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Does the Mode of Financing the Budget deficit Matter for Inflation? The Case of the Gambia

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Abstract. This study examines whether the mode of financing budget deficit matter for inflation, the case of the Gambia. We are able to identify five instruments that are used for budget deficit financing in the Gambia namely: broad money growth, gross capital formation, official exchange rate and current account balance. We excluded donor fund because it is not a reliable sources of government revenue. The study employed Vector Error Correction Model and Granger Causality to determine the short-run, long-run and causality relationships of the variables respectively. We are able to ascertain that all the selected mode of budget deficit financing adapted by The Gambia have both short-run and long-run Significant impact on Inflation rate between 1970-2020. Notably, broad money growth that is considered to be influenced by state printing of money or the money market is the key mode of budget deficit financing in The Gambia and has high significant impact on Inflation.

Keywords. Budget Deficit, Inflation, VECM, Granger Causality, Gambia

1. Introduction

In this Study, we investigate how state mode of financing their budget deficit impact inflation rate. Many highly credible literatures, books, journals highlighted money supply, taxation, state borrowing, government expenditures and grants/aids as the main variables that affect government budgets. Previous studies suggested we first establish the variables that influence budget deficits then determine whether or not those shocks to budget deficit have effect on inflation. The shocks to budget deficit and its effect on inflation varies from country to country depending on country specific policies. For Turkey, Metin (1995) analysed inflation using a general framework of sectoral relationships and found that fiscal expansion was a determining factor for inflation and the excess demand for money affected inflation positively, but only in the short run (Metin, 1998). Excess demand for money is a common tool for financing budget deficit particularly in developing countries. A country experience deficit in her budgetary system when its expenditure exceeds its revenue while budget deficit financing reflects the means of operating budget deficit of the country. However, the source of financing has varying impact on budget deficit and inflation. The major outcomes of empirical studies which examines the relationship between budget deficits and inflation showed strong evidence that budget deficits financed through monetization and a rising money supply could lead to inflation. Budget deficit is a term used to describe a situation where government spending is

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greater than the revenue that the government generates from tax and non-tax revenues (Oladipo et al, 2011). Inflation however, is determined by the effect of fiscal deficit expansion, excess demands, which may originate in the monetary, government, goods, external and labour sectors of the economy (Metin,1995).

Majority of African countries especially The Gambia relies heavily on donors to finance their budget deficit. Therefore, grants and aids could have been a key variable in this study in order to ascertain if donation as one of the modes of financing budget deficit matters for inflation if it was a reliable source of government revenue. However, our goal is to identify which mode of budget deficit financing has a greater impact on inflation. The second most prevalent mode of budget financing used by the government is money supply through printing and selling of bond/treasury bills; research has shown a significant relationship between inflation and money supply (Bhowmilk, 2015).

The objective of the study is to estimate the impact of different modes of budget deficit financing mechanism used by the Gambian government on rate of inflation and how we can come up with the best mechanism to attain the optimum budget deficit to improve the economic situation of the country. The interrelationships between budget deficits, money growth and inflation have been at the heart of the monetary economics literature. It is often argued that monetization of budget deficits is the basic cause of inflation, especially in developing countries (Tekin-Koru & Özmen, 2003).

When government expenditure is more than its expected revenue, it leads to a deficit, which requires financing. The source of this financing includes domestic borrowing (e.g., treasury bills, government bonds, etc), external financing (i.e., external loans), and capital revenue (e.g., sale of government assets). In 2021, the gap between revenue and expenditure remains at a deficit of D5.99 billion (i.e., 5.61 percent of GDP). This deficit is due to an increase in expenditure within certain critical sectors such as health, education and infrastructure, as well as provisions for the upcoming voter registration and presidential elections (MoFEA, 2021). The Gambian government generates fund mainly from tax revenue and donor fund. The non-tax revenue comprises of a small percent compared to the tax revenue and the donor funds; a financial assistance received from development partners usually in the form of loans and grants which is roughly 47 percent of the total revenue (MoFEA, 2021). The inflation rate in the Gambia has been steadily increasing for the past 11 years which is in line with the trends of budget deficits in The Gambia (GBoS, The Gambia, 2021). Therefore, we need to determine if those mode of financing budget deficit discussed above Granger Cause inflation or not?

2. Literature Review

There are numerous approaches that states use to finance their budget deficits and some of those approaches have spill over effect on inflation. Some of the highly credible literatures we investigated revealed astounding evidence.

To start, Serfraz and Anwar (2009) focused on relationship between fiscal deficit and inflation and how the mode of financing affects inflation in Pakistan. The empirical findings of the study using co integration test indicate that there exists a positive relation between fiscal deficit and inflation. All the modes of financing deficit (deficit financing, financing through external borrowings and internal borrowing) are positively and significantly related to inflation.

Bhowmilk (2015) investigated an econometric model of inflation in India. In his study, he was able to verify that the inflation model in India is cointegrated in the order(I) considering GDP growth rate, degree of openness, growth rate of money supply, nominal exchange rate of Rupee with respect to US dollar by using Johansen Cointegration test Vector Error Correction

Model and Impulse response function. There result shows that there is a significant relationship between inflation (CPI) and growth of money supply. Tekin-Koru and Özmen (2003) discussed thoroughly the relationship between budget deficits, Money growth and Inflation: The Turkish evidence in order to examine the long run relationship between budget deficits inflation and monetary growth in turkey considering two alternative trivariate systems corresponding to the narrowest and the broadest monetary aggregates. The results of Johansen cointegration analysis suggest that money and inflation are jointly determined and there appears to be no direct link between budget deficits and inflation. However, they claimed that budget deficits exogenously determine money growth.

Ssebulime and Edward (2019) also conducted a similar study on Budget deficit and inflation nexus in Uganda 1980-2016 by using cointegration and error correction modelling approach as well as the pairwise Granger causality. The purpose of their paper was to investigate the budget deficit and inflation nexus for Uganda. They showed that budget deficit affects inflation directly and indirectly through fluctuation in the nominal exchange rate and money supply. However, the issue with these evidences is that they did not examine deeply various modes of budget deficit financing and how those modes affect inflation. We investigated numerous credible literatures that try to investigate the direct effect of budget deficit and its impact on inflation and most of those studies revealed a contentious result simply because they did not investigate deeply the various shocks to the budget and how they individually affect inflation rate. However, A study done by (Durguti, 2020) on How Does the Budget Deficit Affect Inflation Rate-Evidence from Western Balkans by using vector error correction model (VECM) and the multivariate time series for the two types of analysis they employed. Selected key variables such as Government debt, real exchange rate and unemployment rate as tool for their investigate. According to the results they obtained from the long-run relationship, reveals that the inflation rate positively and significantly relates to government debt and budget deficit, while in Western Balkans Countries, the inflation rate negatively and significantly relates to the real exchange rate. Interestingly, a study showed that the internal financing of the budget deficit works on increasing the inflation rate and the current account deficit, which in turn leads to an increase in economic growth and similarly, external financing of the general budget deficit leads to increase money supply, inflation and economic growth (Kasasbeh, 2018). It is important to note that mode of budget deficit financing is relative to countries and their respective policies. A case done on Tanzania, from 1967-2001 investigated the existence of a stable long run relationship between the budget deficit, exchange rate, GDP and inflation and their result was affirmative. The Simulations indicate that inflation is very responsive to shocks in the budget deficit as well as GDP (Solomon et al, 2004). This implication is important for developing countries with inefficient and under developed financial systems such as The Gambia. A study was conducted to examine how various fiscal policies affect budget deficits and how those budget deficits may affect short-run demand via expectations in the long term. An important consideration, however, is that fiscal deficits today and high nominal debt levels may very well create an expectation of higher inflation tomorrow (Denes et al, 2013). Using an error-correction model, Sowa (1994) found that inflation in Ghana is influenced more by output volatility than by monetary factors, both in the long run and in the short run (Metin, 1998).

The case of Nigeria, (Egwaikhide et al, 1994) investigated exchange rate, depreciation, budget deficit and inflation. The results of their inflation equation demonstrate that official exchange rate is a significant determinant of price inflation, with a lag period of one year. Therefore, it is essential for policy makers to know the perfect country specify tools for budget deficit financing and keep inflation at a favourable economic state to stimulate Growth. This forms the basis of this study.

3. Model Specification

Based on the credible literatures reviewed, the model specification adopted by this study is partly borrowed from Ssebulime and Edward (2019), in which they followed the one used by Catao and Terrones (2001) and it is widely supported in the literatures over the conventional scaling of the budget deficit to GDP. In order to answer the question whether or not the mode of budget financing matters for inflation, the model can be expressed in the form:

$$CPI = f(M2, GCF, OER, G2, CAB) \quad (1)$$

Where CPI is a proxy for inflation, consumer prices (annual %), M2 represents Broad money growth (annual %), GCF stands for Gross Capital Formation (annual % growth), OER denotes Official Exchange Rate (LCU per US$, period average) and CAB is the Current Account Balance (% of GDP). G2 which represents support from development partners is omitted from the study because it is not a reliable sources of government revenue and this fact is in line with the suggestions made by other credible literatures (Ssebulime & Edward, 2019), even though mode of budget deficit financing somehow depends on Grants in The Gambia. Therefore, we can further express 1) in the form of simultaneous time series model:

$$\pi_t = \alpha_0 + \alpha_1 M2_t + a_2 GCF_t + a_3 OER_t + a_4 G2_t + a_5 CAB_t + e_t \quad (2)$$

$$CAB_t = \beta_0 + \beta_1 M2_t + \beta_2 GCF_t + \beta_3 OER_t + \beta_4 G2_t + \beta_5 \pi_t + v_t \quad (3)$$

Where π_t is the Consumer Price Index (CPI) which is used as a proxy to inflation, $e_t \; and \; v_t$ are the respective error terms?

4. Data Source and Analysis of Results

Data for the study is from World Bank (databank) and it covers the period from 1970 to 2020. It provides credible database to serve researchers, academics, and investors who need reliable economic data for accurate information. The country under study is The Gambia and the indicators have the following distribution:

Table 1. Data distribution and Statistics

Statistics/ Indicators	**M2**	**CPI**	**GCF**	**OER**	**CAB**
Data range	1970-2020	1970-2020	1970-2020	1970-2020	1970-2020
Observation	50	50	50	50	50

Notably, some of the indicators have missing values in between the years. Therefore, in order to avoid spuriousness in the data, we used the weighted average as a proxy to the missing values. The Equation used for the weighted Average:

$$\overline{Ind}_t = \frac{1}{T} \sum_{T=1}^{N} Ind_t \quad (4)$$

Where Ind_t is the method used to generate the weighted average of all the indicators.

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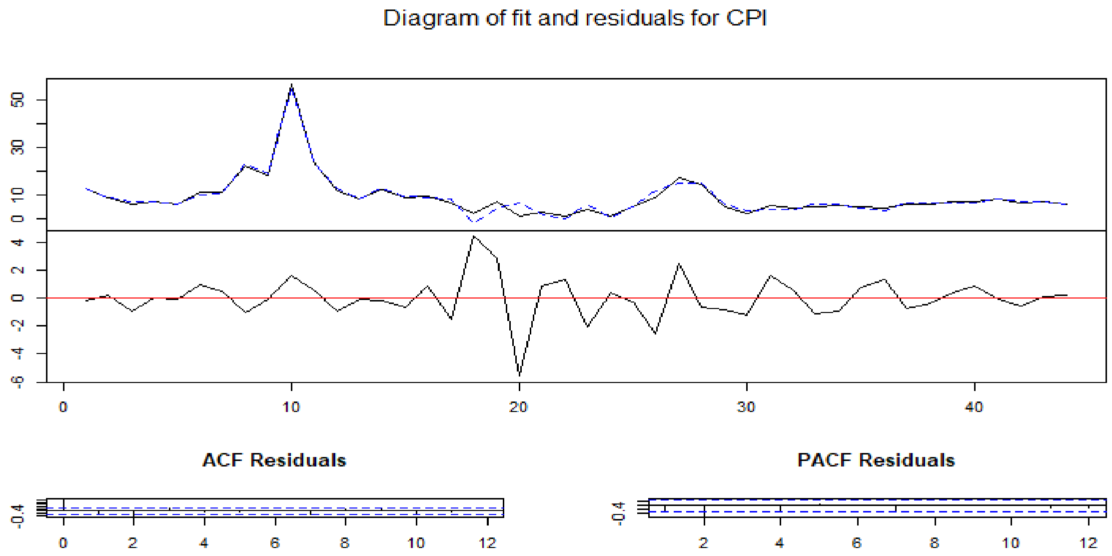

The diagram above represents the fit and residual of our main variable (Inflation) under study.

5. Empirical Methodology and Results

In this study, we use VAR tools such as the Error Correction model to capture the short and long-run dynamics as well as the speed of adjustment between the instruments of budget financing and inflation for The Gambia. The Granger causality is used to determine causality between the instruments and inflation. For instance, (**Sannoh, 2019**) used the simultaneous equation model to mathematically illustrate how the variables relates to each other. Consider if we express equation (2) in their own past, ggenerally, we say that $M2_t$ which is one of the modes of budget financing in The Gambia Granger causes π_t, if

$$E(\pi_t|I_{t-1}) \neq E(\pi_t|J_{t-1}) \qquad (5)$$

Where I_{t-1}contains past information on π_t and all the selected modes of budget financing while J_{t-1} contains only information on past π_t. When the condition 4) holds, then past values of $M2, GCF, OER, G2\ and\ CAB$, are useful in predicting π_t. The term Granger causality should be interpreted with caution because the only case in which $M2, GCF, OER, G2\ and\ CAB$ causes π_t is if condition (5) holds. From this we can easily test the null hypothesis that $M2, GCF, OER, G2\ and\ CAB$ does not granger cause π_t against the alternative that $M2, GCF, OER, G2\ and\ CAB$ individually Granger cause π_t by assuming a linear model and decide how many lags of the dependent variable should be included (Sannoh, 2019).

Unit Root test

Unit Root Test is done when one is dealing with time series data to determine whether or not the variables studied are non-stationary because the presence of a unit root implies that a shock today has a long-lasting impact on the dependent variable. In a situation like that we infer that the variables contain a unit root otherwise they are stationary. One of the most famous models used to test for a unit root in a time series variable is called Dickey-Fuller test or for large time series data, its extension is called the Augmented Dickey-Fuller (ADF) test.

Table 4. Augmented Dickey-Fuller Test.

Country	Variables	Value of Test-Statistics	Test Statistics (1^{st} Diff)	Lag	Order of integration
Gambia	M2	-3.2326	-	4	I (0)
	CPI	-2.7221	-	4	I (0)
	GCF	-3.1628	-	4	I (0)
	OER	1.6837	-3.0603	4	I (1)
	CAB	-2.6335	-	4	I (0)

$Critical\ values\ for\ test\ statistics$: $1pct\ 5pct\ 1\ tau2\ -3.58\ -2.93\ -2.60$

We have tested the variables to determine their order of integration. Based on the result of the Augmented Dickey-Fuller Test, all the selected variables are stationary at level which means they have zero order of integration except OER which prove to be stationary at first difference. In other word, we rejected the existence of unit root for M2, CPI, GCF and CAB at 5% level and we fail to reject the existence of unit root for OER at level but after taking the first difference, the existence of unit root was rejected at 5% Significance level.

Cointegration Analysis

The term cointegration was given a formal treatment by Engle and Granger in 1987. The issue of cointegration applies when two series are I(1), but a linear combination of them is I(0); which means it has constant mean, constant variance, autocorrelations that depend only on the time distance between any two variables in the series, and it is asymptotically uncorrelated. In this case, the regression of one on the other is not spurious, but instead tells us something about the long-run relationship between them. Between the two series also implies a kind of model called an error correction model, for the short-term dynamics (Wooldridge, Jeffrey 2004, 2nd ed.)

Table 5. The Cointegration Test Results (**Johansen-Procedure)**

Country	Null Hypothesis	Test statistics (λ max)	5% Critical value	Test statistics (λ trace)	5% Critical Value2
Gambia	r <= 4	3.64	9.24	3.64	9.24
	r <= 3	7.65	15.67	11.29	19.96
	r <= 2	28.38	22.00	39.67	34.91
	r <= 1	35.95	28.14	75.62	53.12
	r <= 0	115.44	34.40	191.06	76.07

As explained above, there is a need for Johansen cointegration test to determine if there exist a long-run relationship between the variables. According to Johansen-procedure, we strongly fail to reject the null hypothesis of at most two cointegrating relationships between the variables at 5% significance level and we reject the null hypothesis that there exist at most 3 cointegrating relationship in our model. Therefore, we can infer that, there exist three cointegrating relationship in the model as per the Johansen procedure. From the results it is evidenced that there is a long run equilibrium relationship between the variables selected as modes of budget financing and inflation rate in The Gambia. These results are consistent

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between both kinds of test (Eigen and Trace) which prove that there is indeed some kind of long-run equilibrium relationship between the variables in the model.

Error Correction Model

We conducted vector error correction estimation to determine the short-run relationship and validate the inference that there exists a long-run equilibrium meaningful relationship between the variables in the model. The equation of the error correction model is in the form:

$Response\ CPI.d$:

$$lm(formula = CPI.d \sim ect1 + M2.dl1 + CPI.dl1 + CF.dl1 + OER.dl1 + CAB.dl1 + M2.dl2 + CPI.dl2 + CF.dl2 + OER.dl2 + CAB.dl2 + M2.dl3 + CPI.dl3 + CF.dl3 + OER.dl3 + CAB.dl3 + M2.dl4 + CPI.dl4 + CF.dl4 + OER.dl4 + CAB.dl4 + M2.dl5 + CPI.dl5 + CF.dl5 + OER.dl5 + CAB.dl5 - 1, data = data.Mat)$$

Table 6. Results of the VECM

Country	**Variables**	Coefficient	**T-value**	**P-value**
Gambia	ect1	0.25485	6.018	8.65e-06 ***
	M2.dl1	-0.26406	-2.414	0.026037 *
	CPI.dl1	0.42053	2.480	0.022688 *
	CF.dl1	-0.90982	-5.111	6.20e-05 ***
	OER.dl1	1.07273	1.949	0.066230.
	CAB.dl1	1.17520	5.816	1.33e-05 ***

$Signif.codes$: 0 ‘ *** ’ 0.001 ‘ ** ’ 0.01 ‘ * ’ 0.05 ‘.’ 0.1 ‘ ’ 1
$Residual\ standard\ error$: 4.919 on 19 $degrees\ of\ freedom$
$Multiple\ R-squared$: 0.8634, $Adjusted\ R-squared$: 0.6765
$F-statistic$: 4.62 on 26 and 19 $DF, p-value$: 0.0005582

From the table above, it is confirmed that there exist a significant short-run and long-run relationship between inflation and the modes of budget deficit financing. The Granger Causality test result confirmed the long-run positive relationship between the variables and the lag values to one year shows there exist a short run adjustment to the equilibrium. This means that all the variables selected has a short run significant impact on inflation rate in the Gambia since all the p-values are significant at 5% statistical level. The model represented is also a good fit based on the value shown by the coefficient of determination.

Granger Causality Test

We conducted Granger causality test to determine which variable is actually influencing the other variable in the model. This way we can make a sound policy prediction about the indicators concern.

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Table 6. Result of Granger Causality Test (Direction)

Country	F-statistics M2 → CPI	P-value GCF → CPI	P-value OER → CPI	P-value CAB → CPI
Gambia	0.04732 *	0.9642	0.299	0.02698 *

$Signif.\ codes$: 0 ‘ *** ’ 0.001 ‘ ** ’ 0.01 ‘ * ’ 0.05 ‘.’ 0.1 ‘ ’ 1

Table 7. Result of Granger Causality Test (reverse direction)

Country	P-value CPI → M2	P-value CPI → GCF	P-value CPI → OER	P-value CPI → CAB
Gambia	0.09426	0.9987	0.4726	0.2708

$Signif.\ codes$: 0 ‘ *** ’ 0.001 ‘ ** ’ 0.01 ‘ * ’ 0.05 ‘.’ 0.1 ‘ ’ 1

Table 6 shows the direction and table 7 shows the reverse direction of the variables. In table 6, it is observed that M2 which represents the annual broad money growth leads to inflation rate in the Gambia and the effect is significant at 5% level vice versa. Moreover, table 7 shows that there exists a unidirectional relationship between current account balance as a percentage of GDP and Inflation rate in the Gambia. In simple language, CAP Granger causes inflation in the Gambia. There is no significance directional relationship that runs from GCF to CP, OER to CPI and vice versa. This means none of those variables significantly Granger cause the other variables in the model for Gambia.

Conclusion

The aim of this study was to determine whether or not the mode of budget financing matters for inflation in The Gambia. The instruments identified as a method of budget deficit financing in the Gambia are GCF, OER, CAB and M2. The mode of budget deficit financing that has high positive significant effect on inflation in the Gambia is broad money growth. This is in line with our priori expectation since it is a stylize fact that printing or Government's other ways of supplying money in the market is positively correlated with inflation. This statement is also vindicated by well known Quantity theory of Money, a theory asserting that the quantity of money available determines the price level and that the growth rate in the quantity of money available determines the inflation rate (Mankiw, 2011). However, based on the Johansen Cointegration and Error Correction Model, all the identified methods of Gambian Government budget deficit financing actually have both short run and lung-run impact on inflation but the severity of their impact is relative and differs. The two most identified mode of budget deficit financing that trigger inflation in the Gambia is broad money growth and the Current Account Balance. The government of the Gambia, particularly central bank of the Gambia should be very strategic in their mode of budget financing to control the level of price in the country especially policy directed to Money Supply because it indeed matters for inflation.

Conflict of Interest

The African Economic Research consortium (AERC) may have research interest in this particular theme to draw on the broader context of literatures on determinants of inflation and specifically the inflation deficit nexus in Africa. However, this study is conducted specifically on Gambia in absence of individual financial gains but just to inform the mode of budget deficit and inflation policy decisions and broaden the country's literature on the subject.

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