.

DEF(-1)	0.155924	0.050850	3.066359	0.0134
DEP(-1)	-0.139795	0.033044	-4.230526	0.0022
INF(-1)	0.307080	0.065451	4.691738	0.0011
LENDR(-1)	-0.354256	0.209882	-1.687883	0.1257
M2GDP(-1)	-1.253847	0.248260	-5.050531	0.0007
DEF(-2)	0.845069	0.167119	5.056681	0.0007
DEP(-2)	0.046621	0.020539	2.269840	0.0494
INF(-2)	0.068634	0.015586	4.403708	0.0017
LENDR(-2)	0.778560	0.165479	4.704894	0.0011
OPEN(-2)	**-0.218031**	**0.057654**	**-3.781707**	**0.0043**
R-squared	0.927915	**Mean dependent var**		3.655556
Adjusted R-squared	0.791754	**S.D. dependent var**		1.510561
S.E. of regression	0.689329	**Akaike info criterion**		2.328525
Sum squared resid	4.276572	**Schwarz criterion**		3.192417
Log likelihood	-13.43509	**Hannan-Quinn criter.**		2.585406
F-statistic	6.814843	**Durbin-Watson stat**		2.624038
Prob(F-statistic)	0.003006			

It is evident from the result that changes in deficit, the variable of interest, are significant at the 1.0 per cent level, and the coefficient of the variable suggests a negative effect on growth contemporaneously, but positive effects with a lag of one to two years. Thus, a 1.0 percent increase in deficits will result in an increase of approximately 0.2 per cent in economic growth with one year lag and 0.9 percent with two year lag. This is consistent with the findings by Al-Khedair (1996) who studied the relationship between the budget deficit and economic growth in the seven major industrial countries (G-7) and found that the budget deficit has a significant positive impact on economic growth in France, Germany, and Italy and concluded that the budget deficit seems to positively and significantly affect economic growth in all the seven major industrial countries.

It is apparent from the estimation that the level of depreciation in Guinea over the study period had a positive relationship with growth and was significant at the 1.0 per cent level; and that a 10.0 per cent increase in the rate of depreciation will lead to a 0.8 per cent increase in growth. Moreover, the result indicates that depreciation in a current year does have positive impact on growth, while it impacts growth adversely with a one year lag. The rate of depreciation does have a positive effect on growth with a two year lag. This is quite instructive as the overall impact of the rate of depreciation taking the coefficient of the variable (both current and lag) together indicates a negative impact of depreciation on real growth rate. Although this may appear inconsistent with conventional theory, it is very plausible given the nature of the Guinean economy. The economy is mainly agrarian and is basically dependent on the exports of bauxite which is priced in foreign currency, thus the impact of domestic currency depreciation does not impact the output of the bauxite and by extension exports. Thus, depreciation as a policy instrument is unlikely to be beneficial to the Guinean economy.

From the results, we see that the coefficient on inflation rate suggests that a 1.0 per cent change (increase?) in inflation is associated with a 0.3 and 0.1 per cent increase in growth in the first and second year lag period, respectively. This is contrary to a prior expectations although it is in line with the findings of Kormendi and Meguire (1985) who found positive relationship between inflation and long-run growth for a cross-section of countries.

The results also suggest that the money stock to GDP ratio in the current year is positively related with growth, and that a 1.0 per cent change (increase?) in the level of money stock will result in a 0.99 per cent increase in output growth. This is significant at the 1.0 per cent level. However, the level of money stock in the previous year is negatively related with growth, a 1.0 per cent change in the level of money stock in the previous year will result in a 1.3 per cent decrease in output growth. Given that money stock as a ratio of GDP is used in the model as a scale variable to proxy financial depth, the result is consistent with the findings by Ndebio (2004), Odedokun (1989,), Ram, (1999), and Rousseau and Wachtel (2005).

The variable *OPEN* introduced to capture the impact of the level of openness of the economy, was statistically significant at the I.0 per cent level and reported a negative relationship with growth over the period, contrary to theoretical expectations. This might result from so many years of the economy being under controlled policy regimes. Indeed several years of economic regulations arising from the leaning towards the socialist economic principles might explain the outturn of this variable in the model

The results also show that investment in the current year does have negative effect on growth, contrary to theoretical expectations. A 1.0 per cent increase in investment in the current year will reduce output growth by 0.3 per cent. The result is statistically significant at the 1.0 per cent level. Given the role of investment in economic growth it is difficult to fathom the plausible explanation for this result; perhaps, the one that readily comes to mind is the direction and quality of investment. Therefore, much more private investment would be needed to spark sustainable growth in output, income, and employment, but such investment must be in the growth- enhancing sector of the economy like infrastructure that would engender higher growth.

The other variable in the model that was found to be consistent with a prior expectations was the lending rate. The results also show that lending rate does have negative effect on growth contemporaneously. However, the theoretical expectations of a negative impact of the variable on growth were satisfied with one year lag. A 1.0 per cent increase in lending rate impacts growth negatively by 0.4 per cent with a year lag. However, the level of significance (10.2) was marginally above conventional level. The sign of the coefficient of a two year lag impact of lending rate on real output growth was again positive and significant at 1.0 percent. Thus a 1.0 per cent increase in lending rate would impact positively (0.8 per cent) on growth. The long period of financial repression that characterized the Guinean economy during most of the study period is likely to be the core explanation for this phenomenon.

The estimate shows that the coefficients of most of the regressors (explanatory variables) have the expected signs. The adjusted R^2 value of 0.791754 indicates that most of the variations in real output growth can be explained by the explanatory variables. In other words, about 79.2 percent of the changes in output growth can be explained by the explanatory variables in the model.

IV.4 Analysis of the Results of the Threshold Model

Only the explanatory variables that are statistically significant are reported along with the deficit dummies to conserve space (see Appendix 1).

As shown in Appendix 1, the minimization of RSS occurs at the threshold levels of 2.0 - 3.0 per cent, where the RSS records the lowest value of 3.5154. To further confirm the threshold effect, the adjusted R^2 from the estimation at 2.0- 3.0 per cent yields the highest value of 82.9 per cent. A close study of Appendix 1 shows that the coefficient of deficit dummy for deficit above[6] the threshold (G_{2t}), carries

[6] *It should be noted that since the value of the deficit s are express as negative, above here refers to deficit levels of -1 and,-2; since -2>-3.*

positive sign indicating that above 3.0 per cent, (that is between negative 1 and 2) the effect of deficit on growth may be positive. Conversely, the coefficient of deficit dummy D_{1t}, representing effect of deficit below (negative 4 and beyond) the threshold level possess negative sign, suggesting that, deficit level lower than negative 3.0 per cent is detrimental to growth. Thus, the threshold level of deficit for Guinea is identified at 2.0-3.0 per cent. It should be noted that the two parameters are statistically significant at conventional levels. Given the record of deficit in Guinea, the location of deficit threshold for Guinea at 2.0- 3.0 per cent seems both plausible and realistic. Over the period covered by the study (1980-2009), Guinea recorded average deficit of 6.7 per cent, with the highest and the lowest rates of 0.5 per cent and 23.9 per cent, respectively

Table 6 presents another interesting finding of this study. As can be seen from the table, the effects of deficit, measured by the signs of the coefficients of the deficit dummies are generally positive from K= 1.0 to 3.0 per cent. The coefficients of the deficit dummy D_{1t}, maintain negative values all through, suggesting that deficit impacts negatively on growth above at levels lower than negative 3 per cent. The policy implication is that increasing deficit beyond 3.0 per cent may be detrimental to growth. Thus the range of 1.0 – 3.0 per cent provides the amphi-theatre for a menu of policy choices on deficit levels that would be consistent with economic growth in Guinea.

Table 6: Fiscal Deficit Conducive for Growth

	D_{1t} = Effect of deficit below K		G_{2t} = Effect of deficit above K	
K	**Coefficient**	**Effect**	**Coefficient**	**Effect**
1%	0.459744	Negative	0.622730	Positive
2%	0.501516	Negative	2.171729	Positive
K*=3%	0.501516	Negative	2.171729	Positive
4%	-0.459992	Negative	-0.679547	Negative
5%	-0.456717	Negative	-0.424759	Negative
6%	-0.315774	Negative	-0.108548	Negative
7%	-0.455169	Negative	-0.387058	Negative
8%	-0.317140	Negative	-0.162835	Negative
9%	-0.445528	Negative	-0.420785	Negative
10%	-0.276660	Negative	- 0.108077	Negative
11%	-0.463339	Negative	- 0.449906	Negative
12%	-0.463339	Negative	-0.449906	Negative

IV.5 Diagnostic Test Results

Diagnostic tests were carried out for the 3.0 per cent threshold model. The results for which are optimal level of deficit are depicted in table 7 below.

Table 7: Guinea Diagnostic Test Results at 3 percent Threshold

TEST TYPE	STATISTIC	VALUE	PROBABILITY	REMARKS
Normality	Jarque Bera	1.710536	0.425169	Normally distributed residuals
Serial Correlation (LM)	F-statistic	0.664742	0.5441	No serial correlation
Heterescedasticity (ARCH)	F-statistic	0.718850	0.4049	No heteroscedasticity
Stability	Cusum squares	Within bands		Stable

The residuals for the estimated equation was found to be normally distributed and stable. No serial correlation and heteroscedasticity were observed in the equation, implying that the estimates are reliable and therefore, can be relied on for policy.

V. Summary, Conclusions and Recommendations

This paper sought to ascertain the nature of the relationship between fiscal deficits and economic growth, as well as to establish the fiscal deficit threshold that is consistent with economic growth in Guinea. It is evident from the analysis that there exists a positive relationship between fiscal deficit and economic growth in Guinea albeit with a one year lag. Therefore, a 1.0 per cent increase in deficits will result in an increase of approximately 0.2 and 0.9 per cent in economic growth with a one and two year lag, respectively. The threshold level of fiscal deficit conducive for economic growth for Guinea was identified as at 3.0 per cent. Consequently, the level of fiscal deficit beyond 3.0 per cent is unfavourable to economic growth in Guinea. It should however be noted that the impact of deficit on growth is not contemporaneous as the variable impact on growth positively with a lag of one to two years. This is not surprising as it takes time for the investment in infrastructure financed by deficits to mature and impact growth.

On the policy front, this study has provided ample evidence in support of the proposition that fiscal deficit beyond certain threshold is detrimental to growth. This suggests that the Guinean authorities should endeavour to reduce fiscal deficits to 3.0 per cent, (a levels consistent with economic growth). Again, depreciation as a policy measure should not be pursued by the authorities as the impact on the economy is bound to the be negative, however, appropriate policy on both the fiscal and monetary front should be undertaken proactively to ensure that the real exchange rate of the local currency is properly aligned.

Furthermore, the Guinean authorities would need to adopt a mixture of policy to ensure that inflation is not excessively high so that growth will not be retarded. There is also need to pursue a transparent external policy that will attract foreign direct investment to augment the domestic savings so that growth could be augmented. The case for the availability and affordability of credit to the private sector should also be re-examined with a view to reducing the cost of credit to the economy in order to foster investment and growth.

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APPENDIX 1

Results of the Threshold Model

K	Variable	Coefficient	Std. Error	t-Statistic	Prob.	RSS	Adj.R^2
	D1*DEF	-0.459744	0.083042	-5.536267	0.0004		
	G1*DEF	0.622730	2.025832	-0.307395	0.7655		
	RGDPG(-1)	0.612794	0.190406	3.218349	0.0105		
1%	RGDPG(-2)	1.589742	0.304115	5.227444	0.0005	4.6004	0.775985
	DEP	0.070402	0.018404	3.825452	0.0041		
	INV	-0.253157	0.063054	-4.014926	0.0030		
	M2GDP	0.997059	0.199935	4.986923	0.0008		
	DEF(-1)	0.169162	0.058783	2.877761	0.0182		
	DEP(-1)	-0.140978	0.035678	-3.951396	0.0033		
	INF(-1)	0.291017	0.068770	4.231743	0.0022		
	M2GDP(-1)	-1.267308	0.283626	-4.468230	0.0016		
	DEF(-2)	0.803412	0.171299	4.690121	0.0011		
	DEP(-2)	0.041956	0.020490	2.047632	0.0709		
	INF(-2)	0.070023	0.016804	4.167054	0.0024		
	LENDR(-2)	0.715361	0.166936	4.285238	0.0020		
	OPEN(-2)	-0.213063	0.073251	-2.908688	0.0173		
	D2*DEF	-0.501516	0.074768	-6.707634	0.0001		
	G2*DEF	2.171729	1.027196	-2.114229	0.0636		
	RGDPG(-1)	0.556748	0.162981	3.416022	0.0077		
2%	RGDPG(-2)	1.691287	0.263900	6.408824	0.0001	3.5154	0.828820
	INV	-0.202493	0.062779	-3.225488	0.0104		

	M2GDP	0.995544	0.173575	5.735525	0.0003		
	DEP(-1)	-0.143555	0.029899	-4.801415	0.0010		
	INF(-1)	0.303629	0.057596	5.271712	0.0005		
	LENDR(-1)	-0.425097	0.195393	-2.175602	0.0576		
	M2GDP(-1)	-1.298431	0.226355	-5.736260	0.0003		
	DEF(-2)	0.843936	0.147282	5.730086	0.0003		
	INF(-2)	0.072358	0.014041	5.153309	0.0006		
	LENDR(-2)	0.778715	0.140265	5.551749	0.0004		
	OPEN(-2)	-0.221994	0.052349	-4.240653	0.0022		
	D3*DEF	-0.501516	0.074768	-6.707634	0.0001		
	G3*DEF	2.171729	1.027196	-2.114229	0.0636		
	RGDPG(-1)	0.556748	0.162981	3.416022	0.0077		
3%	RGDPG(-2)	1.691287	0.263900	6.408824	0.0001	3.5154	0.828820
	INV	-0.202493	0.062779	-3.225488	0.0104		
	M2GDP	0.995544	0.173575	5.735525	0.0003		
	DEP(-1)	-0.143555	0.029899	-4.801415	0.0010		
	INF(-1)	0.303629	0.057596	5.271712	0.0005		
	LENDR(-1)	-0.425097	0.195393	-2.175602	0.0576		
	M2GDP(-1)	-1.298431	0.226355	-5.736260	0.0003		
	DEF(-2)	0.843936	0.147282	5.730086	0.0003		
	INF(-2)	0.072358	0.014041	5.153309	0.0006		
	LENDR(-2)	0.778715	0.140265	5.551749	0.0004		
	OPEN(-2)	-0.221994	0.052349	-4.240653	0.0022		
	D4*DEF	-0.459992	0.077382	-5.944420	0.0002		

	G4*DEF	-0.679547	0.247926	-2.740932	0.0228		
	RGDPG(-1)	0.608327	0.174932	3.477516	0.0070		
4%	RGDPG(-2)	1.537963	0.288482	5.331223	0.0005	4.2025	0.795361
	DEP	0.064011	0.018901	3.386599	0.0080		
	INV	-0.259146	0.060161	-4.307537	0.0020		
	LENDR	0.334792	0.165370	2.024504	0.0736		
	M2GDP	1.029022	0.193259	5.324580	0.0005		
	DEF(-1)	0.161544	0.049028	3.294919	0.0093		
	DEP(-1)	-0.135781	0.033308	-4.076577	0.0028		
	INF(-1)	0.287102	0.062856	4.567624	0.0014		
	LENDR(-1)	-0.441081	0.229704	-1.920215	0.0870		
	M2GDP(-1)	-1.331217	0.258486	-5.150057	0.0006		
	DEF(-2)	0.792382	0.159906	4.955312	0.0008		
	DEP(-2)	0.041560	0.019589	2.121613	0.0629		
	INF(-2)	0.070540	0.015301	4.610284	0.0013		
	LENDR(-2)	0.755049	0.153177	4.929268	0.0008		
	OPEN(-2)	-0.206839	0.058053	-3.562932	0.0061		
	*D5*DEF*	*-0.456717*	*0.083218*	*-5.488191*	*0.0004*		
	G5*DEF	-0.424759	0.181627	-2.338639	0.0441		
	RGDPG(-1)	0.595136	0.192217	3.096172	0.0128		
5%	RGDPG(-2)	1.595324	0.293993	5.426393	0.0004	4.5781	0.777071
	DEP	0.071004	0.018531	3.831601	0.0040		
	INV	-0.251473	0.063300	-3.972722	0.0032		
	M2GDP	0.988728	0.200171	4.939420	0.0008		
	DEF(-1)	0.165267	0.051298	3.221704	0.0105		

	DEP(-1)	-0.140728	0.034428	-4.087561	0.0027		
	INF(-1)	0.290506	0.066030	4.399607	0.0017		
	M2GDP(-1)	-1.249797	0.259293	-4.820009	0.0009		
	DEF(-2)	0.802509	0.167134	4.801585	0.0010		
	DEP(-2)	0.041451	0.020566	2.015549	0.0747		
	INF(-2)	0.070661	0.016002	4.415712	0.0017		
	LENDR(-2)	0.717260	0.155561	4.610810	0.0013		
	OPEN(-2)	-0.214505	0.060243	-3.560659	0.0061		
	D6*DEF	-0.315774	0.068679	-4.597826	0.0013		
	G6*DEF	-0.108548	0.115635	-0.938714	0.3724		
	RGDPG(-1)	0.370597	0.188372	1.967367	0.0807		
6%	RGDPG(-2)	1.291717	0.297455	4.342561	0.0019	5.7537	0.719825
	DEP	0.065836	0.020705	3.179783	0.0112		
	INV	-0.157080	0.061818	-2.541027	0.0317		
	M2GDP	0.849651	0.219761	3.866250	0.0038		
	DEF(-1)	0.168001	0.057042	2.945234	0.0163		
	DEP(-1)	-0.082996	0.031426	-2.641031	0.0269		
	INF(-1)	0.187521	0.060842	3.082126	0.0131		
	M2GDP(-1)	-1.124808	0.290571	-3.871028	0.0038		
	DEF(-2)	0.587977	0.156927	3.746808	0.0046		
	INF(-2)	0.049256	0.018629	2.644014	0.0267		
	LENDR(-2)	0.676534	0.183513	3.686572	0.0050		
	OPEN(-2)	-0.109872	0.054621	-2.011552	0.0751		
	D7*DEF	-0.455169	0.078112	-5.827101	0.0003		
	G7*DEF	-0.387058	0.115667	-3.346300	0.0086		

	RGDPG(-1)	0.626590	0.177121	3.537633	0.0063		
7%	RGDPG(-2)	1.657237	0.291990	5.675670	0.0003	4.2492	0.793087
	DEP	0.073394	0.018010	4.075072	0.0028		
	INV	-0.268487	0.062571	-4.290899	0.0020		
	M2GDP	0.993704	0.190841	5.206973	0.0006		
	DEF(-1)	0.174156	0.049692	3.504698	0.0067		
	DEP(-1)	-0.137249	0.033267	-4.125688	0.0026		
	INF(-1)	0.288349	0.063112	4.568843	0.0013		
	M2GDP(-1)	-1.278882	0.248611	-5.144109	0.0006		
	DEF(-2)	0.813609	0.160252	5.077051	0.0007		
	INF(-2)	0.069231	0.015447	4.481829	0.0015		
	LENDR(-2)	0.734200	0.150190	4.888465	0.0009		
	OPEN(-2)	-0.206266	0.058626	-3.518316	0.0065		
	D8*DEF	-0.317140	0.080108	-3.958920	0.0033		
	G8*DEF	-0.162835	0.130375	-1.248973	0.2432		
	RGDPG(-1)	0.489482	0.218328	2.241956	0.0517		
8%	RGDPG(-2)	1.472890	0.372847	3.950384	0.0034	6.9135	0.663348
	DEP	0.066284	0.022655	2.925841	0.0169		
	INV	-0.273897	0.082714	-3.311353	0.0091		
	M2GDP	0.807292	0.242659	3.326861	0.0088		
	DEF(-1)	0.128207	0.064352	1.992284	0.0775		
	DEP(-1)	-0.100836	0.037202	-2.710463	0.0240		
	INF(-1)	0.223739	0.071628	3.123609	0.0122		
	M2GDP(-1)	-1.230604	0.342114	-3.597055	0.0058		
	DEF(-2)	0.622465	0.183416	3.393728	0.0080		

	INF(-2)	0.075828	0.020457	3.706738	0.0049		
	LENDR(-2)	0.698604	0.212854	3.282087	0.0095		
	OPEN(-2)	-0.125280	0.060084	-2.085101	0.0667		
	D9*DEF	-0.445528	0.109306	-4.075972	0.0028		
	G9*DEF	-0.420785	0.206227	-2.040400	0.0717		
	RGDPG(-1)	0.621935	0.193045	3.221702	0.0105		
9%	RGDPG(-2)	1.546788	0.373129	4.145455	0.0025	4.5806	0.713407
	DEP	0.067849	0.022002	3.083777	0.0131		
	INV	-0.248088	0.067884	-3.654561	0.0053		
	M2GDP	0.999521	0.199172	5.018385	0.0007		
	DEF(-1)	0.165651	0.051136	3.239425	0.0102		
	DEP(-1)	-0.137417	0.039815	-3.451419	0.0073		
	INF(-1)	0.286444	0.071610	4.000066	0.0031		
	M2GDP(-1)	-1.285254	0.287355	-4.472698	0.0015		
	DEF(-2)	0.786290	0.191596	4.103887	0.0027		
	DEP(-2)	0.040771	0.021192	1.923856	0.0865		
	INF(-2)	0.069643	0.016396	4.247566	0.0022		
	LENDR(-2)	0.727150	0.158397	4.590671	0.0013		
	OPEN(-2)	-0.207613	0.072615	-2.859099	0.0188		
	D10*DEF	-0.276660	0.074886	-3.694422	0.0050		
	G10*DEF	-0.108077	0.166045	-0.650887	0.5314		
	RGDPG(-1)	0.621321	0.237576	2.615253	0.0280		
10%	RGDPG(-2)	0.971023	0.268819	3.612182	0.0056	6.3982	0.688440
	DEP	0.042045	0.020481	2.052834	0.0703		

	INV	-0.185937	0.070575	-2.634605	0.0272		
	LENDR	0.367710	0.194930	1.886372	0.0919		
	M2GDP	0.937967	0.237433	3.950450	0.0034		
	DEF(-1)	0.152598	0.059883	2.548284	0.0313		
	DEP(-1)	-0.085079	0.033819	-2.515672	0.0330		
	INF(-1)	0.198253	0.064371	3.079831	0.0131		
	LENDR(-1)	-0.522706	0.267668	-1.952814	0.0826		
	M2GDP(-1)	-1.402708	0.339288	-4.134272	0.0025		
	DEF(-2)	0.523622	0.157117	3.332695	0.0088		
	LENDR(-2)	0.744779	0.187570	3.970673	0.0033		
	OPEN(-2)	-0.102151	0.055222	-1.849815	0.0974		
	D11*DEF	-0.463339	0.081561	-5.680874	0.0003		
	G11*DEF	-0.449906	0.099978	-4.500026	0.0015		
	RGDPG(-1)	0.618138	0.189326	3.264943	0.0098		
11%	RGDPG(-2)	1.600568	0.295277	5.420565	0.0004	4.5848	0. 76743
	DEP	0.070041	0.018481	3.789942	0.0043		
	INV	-0.251306	0.063797	-3.939155	0.0034		
	M2GDP	1.003798	0.203217	4.939529	0.0008		
	DEF(-1)	0.165265	0.051505	3.208719	0.0107		
	DEP(-1)	-0.142694	0.034444	-4.142840	0.0025		
	INF(-1)	0.295195	0.066627	4.430576	0.0016		
	M2GDP(-1)	-1.270561	0.265424	-4.786909	0.0010		
	DEF(-2)	0.812865	0.169400	4.798500	0.0010		
	DEP(-2)	0.041670	0.020511	2.031623	0.0727		
	INF(-2)	0.070772	0.016079	4.401545	0.0017		

	LENDR(-2)	0.723526	0.156051	4.636462	0.0012		
	OPEN(-2)	-0.216610	0.059669	-3.630171	0.0055		
	D12*DEF	-0.463339	0.081561	-5.680874	0.0003		
	G12*DEF	-0.449906	0.099978	-4.500026	0.0015		
	RGDPG(-1)	0.618138	0.189326	3.264943	0.0098		
12%	RGDPG(-2)	1.600568	0.295277	5.420565	0.0004	4.5848	0.776743
	DEP	0.070041	0.018481	3.789942	0.0043		
	INV	-0.251306	0.063797	-3.939155	0.0034		
	M2GDP	1.003798	0.203217	4.939529	0.0008		
	DEF(-1)	0.165265	0.051505	3.208719	0.0107		
	DEP(-1)	-0.142694	0.034444	-4.142840	0.0025		
	INF(-1)	0.295195	0.066627	4.430576	0.0016		
	M2GDP(-1)	-1.270561	0.265424	-4.786909	0.0010		
	DEF(-2)	0.812865	0.169400	4.798500	0.0010		
	DEP(-2)	0.041670	0.020511	2.031623	0.0727		
	INF(-2)	0.070772	0.016079	4.401545	0.0017		
	LENDR(-2)	0.723526	0.156051	4.636462	0.0012		
	OPEN(-2)	-0.216610	0.059669	-3.630171	0.0055		

Computed by the Researcher: Threshold Level of Deficit K*=3%