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THE IMPACT OF FISCAL DEFICIT ON INFLATION IN NAMIBIA

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Abstract

This paper examined the impact of fiscal deficit on inflation in Namibia. The paper employed Autoregressive Distributed Lag Model (ARDL) and Granger causality approach using quarterly data for the period 2002 -2017. Empirical results showed evidence of a long run positive effect of fiscal deficit on inflation in Namibia. This suggests that fiscal deficit has a direct effect on inflation in Namibia. The study also found a unidirectional causality running from fiscal deficit to inflation in Namibia. The study confirmed that South Africa's prices have positive effect on in inflation in Namibia. The key policy implication drawn for the result is that, high negative fiscal balances if not contained, could impair the monetary policy objective of price stability. It is therefore, advised that fiscal and monetary policy need to be well coordinated to bring fiscal deficit within acceptable level. Given that the main monetary policy goal in Namibia is to achieve and maintain price stability, the results in this study suggest that monitoring budget deficits and price developments in South Africa to develop informed policies, is one way to achieve this objective.

Key words: fiscal deficit, inflation, Namibia, ARDL, cointegration

JEL Classification: C2, C3, E310, H72

1. INTRODUCTION

There is a general consensus on the effect of fiscal policy on monetary policy in terms of monetization[1] of the deficit, but uncertain for financing through debt financing domestically or externally**.** Boariu and Bilan (2007) points out that monetary financing increases the price level by putting money in circulation more than normally necessary, while the debt issuance exhibits a low inflationary character. The literature thus suggests that the impact of public debt on inflation depends on how the deficit is financed as well as the level of public debt. The literature further suggests that the effect of debt issuance may further depend on whether deficit is financed through domestic or external debt (Ahmad et al 2012 and Mweni et al 2016).

Increasing fiscal deficit challenges and the rising public debt may increase pressure to use monetisation to finance the deficit. Excessive debt is linked with economic uncertainty and instability, forces the government to adopt financially repressive policies to control inflation in order to meet financial need with seigniorage (monetization of deficit), and reduce government spending on interest paid on debt (Mweni et al 2016). This may implicate the conduct of monetary policy. It may also result in high spending and consequently high inflation, which can distort the main objective of monetary policy.

Stabilising price levels plays a critical role in determining growth of an economy. It is for that reason that monetary authorities in many countries implement monetary policies to control and contain inflation. The effectiveness of monetary policy is hampered if fiscal policy becomes dominant, implying that inflation is not exclusively a monetary phenomenon. Fiscal policy tools such as government expenditure and revenue, fiscal deficit and public debt may impact inflation (Van Bon 2015). The relationship between budget deficit and inflation has received a lot of attention, however, the relationship between public debt and inflation has been met with mixed results. The literature suggests that high fiscal deficit has economic effects, which are interrelated in many ways on inflation, capital formation, economic development and income distribution. Empirical studies on the relationship between public debt and inflation are mixed, depending on the level of economic development (developed, emerging market and developing), and level of public debt (Kocner 2014).

[1] Refers to the creation of money by central bank, to help finance the fiscal deficit of the Government.

Investigation of the effect of budget deficit on inflation is very important for developing economies such as Namibia. The budget deficit in Namibia has risen considerably in recent years, resulting in rapid increase in the public debt to GDP ratio. The overall fiscal balance has averaged -6.0 percent of GDP between 2013/14 and 2017/18, peaking at -8.0 percent of GDP in 2015/16. Public debt has increased from 26.5 percent of GDP in 2011/12 to 43.5 percent of GDP in 2017/18. The sharp increase has culminated in concerns about public debt sustainability in Namibia and whether the high fiscal deficit will begin to impact on the conduct of monetary policy, which is already constrained by the fixed exchange rate through the peg of the Namibia dollar to the South African Rand.

Namibia has been experiencing a budget deficit since independence, except for two periods (2006/07 to 2008/09). Over the last few years the fiscal deficit has widened further, particularly from 2009/10 to 2016/17 fiscal year. The widening fiscal deficit has resulted in the government cutting cost under the consolidation initiative since late 2016. The consolidation measures have had a negative impact on growth and the economy is expected to stay dampened in the short term. The government is thus faced with a continuous challenge to generate enough resources to finance government expenditure and the consequent rising public debt has raised macroeconomic instability concerns. This has raised concerns of whether fiscal policy may start to dominate and counteract the effect of monetary policy.

Understanding the relationship between fiscal and monetary policies in developing economies such as Namibia is very important, particularly since monetary policy is already restricted through the exchange rate regime. Namibia's monetary policy is restrained by the Namibia Dollar being pegged to the South African Rand and inflation caused by fiscal policy may further negate the effect of monetary policy. Despite the fact that the relationship between fiscal and monetary policy is very important, empirical studies on Namibia are limited or non-existent. To our best knowledge, there are no empirical studies on the effect of fiscal deficit on monetary policy variables such as inflation in Namibia. There are two previous studies on the determinants of inflation in Namibia. These are Gaomab (1998) and Odada and Eita (2010). These studies estimated several models of inflation; however, they did not test the impact of fiscal deficit on inflation in Namibia. Undji and Kaulihowa (2015), examined the determinants of inflation in Namibia in which government expenditure was found to be one of the determinants. Although the study analysed the effect of government expenditure on inflation between the period 1993-2013, it did not capture the effect of fiscal defit. This study will therefore test the effect of fiscal deficit on inflation and extend the

analysis to the latest developments between 2008 to 2017 (when the fiscal deficit expanded). This is contrary to previous studies that ignored the effect of fiscal deficit on inflation in Namibia.

In light of the above, the objective of this paper is to examine the impact of fiscal deficit (balance) on inflation in Namibia. More specifically, the paper examines the long-run and causal relationships between fiscal deficit and inflation in Namibia. The rest of paper is structured as follows**.** Section 2 provides an overview of fiscal policy in Namibia. Section 3 reviews the relevant theoretical and empirical literature on fiscal deficit and its implications for monetary policy. Section 4 explains the methodology of the study, followed by section 5 which presents the empirical results. Section 6 provides an overall conclusion of the study with policy implications.

2. OVERVIEW OF FISCAL POLICY IN NAMIBIA

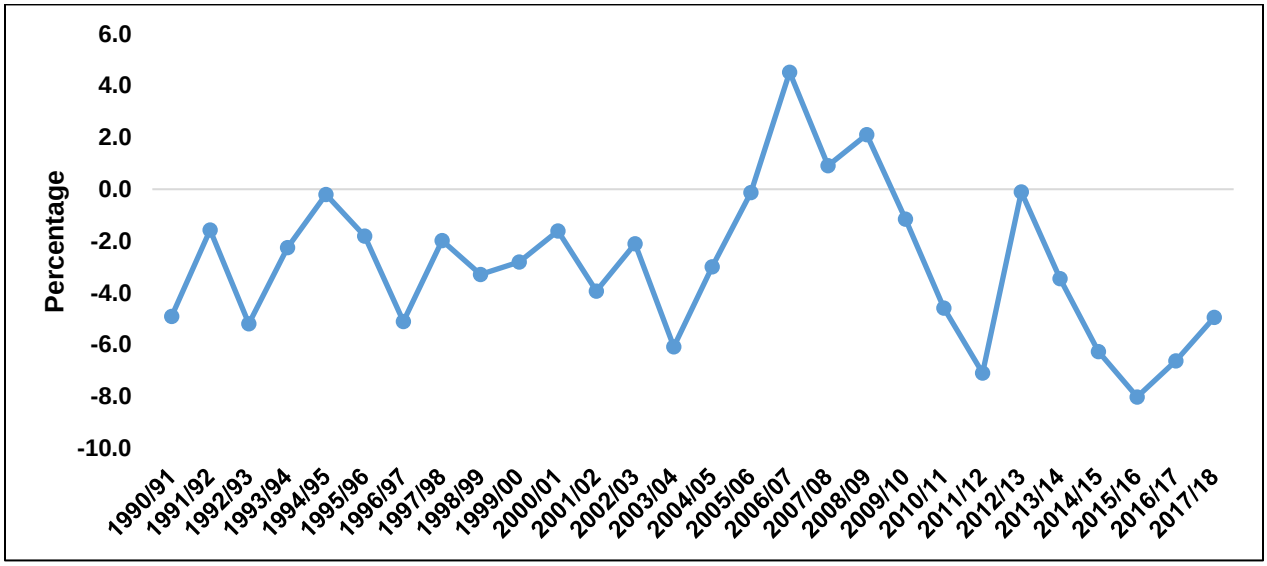
A persistent increase in Government expenditure is a growing concern in Namibia. The rising public debt to support government expenditure has contributed to macroeconomic imbalances such as the widening of current account deficit during the period 2011 to 2016, and the recent down grading of South African and Namibian economies' credit ratings.

Fiscal policy plays a very crucial role in the Namibian economy due to the fact that Namibia is a member of the Common Monetary Area (CMA). As a member of the CMA, Namibia pegged its currency (the Namibia dollar) to the South African rand on a one to one basis. The CMA is an asymmetric currency or exchange rate union because Namibia and other smaller fellow members (Eswatini and Lesotho) follow monetary policy that is determined by South Africa (although Namibia has limited monetary independence). Since independence in 1990, the government has maintained relative fiscal discipline and upheld macroeconomic stability and balance. Such stance has served the economy well. Namibia achieved moderate to almost relatively high level of economic growth. This level of economic growth has been met with significant improvements in employment and a reduction in the incidence of poverty and inequality. However, unemployment poverty and inequality in Namibia still remain high.

The government has as a result implemented and sustained different social safety net programs such as social grants to pensioners, disabled persons and vulnerable children and recently the introduction of a food bank. The onset of the global financial crisis in 2009 has resulted in government adopting a more expansionary fiscal policy to sustain such programmes, which resulted in an increase in the public debt levels. Moreover, in its effort to increase equality and reduce poverty, the government introduced free primary and secondary education in 2016. All these programmes put extra burden on government expenditure, which ultimately has an impact

of monetary policy. Government also increased expenditure in support of the country's developmental priorities and its long-term development vision, Vision 2030, the national development plans (NDPs), Targeted Intervention Program for Employment and Economic Growth (TIPEEG) and the Harambee Prosperity Plan (HPP). The growth in expenditure has not been met with the same level of growth in revenue collection, which necessitated an increase in government borrowing to finance the budget deficit. Figure 1 presents Namibia's budget deficit as percentage of GDP for the period 1990 to 2018.

Figure 1: Namibia fiscal balance as percentage of GDP



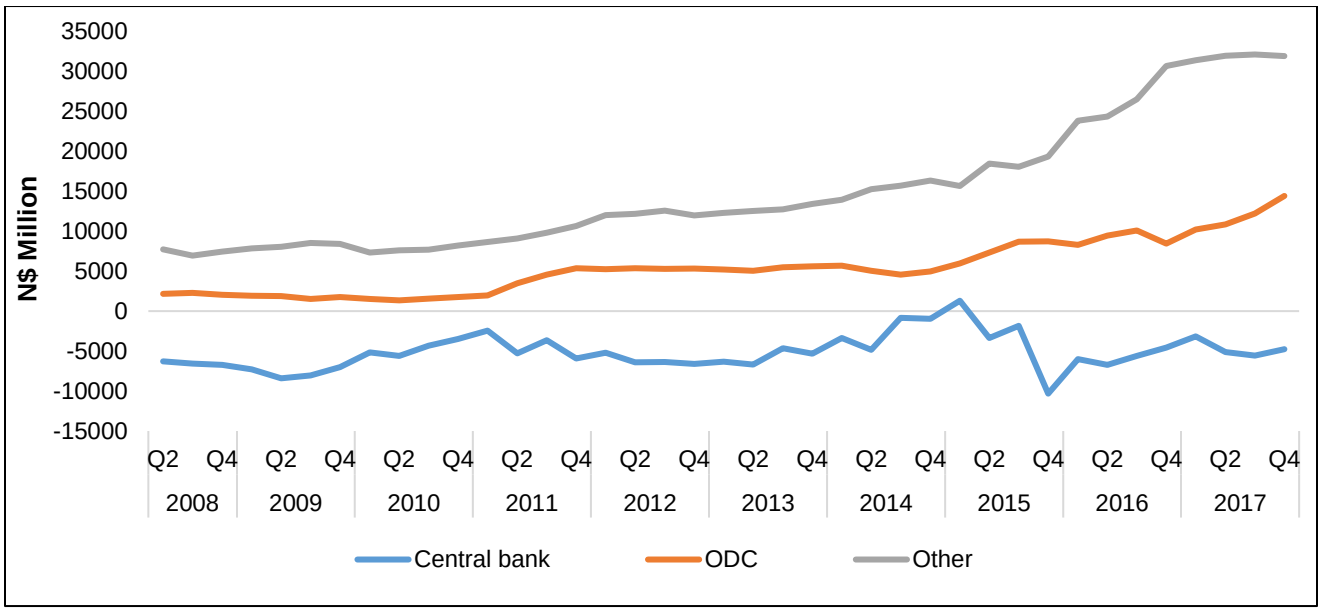
Source: Bank of Namibia (2018)

Figure 1 shows that Namibia's government budget deficit as percentage of GDP generally remained lower since independence in 1990 despite a relatively higher deficit in 2015/16. Government deficit as a ratio to GDP has been less than 6.0 percent from 1990/91 to 2003/04, but increased to levels in excess of 7.0 percent in 2011/12 and 2015/16. The overall fiscal deficit in Namibia averaged to about 2.0 percent of GDP between 2000/01 and 2013/14, and about 6.5 percent between 2014/15 and 2017/18. The lowest budget deficit as percentage of GDP recorded for the past 10 years is 0.1 percent in 2005/06 and 2012/13 while the highest is 8.0 in 2015/16. The wider fiscal deficits during this period were mainly due to increases in public expenditure compared to revenue, which resulted in government cutting costs under the consolidation initiative since late 2015/16 fiscal year.

The budget deficit in Namibia largely has been financed from the domestic market rather than external sources. The total government debt has been on the rise since 2012/13, reaching the highest share of 41.3 percent of GDP in 2017/18. This ratio is above the benchmark of 35 percent debt to GDP ratio in Namibia and below the 60 percent benchmark for SADC. Although the largest share of deficit financing was sourced domestically, external financing as a share of GDP increased sharply during the period 2015 to 2017.

Despite running budget deficits, Namibian government has not borrowed from the central bank to finance its deficit. A closer look at the domestic government financing by type of source reveals that, government borrows more from the banking sector as well as other depository corporation (ODC) and other domestic financing institutions, which comprises of non-banking institutions, public non-financial institutions, state and local government as well as social security. Namibia has hardly used central bank borrowing as a source of financing except for 2015Q1 (Figure 2). The limited borrowing from central bank is reinforced by the restrictions from Common Monetary Area (CMA) agreement, which require maintenance of a one to one exchange rate with the South African rand and having national currency issued by the central bank to be fully backed by foreign reserves (Wang et al 2007).

Figure 2: Domestic sources of government debt financing (N$ million)



Source: Bank of Namibia (2018)

3. REVIEW OF LITERATURE

3.1. Theoretical review

The view that fiscal deficits can influence monetary policy through its effects on the price level is rooted in the quantity theory of money (QTM). Baldini and Ribeiro (2008) asserts that fiscal deficits cause inflation because governments that run persistent fiscal deficits tend, over time, to resort to money creation to finance the deficits and thus, inflation is always and everywhere a monetary phenomenon. The debate that fiscal deficit and debt financing lead to inflation appear settled if (deficit) is financed through monetization. However, there is no clear consensus on whether other forms of deficit financing also affect the price level.

The basis that fiscal deficit can have an impact on monetary policy through other channels of deficit financing springs from the fiscal theory of the price level (FTPL). FTPL theory asserts that money creation is not the only channel through which fiscal policy influences monetary policy. While fiscal policy stances can directly jeopardize the objective of price stability through the accommodation of expansionary fiscal policy, it can also influence the effectiveness of monetary policy indirectly through its effects on other channels of monetary policy transmission (Chileshe and Longa 2016). Fiscal policy may affect monetary policy effectiveness through the interest and sovereign spreads. High fiscal deficits is associated with higher interest rates on the short- and long-term financial assets as per the Fisher Hypothesis[2] (Chileshe and Longa 2016). It is claimed that in a non-Ricardian fiscal dominant regime, an unsustainable fiscal policy and government bonds are considered net wealth, with effects that jeopardize the objective of monetary policy, with the fiscal policy determining the price level (Baldini and Ribeiro 2008).

High indebtedness, besides the tight monetary conditions, increases the debt burden through interest payments (Alagidede 2016). This is expected to cause the yield curve to become more positively sloped in anticipation of the deterioration in the fiscal space (Chileshe and Longa 2016). Thus, theoretically, the effect of fiscal policy on monetary policy can be explained through the following three ways. Firstly, fiscal policy may affect demand for loanable funds through interest rates in the money market. Secondly, unsustainable fiscal policy could lead to higher inflation expectations. Thirdly, the capital market effect that relates to government funding needs may lead to changes in interest rates in response to fiscal changes. Thus, a rising fiscal deficit will cause

[2] Fisher Hypothesis is an economic hypothesis stating that the real interest rate is equal to the nominal rate minus the expected rate of inflation.

higher interest rates on government debt instruments and consequently interest rate spreads (Chileshe and Longa 2016).

Similarly, the nexus between fiscal and monetary policy is also explained by the Keynesian and Monetarist theoretical approaches. According to Bwire and Nampewo (2014), the Keynesian approach views economic growth as the cause of inflation and that government expenditure is a source of economic growth. The Keynesian theory emphasizes the role that fiscal policy plays in stabilizing the economy. In particular, Keynesian theory suggests that higher government spending in a recession can help enable a quicker economic recovery. The monetarist believes that fiscal policy causes inflation and crowding out in the economy, therefore, it is not helpful in stabilizing the economy. Monetarists believe that inflation is always a monetary phenomenon, they argue that money creation boosts the economy. Monetarists emphasize the importance of controlling the money supply to control inflation. The Keynesians view budget deficits as inflationary because they stimulate aggregate demand in the economy, whereas the monetarists argue that budget deficits are inflationary as they cause money supply growth in the economy.

Furthermore, the literature suggests that fiscal policy can also affect monetary policy through its impact on exchange rates. The Mundell-Flemming model demonstrates the impact of fiscal policy on exchange rates as depending on the openness of the capital account and on the country's exchange rate regime and the associated changes in sovereign default risk. A country with high capital mobility and flexible exchange rate regime with constant country premium, expansionary fiscal policy is expected to lead to an appreciation (Chileshe and Longa 2016). The appreciation is due to increasing interest rate in the domestic economy, which attracts the inflow of capital. In a fixed exchange rate regime, as the case for Namibia, expansionary fiscal policy would result in an increase in foreign reserves due to increasing interest rates and increase in money supply.

3.2. Theoretical Model

The theoretical interactions between the fiscal deficit and monetary policy can be based on the Keynesian theory. The Keynesians are of the view that consumer demand and economic growth are the cause of inflation. They believe that government expenditure is a source of economic growth, as demand outstrips supply and puts pressure on inflation. The Keynesian theory emphasises the role that fiscal policy plays in stabilising the economy. In particular, Keynesian theory suggests that higher government spending in a recession can help enable a quicker economic recovery.

Monetarists believe that inflation is always a monetary phenomenon and argue that money creation temporarily boosts the economy in the short run. They believe that increasing the money supply provides a temporary boost to economic growth and job creation but results in increase in inflation in the long run. As demand outstrips supply, prices will rise in the long run. Monetarism emphasises the importance of controlling money supply in order to have control of inflation.

The Keynesian's view is that budget deficits are inflationary because they stimulate aggregate demand in the economy, whereas the monetarists argue that budget deficits are inflationary because they cause money supply growth in the economy. Literature generally believes that deficit financing mechanisms play a major role in determining this theoretical divergence. The result may of course not be similar from one economy to the next.

In order to estimate the effect of budget deficit on inflation, this study adopts the theoretical model used by Solomon and De Wet (2004). The model begins with the long-run government budget constraints. This government budget constraint is given by:

$$\frac{D_{t-1}}{P_t} = \sum \frac{1}{INT_j}\left(Tax_{t-j} - GE_{t+j} + (M_{t+j} - \frac{MS_{t-1-j}}{P_{t+j}})\right) \quad \text{..... (1)}$$

Where:

$\frac{D_{t-1}}{P_t}$: *Government debt*

INT_j: *The discount rate*

Tax_{t-j}: *Total tax revenue*

GE_{t+j}: *Total government expenditure*

MS_t: *Broad money supply*

According to Solomon and de Wet (2004), a scenario where public debt cannot grow, implies that the entire budget deficit is ultimately financed through seigniorage. Imposing this restriction on the public debt, one obtains the following short run budget constraint:

$$\frac{D_{t-1}\,(t)}{P_t} = Tax_t - GE_t + \left(\frac{MS_t - MS_{t-1}}{P_t}\right) \quad \text{..... (2)}$$

where D(t) is the debt with the maturity in period t that has to be paid and is not rolled-over. This can be rewritten as:

$$\frac{D_{t-1}\,(t)}{P_t} - Tax - GE_t = \left(\frac{MS_t - MS_{t-1}}{P_t}\right) \quad \text{..... (3)}$$

The term on the left-hand side of equation (3) is the budget deficit formed from the fiscal deficit and repayment of public debt with the maturity in period *t*. The term on the right-hand side of

equation (3) is seigniorage revenue. Seigniorage revenue (SEIN) can be written as a function of the inflation rate and real money supply. This is presented in equation (4)

$$SEIN = \frac{f(INF_t)MS_{t-1}}{P_t} \quad \text{(4)}$$

Equation (4) represents demand function of money in its reduced form. Since seigniorage revenue is expected to increase when inflation rate rises, equations (3) and (4) can be combined in order to obtain a function where budget deficit and money supply explain the inflation rate. This is presented in equation (5):

$$INF = \frac{\beta DEF_t P_t}{MS_t} \quad \text{(5)}$$

where β is the inverse linear multiplier, DEF_t is the budget deficit. The budget deficit is computed as $DEF_t = GE_t - Tax_t - D_t\text{-}1$. M/p represents the real money supply.

3.3. Empirical literature

The effect of fiscal deficit on monetary policy variables such as money supply, inflation and the interest rate has generated a vast interest in literature both theoretically and empirically. There is broad consensus that persistently running a high budget deficit results in an increase in the level of prices in the economy, which may affect the effectiveness of monetary policy transmission to the rest of the economy. There is empirical support that public debt affects the effectiveness of monetary policy. Boaru and Bilan (2007) found that debt financing of the budget deficit causes inflation. The results revealed that in general, developing economies have high inflation associated with high budget deficits, while developed countries show little evidence of a relationship between budget deficit and inflation.

The results are overwhelming in terms of deficit financing through monetization, while support is somehow mixed for financing through domestic and external borrowing especially in developing economies. Several studies have found positive relationships between the price level (inflation) and budget deficits or public debt. Van Bon (2015) empirically investigated the relationship between public debt and inflation for 60 developing countries in Asia, Latin America and Africa for the period 1990 to 2014 using the estimation method of difference panel Generalised Methods of Moments (GMM) and Arellano-Bond. The results confirm that public debt has a significant positive

influence on inflation. Ahmad et al (2012) found that domestic debt and domestic debt servicing enhance the price level in Pakistan. Likewise, Memon and Ghumro (2014) also found positive effect of fiscal stimulus on inflation. Mweni *et al* (2016) found that external debt has a positive and significant effect on inflation. Similarly, Descalzi and Neder (2017) found a long run relationship between inflation, money issuing, nominal exchange rate and fiscal deficit in Argentina.

In relation to the developed economies, the results on the relationship between inflation and public debt seems to be mixed. Kocner (2014) found that a decline in inflation is often associated with the growth of debt, but such relationship is mostly associated with newly acceding countries to the EU. The results further suggest that the level of public debt influences GDP, with a stronger impact when the debt level is above 60 percent of GDP. The results, however, did not support a significant impact on inflation in terms of the level of external debt. Moreover, empirical study by Kliem et al (2015) on monetary –fiscal policy interaction and fiscal inflation concluded that the relationship between fiscal deficits and inflation depends on the interaction between monetary and fiscal policies. They further find that the relationship is high whenever fiscal authorities did not stabilize outstanding debt together with the central bank which accommodated that behavior.

Bakare *et al* (2014) established a long-term relationship between budget deficit, money supply and inflation in Nigeria between 1975 and 2012. While Bwire and Nampewo (2014), using Vector Error Correction model (VECM), did not find evidence of the relationship between fiscal deficits and inflation in the short run, they find evidence that in the long run fiscal deficit does trigger inflation. They further found a unidirectional causality running from inflation to fiscal deficit, from money supply to the fiscal deficit, and a feedback causal effect between money supply and inflation in the short-run. Similarly, Solomon and de Wet (2004), using the cointegrating vector analysis, found a significant impact of the budget deficit on inflation in Tanzania, under the assumption of long run monetary neutrality. Simulation results in their study indicated that, inflation is very responsive to shocks in the budget deficit as well as GDP.

Makochekanwa (2008) also examined the deficit and inflation nexus in the Zimbabwean economy. The findings of the study revealed that there exists a causal link that runs from the budget deficit to the inflation rate in Zimbabwe, using Johansen (1991, 1995) cointegration technique over the period 1980 - 2005. The study concluded in favour of the fiscal deficit causing an increase in prices levels and added that massive monetization of the budget deficit experienced in Zimbabwe had significant inflationary effects.

There are however studies that found contrary evidence about the budget deficit and deficit financing causing inflation. Mukhtar and Zakaria (2010), examined the link between fiscal deficit, money supply and inflation in Pakistan, using quarterly data for the period 1960-2007. The results indicated that in the long-run, inflation was not related to the government's budget deficit but only to supply of money. Similarly, the supply of money had no causal connection with the budget deficit. They concluded that there was no significant long-run relationship between inflation and the budget deficit. Likewise, Ezeabasili *et al* (2012), found an insignificant positive relationship between inflation and the fiscal deficit in Nigeria. They further found that there was no strong evidence linking past levels of fiscal deficits to inflation in Nigeria, during the period 1970 to 2006.

Despite the fact that the relationship between fiscal deficit and inflation variables is very important for both developed and developing economies, there is to date no empirical study on Namibia. To our best knowledge, the relationship between fiscal deficit and inflation has not been empirically tested in Namibia. Studies that investigated the determinants of inflation in Namibia did not test the effect of fiscal deficit as an important determinant of inflation. For example, Gaomab II (1998) concluded that there is a dominant influence of South Africa prices on Namibia's inflation**.** Gaomab II reviewed the experience of inflation in the Namibian economy for the period between 1973 and 1996, using cointegration analysis, error correction modeling (ECM) and structural stability testing for time series analysis and forecasting. The study found that there is a dominant influence of foreign prices and imported inflation from South Africa on Namibian prices and inflation. The study further concluded that, the rest of the world, as proxied by the United States prices, broad money supply and money supply, growth in real income and interest rate also have effects on the Namibian inflation. This study did not include fiscal deficit due to unavailability of consistent time series data on fiscal deficit in Namibia. Another empirical study by Odada and Eita (2010) estimated several equations of inflation in Namibia but did not include fiscal deficit and as a possible explanatory variable. Undji and Kaulihowa (2015) also estimated the determinants of inflation in Namibia using money supply, government expenditure, real GDP and imports as explanatory variables. Undji and Kaulihowa (2015) also did not include fiscal deficit as in the model. Hence, this study will fill up the gap in the Namibian literature.

4. METHODOLOGY

4.1. Empirical model

To empirically examine effects of the fiscal deficit on monetary policy variables in Namibia, the study modified Bwire and Nampewo (2014) empirical model**.** The model adopted in this study includes Namibia's consumer price index, budget deficit, prime lending rate and South Africa's consumer price index. A four variables empirical model is used. Namibia's CPI is the endogenous variable, while fiscal deficit, prime lending rate and South Africa's inflation are treated as exogenous in the model. The empirical model for Namibia is specified in equation 6 as follows.

$CPIna_t = (CPIsa_t, fbgdp_t, r_t)$…….....(6)

Where:

$CPIna$ is Namibia's Consumer Price Index (CPI)?

$CPIsa$ is South Africa's CPI

$fbgdp$ is fiscal deficit as percentage of GDP

r is interest rate (prime lending rate)

From the monetarist perspective, the effect of budget deficit financing on inflation is expected to be positive. As such, the higher the budget deficit financing, the higher the money creation or money supply through borrowing and the higher will be the rate of inflation. Since Namibia's rate of inflation is influenced by the peg to the South Africa rand, it has surrendered its right of having a completely independent monetary policy system. However, Bank of Namibia (Namibia's central bank) could still use its repurchase rate (repo) within fairly narrow limits, together with other monetary policy tools[3], to a certain degree, to influence short-term interest rates, money supply and credit extension to the private sector. This allows the central bank to have control over the domestically induced inflation through expectations and aggregate demand. Based on this, the prime lending rate is used as an explanatory variable. South Africa's inflation is also included as an explanatory variable, since Namibia imports more than 60 percent of goods from that country, hence it is expected to have a direct and positive impact on Namibian prices. The prime lending rate is expected to have a negative impact on inflation because it is used as a monetary policy tool to stabilise prices.

[3] These include capital controls and regulatory barriers.

4.2 Data

The study used quarterly time series for the period 2008Q2 and 2017Q4. The variables are fiscal deficit, Namibia's CPI, prime lending rate and South Africa's inflation. CPI data are in their log forms, prime lending rate is in level, while fiscal deficit is expressed as percentage of GDP. The results are displayed in Table 1. Data on fiscal deficit and prime lending rate were sourced from Bank of Namibia, while that on Namibia CPI was sourced from Namibia Statistics Agency (NSA). South Africa's CPI data was sourced from the Reserve Bank of South Africa's website. The fiscal deficit variable data were converted to calendar year and then to quarterly data.

4.3 Estimation technique

This paper employed the Autoregressive Distributed Lag Model (ARDL) or bound test methodology technique by Pesaran, Shin and Smith (2001). Additionally, the study used Granger causality approach to establish whether the observed persistent fiscal deficits in Namibia have an impact on monetary policy.

This methodology is preferred over other methodologies due to a number of comparative advantages**.** Firstly, the ARDL method works well with a small sample which is the case for this study. Secondly, it is more preferred because of its flexibility with the mixed order of cointegration associated with economic variables. Thirdly, a dynamic unrestricted error model (UECM) can be derived from the ARDL bound testing through a simple linear transformation. The UECM integrates the short run dynamics with the long run equilibrium without losing any information for the long run. Lastly, the Dynamic Ordinary Least Square (DOLS), which asymptotically removes the sample bias and corrects for endogeneity and serial correlation, can also be derived from the ARDL model. The ARDL bound cointegration equation is specified as follows:

$$\Delta \mathrm{CPIna} = \delta_0 + \sum_{i=1}^{n} \mu_{1i} \Delta CPIna_{t-p} + \sum_{i=1}^{n} \mu_{2i} \Delta CPIsa_{t-p} + \sum_{i=1}^{n} \mu_{3i} \Delta r_{t-p} + \sum_{i-1}^{n} \mu_{4i} \Delta fbgdp_{t-p} + \gamma_1 cpina_{t-1} + \gamma_2 cpisa_{t-1} + \gamma_3 r_{t-1} + \gamma_4 fbgdp_{t-1} + \varepsilon_t \quad \text{(7)}$$

Where δ_0 represents the intercept, and μ_i are short run parameters, γ_i are long run coefficients and Δ is first difference operator while ε_t represents residuals. The null hypothesis of no cointegration and alternative hypothesis are tested as follows:

$H_0: \gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = 0$

$H_\alpha: \gamma_1 \neq \gamma_2 \neq \gamma_3 \neq \gamma_4 \neq 0$

Failure to reject the null hypothesis implies that there is no cointegration. The opposite indicates that the variables in equation (7) have a long run relationship. The ADRL cointegration technique identifies the long run relationship among the variables in the models. The technique uses the Wald or F-statistics to test for joint significance of $\gamma_1, \gamma_2, \gamma_3$ and γ_4 .

The use of ARDL methodology above assumes that variables are cointegrated, and this also implies that there must be Granger causality running from at least one direction. The main focus of the Granger causality test is between the CPI and budget deficit? in Namibia. Following Granger (1969), Bwire and Nampewo (2014) the causal relationship between the variables is specified as follows:

$$\Delta CPIna_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta CPIna_{t-p} + \sum_{i=1}^{n} \alpha_{2i} \Delta CPIsa_{t-p} + \sum_{i=1}^{n} \alpha_{3i} \Delta r_{t-p} + \sum_{i-1}^{n} \alpha_{4i} \Delta fbgdp_{t-p} + \alpha_5 ECM_{t-1} + \nu_{1t} \quad (8)$$

$$\Delta CPIsa_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i} \Delta CPIna_{t-p} + \sum_{i=1}^{n} \beta_{2i} \Delta CPIsa_{t-p} + \sum_{i=1}^{n} \beta_{3i} \Delta r_{t-p} + \sum_{i-1}^{n} \beta_{4i} \Delta fbgdp_{t-p} + \beta_5 ECM_{t-1} + \nu_{2t} \quad (9)$$

$$\Delta r_t = \rho_0 + \sum_{i=1}^{n} \rho_{1i} \Delta CPIna_{t-p} + \sum_{i=1}^{n} \rho_{2i} \Delta CPIsa_{t-p} + \sum_{i=1}^{n} \rho_{3i} \Delta r_{t-p} + \sum_{i-1}^{n} \rho_{4i} \Delta fbgdp_{t-p} + \rho_5 ECM_{t-1} + \nu_{3t} \quad (10)$$

$$\Delta fbgdp_t = \phi_0 + \sum_{i=1}^{n} \phi_{1i} \Delta CPIna_{t-p} + \sum_{i=1}^{n} \phi_{2i} \Delta CPIsa_{t-p} + \sum_{i=1}^{n} \phi_{3i} \Delta r_{t-p} + \sum_{i-1}^{n} \phi_{4i} \Delta fbgdp_{t-p} + \phi_5 ECM_{t-1} + v_{4t} \quad (11)$$

Where ECM is the error correction variable;α_0 , β_0 , ρ_0 and ϕ_0 are constants; α_{1-5} , β_{1-5} , ρ_{1-5} and ϕ_{1-5} are respective coefficients; ϕ_{1-4} are the residuals. The ECM differentiates between long run and short run causalities. The individual coefficients' lags as presented in equations (8) to (11) are used in order to test whether the short run relationship between the variables are significant. If the lagged ECM term is statistically significant, it indicates that there is long run causality.

5. EMPIRICAL RESULTS

5.1 Unit root test

All variables were subjected to unit root test using Kwiatkowski-Phillips-Schmidt-Shin (KPSS). The unit root results presented in Table 1 revealed that all variables are cointegrated of order one I(1), with the exception of fiscal deficit which is an I(0). The most important procedure of cointegration analysis is to examine the feature of data used in the study**.** Data was tested for the order of integration or stationarity using Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test, in levels and with the inclusion of intercepts. The results from KPSS test revealed that all variables with the exception of fiscal deficit are integrated of the same order 1, at 5 percent significant level (Table 1). This implies that these variables except fiscal deficit are not stationary in levels, however, they become stationary after their first differences with intercepts.

Table 1: Kwiatkowski-Phillips-Schmidt-Shin test

	Levels with intercept		***First difference with intercept***		**Order of integration**
	Critical value	LM-Stats	Critical value	LM-Stats	
CPIna	0.463000	1.009682	0.463000	0.089145	I(1)
FDGDP		0.418264		0.109896	I(0)
CPIsa		1.006057		0.066199	I(1)
r		0.689312		0.134855	I(1)

5.2 ARDL bounds test of cointegration results

To test for cointegration, the study applied an ARDL bound test. The existence of cointegration in the model implies that there is a long run equilibrium relationship between Namibia's CPI, South Africa's inflation, fiscal deficit and the prime lending rate. The results of the bound test of cointegration are presented in Table 2 below.

Table 2: Bound test results[4]

	F-statistic	**5% Critical level**	
H0 = Cointegration		Lower Bound	Upper Bound
H1 ≠ Cointegration	8.417663	3.23	4.35

The bound test shows that there is a long run relationship between CPI, fiscal deficit and prime lending rate and South Africa's CPI in Namibia. Given that the computed ARDL F-statistic is greater than the upper bound at 5% level of significance, the null hypothesis of no cointegration is rejected. The study thus concludes that there is evidence of a long run relationship between the variables.

5.3 Long run results

The long run results are presented in equation (12). The long run relationship displayed in equation (12) indicates that fiscal deficit has a positive relationship with inflation in Namibia with its coefficient being statistically significant.

$$lnCPIna = 0.2988 + 0.9954lnCPIsa - 0.0050r + 0.0011FBGDP \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (12)$$

$$(7.8509)^{5} \qquad (128.8966) \qquad (-5.8331) \qquad (2.4643)$$

The result confirms a positive relationship between fiscal deficit and inflation. This means that in the long run, fiscal deficit has significant influence on the level of prices in Namibia. A one percentage increase in the ratio of fiscal deficit to GDP will result in CPI to increase by 0.001

[4] 2 lags were selected based on Schwarz Information Criterion.
[5] Figures in parenthesis denote t-statistics.

percent. The results also confirmed a long run relationship between South Africa's inflation and the prime lending rate with inflation in Namibia. Accordingly, a one percent increase (fall) in South Africa's inflation will cause prices in Namibia to increase (fall) by 0.9954 percent. This high coefficient can be explained by the high correlation between Namibia's CPI and South Africa's CPI (Table 5 in the appendix). Despite a smaller magnitude, an inverse relationship between the prime lending rate and inflation in Namibia is revealed in the long run. This implies that a percentage increase (fall) in the lending rate will lead to a decrease (increase) by 0.005 percent in the level of inflation Namibia.

The results revealed that South Africa's prices, fiscal deficit and prime lending rate in Namibia are the main factors contributing to inflation in Namibia. These findings are consistent with Gaomab II (1998), who also found that imported inflation from South Africa has effects on inflation in Namibia. Moreover, the results are also consistent with Undji and Kaulihowa (2015), who also found government expenditure as one of the determinants of inflation in Namibia.

5.4 Short run results

The short results are presented in Table 3. The estimated coefficients of the error correction terms (ECT) is significant and has an expected sign (negative). The error correction term coefficient is negative and significant at 5 percent significant level, confirming that there exists a co-integration between variables. The speed of adjustment of any deviations in the short run back to equilibrium level in the long run is 58.4 percent every second quarter (Table 3).

Table 3: Short run equation

	Coefficient	T statistics	Probability
D(LNCPIna(-1))	0.268774	2.961280	0.0045
D(LNCPIsa)	0.581360	7.933375	0.0000
D(r)	0.000826	0.713142	0.4788
D(FBGDP)	0.000667	2.556818	0.0134
ECM(-1)	-0.584052	-7.787130	0.0000

Moreover, coefficients of fiscal deficit, South Africa's CPI and inflation from the previous quarter are statistically significant, suggesting that the variables affect inflation in the short run, with the

level of inflation in South Africa being the major contributor of variations in the Namibia prices. On the contrary, the prime lending rate is statistically insignificant in the short run, which implies that it has no effect on inflation in the short-run.

5.5 Granger causality test results

The results of Granger causality are presented in Table 4. The results show that there is a unidirectional causality running from fiscal deficit to inflation in Namibia. This is indicated by the rejection of the null hypothesis (i.e. FBGDP lagged once and twice do not jointly Granger cause inflation). The results further showed no evidence of short run causation running from inflation to fiscal deficit as the study failed to reject the null hypothesis (Table 4).

Table 4: Granger Causality – Walt test

Variables	**Test Statistics**		**Null Hypotheses**	**Decision**
	Chi-square	*Probability*		
FBGDP	12.63567	0.0018	Fiscal deficit does not granger cause inflation	Reject
LNCPIsa	1.385625	0.5002	Inflation does not granger cause fiscal deficit	Fail to reject

These results are consistent with those obtained in the long run and short ARDL models. The diagnostic test of the model in Table 5 in the appendix shows that the model is fit and stable. The serial correlation LM-test and Breusch-Pagan-Godfrey further show that the model does not suffer from serial correlation and heteroscedasticity. In addition, the residuals are normally distributed, this implies that the model is fit, and the results are reliable and can be used for policy recommendations.

6 CONCLUSION AND POLICY IMPLICATIONS

The objective of the study was to examine the effect of fiscal deficit on inflation in Namibia. The study applied the ARDL bound test and Granger causality methods to examine the effect of fiscal deficit on inflation for the period between 2008Q2 and 2017Q4. The results show evidence of a long run positive effect of fiscal deficit on inflation in Namibia. There is also evidence that fiscal deficit causes inflation in the short run. It was further observed that variations in the South African inflation lead to significant variations in the Namibian inflation in the long run and short run. A significant long run relationship also exists between the prime lending rate with inflation in Namibia. In the short run, a direct (positive) effect between the prime lending rate and inflation in Namibia was obtained, however, it was not statistically significant. It was further concluded that there is a unidirectional causality running from fiscal deficit to inflation, which confirms the existence of long run and short run relationship between fiscal deficit and inflation in Namibia.

The policy implications from the empirical results is that a negative fiscal balance have a long run and a short run effect on inflation, therefore, high government budget deficits could impair monetary policy's objective of price stability. Empirically, a negative fiscal balance directly triggers inflation in Namibia, both in the long run and short run. It is therefore, advised that fiscal and monetary policy need to be well coordinated to bring fiscal deficit within acceptable level. Given that the main monetary policy goal in Namibia is to achieve price stability, the results in this study suggest that monitoring budget deficits and price developments in South Africa to develop informed policies, is one way to achieve this objective.

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8 APPENDIX

Table 5: Correlation matrix

	LNCPna	LNCPIa	r	FBGDP
LNCPIna	1.000000	0.999173	-0.747100	-0.529584
LNCPIsa	0.999173	1.000000	-0.727518	-0.535559
r	-0.747100	-0.727518	1.000000	0.474709
FBGDP	-0.529584	-0.535559	0.474709	1.000000

Table 5 above shows the correlation test between Namibia's CPI and fiscal deficit, prime lending rate and South Africa's CPI. A correlation coefficient whose magnitude are between 0.9 and 1.0 indicate variables which can be considered very highly correlated. It is observed that, Namibia's CPI and South Africa's CPI have a very high correlation as the correlation coefficients magnitude are between 0.9 and 1.0. The prime lending rate and CPI are moderately correlated with the correlation magnitude between 0.74. Fiscal deficit has a low correlation with CPI as indicate with the correlation magnitude of 0.53. The high R-square regression of 0.99 percent can be explained by the high correlation between Namibia's CPI, South Africa's CPI and the prime lending rate.

Table 6. Diagnostic tests

Test purpose	**Test statistic**	**Probability**
Normality	Jaque-Bera: (0.2744)	0.8718
Serial correlation	*Breusch-Godfrey Serial Correlation LM Test:* (0.9245)	0.6299
Heteroscedasticity	*Breusch-Pagan-Godfrey* (4.3962)	0.6232