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# Analysing the Relationship between Budget Deficit and Current Account Deficit in Namibia

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***Authors' contributions***

*This work was carried out in collaboration between both authors. Author AS designed the study. Authors AS and JMN managed the analyses of the study. Author JMN further imputed the policy element. Both authors read and approved the final manuscript.*

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## ABSTRACT

Is there a causal relationship between budget deficit and current account deficit? This study attempts to explain the significance of the transmission mechanism, (the exchange rate and interest rate) in explaining the twin deficit hypothesis (i.e. budget deficit and current account deficit) in Namibia. The study employed analytical methods of unit roots, cointegration, Granger-causality, and the impulse response function for estimation. In contributing to this ongoing debate, the study used the case of Namibia over the period spanning from 1990-2014 using time series data. Budget deficit and current account deficit proved to be significant. There is a unidirectional causal relationship between budget deficit and current account deficit in Namibia which runs from current account deficit to budget deficit. However, the transmission mechanism proved to be less significant in explaining the twin deficit hypothesis in Namibia. Having found a positive relationship between current account deficit and budget deficit in Namibia, the government should consider curbing the increasing current account balance as a way of reducing its adverse effect on the budget balance. From this study, it is indicated that stabilising the current account deficit problem could assist in managing the budget deficit problem in Namibia.

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## 1. INTRODUCTION

Following the recent developments in the global economy such as the financial crisis and the debt crisis in the Eurozone in 2008 to 2009, and 2011 respectively, debates about twin deficits hypothesis particularly in the developed economies resurfaced. Such an awakening attracted attention from both academics and policymakers. It has been argued that public sector wastefulness in some economies such the United States, post-2001 era have accounted for the accumulation of large global imbalances, which possibly contributed to the global financial and economic crises of 2008 to 2009 [1]. The argument first came up in the 1980s, when a significant deterioration in the USA current account balance was accompanied by a sharp rise in the federal budget deficit [2]. In recent decades, a number of countries both, developed and developing countries, have been experiencing persistent budget deficits accompanied by unstable current account scenarios. It is noted that in order to attain economic stability and sustained macro-economic growth, both budget deficit and current account deficits have to be kept under control [3]. However, according to [4], the transmission mechanism between the two variables may not necessarily be direct, but through effects on other variables such as exchange rate and interest rate.

Even though budget deficit occurs for various reasons, it is usually referred to as a deliberate effort by the government to stimulate demand by either increasing government spending or lowering taxes [5]. While budget imbalances can lead to positive economic growth, in some cases a very high and persistent budget deficit can instead slow down economic growth. In June 2011, the International Monetary Fund warned that a continuous budget deficit could result in an economic crisis brought on by slow economic growth. Despite the importance of maintaining a healthy current account, there is still no clear consensus regarding the effect of fiscal policy on the current account balance [6]. Due to the critical effects of budget deficits on an economy, prudent management remains one of the key objectives of macro-economic policy. It has been argued that the government budget deficit is one of the main causes of the current account deficit [7]. However, according to [8], empirical work on the causal relationship between the current account and fiscal policy has been rather leaving matters open.

One of the macro-fiscal structural challenges that Namibia needs to overcome in a medium to long term is the reversal of the twin deficits for the government budget and current account [9]. This is largely due to the implication of current account imbalances on a nation's long term economic growth prospects [10]. This concern focusses on the extent to which fiscal adjustment can contribute to resolving external deficit, especially if it continues persisting. It is against this background that this study was conceived to analyse the relationship between government budget deficit and current account deficit.

## 2. LITERATURE REVIEW

### 2.1 Theoretical Literature

In most of the previous literature, only two prime approaches were known to exploring the relationship between budget deficit and current account deficit in an economy. These are the Keynesian approach and Ricardian equivalence.

According to the work of [11], this causal link reasoning can best be demonstrated using a national income identity:

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

Where;

Y is national income, C is private consumption, I is a real investment, G is government spending on goods and services, X is exports of goods and services and M is imports of goods and services.

Current Account is defined as (CA)

$$CA = X - M + F \quad (2)$$

Where:

F is the net transfer payment, which represents income received the country's citizens and companies earn abroad, and the aggregate amount that foreign citizens and overseas companies earn in that country. For simplicity, it is assumed that net factor payments are not large items in the current account. According to

the national income identity in an open economy, national saving is equalled to:

$$S = Y – C – G + CA \quad (3)$$

Where,

Y – C – G = I, which represents Investment, so we have:

$$S = I + CA \quad (4)$$

The distinction between saving decisions is, therefore:

$$S = SP + SG \quad (5)$$

Where

SP is private saving, SG is government saving, after taxes, part of disposable income that is not consumed. In general, we have:

$$SP = Y – T – C \quad (6)$$

SG is defined as government saving which is the difference between government revenue (T) and government spending G, while T is defined as a tax, and TR is transfer payment. This leads us to:

$$SG = T - G – TR \quad (7)$$

From the definition of national saving, we have:

$$S = Y – C – G = (Y –T - C) + (T – G - TR) = SP +SG = I + CA \quad (8)$$

This can be rewritten as:

$$SP = I + CA - SG = I + CA – (T + G + TR) \quad (9)$$

Rearranging this

$$CA = SP –I – (T + G + TR) \quad (10)$$

Where

an expression (T - G + TR) represents the government to balance the budget, CA is the current account balance, (I – SP) is the private saving balance.

$$(T – G – TR) = (X – M) + (I – S) \quad (11)$$

Equation 11 states that government budget surplus is equal to current account surplus plus the excess of investment over private saving [12]. Suppose that the government increases its spending (G), or cuts its taxes (T), thereby creating the budget deficit. This equation indicates that CA must fall or (I – S) must decline or both.

In this case net exports i.e. the trade balance simply equals to the private saving-investment gap plus the budget balance. Thus assuming a stable saving-investment gap, an increase in public sector deficit will directly increase the current account deficit and current account deficit will worsen the budget deficit, which is the traditional twin deficit relationship. Most of the previous works of literature has been centred on the validity of the Keynesian conventional proposition as well as Ricardian equivalence conventional proposition view in explaining the twin deficit issues. However, these are not the only possible outcomes of these relationships.

**(a) Keynesian approach**

**I. Absorption approach**

Assuming the saving-investment gap is stable, an increase in government budget deficit will lead to a deterioration of the current account balance. Theoretically, this mechanism can be well explained by the Keynesian income-expenditure approach. An increase in government expenditure will lead to an increase in domestic absorption, which will lead to an increase in domestic/ national income. Increased national income will induce imports and will eventually reduce or worsen the current account balance, which is the twin deficit hypothesis [13].

**II. Mundell-Flemming approach**

It is based on a well-known Mundell-Fleming framework, which states that an increase in the budget deficit will induce upward pressure on the interest rate, this will lead to an inflow of capital and appreciation of exchange rate. The appreciation of the exchange rate makes the country's exports less competitive and make imports more attractive. Thereby worsening the current account under a flexible system. However, under a fixed exchange rate regime, budget deficit incremental will lead to higher real income or prices and this will worsen current account balance. By the way of explanation, running a persistent budget deficit will ultimately widen the current account deficit in both fixed and flexible exchange rate regime even though the transmission mechanism is different. Mundell

Fleming view is that there is an indirect relationship from public imbalances to domestic interest rates then transfers to the exchange rate and finally influences current account balances [14].

**(b) Ricardian Equivalence hypothesis**

The second hypothesis is the Ricardian equivalence proposition (REH). Modern governments finance their spending in two ways namely, taxing or borrowing. If it uses taxes, then current taxpayers fund government activities. However, if the government is to fund its activities by borrowing, the interest on government debt must be paid by future taxpayers. So in simple terms, Keynesian economist assumes that if the government increase spending today holding tax constant, aggregate demand will increase. However, according to Ricardian equivalence, since agents (taxpayers) are rational forward-looking, they will be aware of paying back government expenditure in the future date. So they will save enough of their current income, by reducing their consumption in order to save up for higher future taxes [15]. So government expenditure borrowing to finance tax cut will have no effect on consumption, so as to aggregate demand.

**(c) Current Account targeting**

The two are not the only testable approaches as far as the interaction between the two deficits is concerned. There is a uni-directional causality that runs current account to the government budget. This outcome occurs when a decline in current account balance leads to a slower growth economic growth and hence increases the budget deficit. This mostly applies to small open developing countries that highly depend on foreign capital inflow to finance their economic development [4]. That is to say, the country budgetary position is directly influenced by large capital inflows or through debt accumulation and with that a country will, in the end, run into budget deficit [15].

**(d) Bi-directional Causality relationship**

There is a bi-directional relationship between balance budget and current account balance. That is to say, budget deficit granger causes current account deficit and vice versa. Twin deficits are defined as a long run (positive) relationship between budget deficit and current account deficit. In other words, the feedback of causality runs from both directions and it is expected that budget balance and current account balance to enter into co-integrating space. This can best be explained by equation 11. In this equation net exports i.e. the trade balance simply equals to the private saving-investment gap plus the budget balance.

**(e) Twin divergence**

This happens when budget balance worsens, current account balance improves or when current account deficit, improves budget balance is referred to as twin divergence. A twin divergence is possible, and can be attributed to two factors; the partial Ricardian equivalence movement of private saving, as private savings increases and investment crowding out effect, as investment declines this is due to the increase of real interest rate. This improves current account balance, at the same time nominal exchange rate depreciates, as opposed to relative price level changes (real exchange rate depreciates), [16]. So when the two balances are affected by output shocks, then twin divergence is more likely. It is more likely to occur due to output shocks than fiscal shocks [17].

## 2.2 Empirical Literature

There are several studies done on the relationship between budget deficit and current account deficit. In a study on the twin deficit hypothesis in Kenya [13], it was discovered that the twin deficit hypothesis does exist in Kenya when the interest rate and exchange rate are included. The same view was also supported in the study of the causal relationship between budget deficit and current account deficit in Thailand [15]. In this study, interest rate and exchange rate helps in explain the twin deficit hypothesis. So, the increase in the budget deficit is transmitted to the interest rate, which is then transmitted to the exchange rate, this will then lead to an increase in the current account deficit.

The development of the Indian economy brought the question of the validity of the twin deficits hypothesis. [18] empirically analysed the causal relationship between budget and current account deficit in the Indian economy covering the period from 1990 to 2013. They used a co-integration test, which suggests that budget balance and current account balance have a long run association and move with each other for a long period of time. Granger causality test found the existence of the bidirectional relationship between two deficit variables, this is in support of

[15], who did the study on Malaysia and Philippines.

Aloryito et al. [1] who investigated the twin deficit hypothesis of most countries in SSA, as they have appeared have been widening over the past several years in the face of positive output growth. They analysed the data of 41 countries from 2000 to 2012, using the system Generalised Method of Moments (GMM) estimation technique, their major findings indicates that fiscal deficits tend to improve the current account and vice versa, thereby rejecting the null deficits hypothesis in favour of the twin divergence proposition. However, this was in contradiction with [19] their study found out that there positive and significant impact of budget deficit on the trade balance, which confirms twin deficits in SSA.

Furthermore, the relationship between budget balance and current account balance was examined by [20], the study covered the period from 1980 to 2011, for nine countries individually. This was done within the framework of Granger causality test and VAR approaches on time series. The Granger causality results support twin deficit relationship, and causal runs from fiscal deficit to external deficit for two countries: Malawi and Zambia together with SADC group average. The inverse link runs from external balance to fiscal balance for another two countries: Swaziland and Zimbabwe. While Botswana confirms a bi-directional causality and Mozambique confirms a Ricardian equivalence proposition. Angola, Seychelles and South Africa results were inconclusive. The conclusion of this study point to the existence of a direct causal link that goes from fiscal deficit to current account deficit. This indicates that fiscal tightening tent to improve current account directly. However, in Zimbabwe and slightly Swaziland the current account can be used to tackle the government budget. While Malawi and Zambia, exhibit twin deficit, suggest that policymakers must think carefully about fiscal consolidation. However, these relationships tend to change over time depending on the dynamics, and complexity of the economy.

Mosayeb and Salman [21] examined the relationship between the budget deficit and current deficits in the Philippines using time series data for the period of 1970-2005. Their results give further support to the Keynesian view that there is a strong link between budget deficits and current account deficits in the Philippines. [22] extended the Greiner and Semmler framework to include welfare analysis. Their main objective is to analyze the growth and welfare implications of the golden rule of public finance. They showed that optimal fiscal policy depends on the particular budgetary regime considered.

In short, different researchers have found different results on the relationship between budget deficit and current account deficit. Research on the relationship between budget deficit and current account deficit is based mainly on five theoretical approaches.

## 3. MATERIALS AND METHODS

### Model specifications and Econometric Framework

This study makes use of the Vector autoregressive (VAR) model. In the VAR model, each variable is explained by its own lagged variable. The VAR model by Njoroge (2014) will be adapted as follows:

$$CAD_t = \alpha_1 + \sum_{i=1}^{n} \beta_i CAB_{t-i} + \sum_{j=1}^{n} \beta_j BD_{t-j} + \sum_{k=1}^{n} \beta_k INT_{t-k} + \sum_{l=1}^{n} \beta_l EXC_{t-l} + \mu_1 \quad (1)$$

$$BD_t = \alpha_2 + \sum_{i=1}^{n} \beta_i BD_{t-i} + \sum_{j=1}^{n} \beta_j CAD_{t-j} + \sum_{k=1}^{n} \beta_k INT_{t-k} + \sum_{l=1}^{n} \beta_l EXC_{t-l} + \mu_2 \quad (2)$$

$$INT_t = \alpha_3 + \sum_{i=1}^{n} \beta_{i=1} INT_{t-i} + \sum_{j}^{n} \beta_{j=1} CAD_{t-j} + \sum_{k=1}^{n} \beta_k BD_{t-k} + \sum_{l=1}^{n} \beta_l EXC_{t-l} + \mu_3 \quad (3)$$

$$EXC_t = \alpha_4 + \sum_{i=1}^{n} \beta_i EXC_{t-i} + \sum_{j=1}^{n} \beta_j CAD_{t-j} + \sum_{k=1}^{n} \beta_k BD_{t-k} + \sum_{l=1}^{n} \beta_l INT_{t-l} + \mu_4 \quad (4)$$

*Where;*
*Budget deficit (BD), Current Account deficit (CAD), Exchange rate (EXC), Interest rate (INT), μ is the Error term, α's are the intercept, β's are the coefficient matrices (n*n)*

Furthermore, the causal relationship between Budget deficits, Current account deficit, Interest rate and the Exchange rate is tested using a four-step procedure. First, the unit root was conducted using the Augmented Dickey-Fuller (ADF) test and the Phillips and Peron (PP) test. These tests determine the order of integration for all four variables. The second step is doing a cointegration test in order to check on the presence of a long-run relationship among all four variables. Cointegration test is conducted using the Johansen cointegration procedure. The third step is then the Granger-causality procedure. This procedure tells if the variables

predict one another variable. The final fourth step will be the impulse response, which traces out the response of the dependent variable in the Vector Auto-Regression model.

### 3.1 Data and Source

This study uses quarterly data, from 1990:01 to 2014:12. The four variables captured are a Budget deficit, Current account deficit, Interest rate and Exchange rate. The data series was obtained from the Bank of Namibia database.

## 4. RESULTS AND DISCUSSION

### 4.1 Unit Root Test

The ADF and the PP tests are applied for unit root as stated earlier. The ADF tend to under-reject the null hypothesis for unit root because of its limitation of lower power [23]. The PP is, therefore, added as a confirmatory test. The results of the unit root test in levels and first difference are presented in Table 1.

Results in Table 1 shows that the variables are non-stationary in levels forms. However, after differencing once they became stationary. The variables are therefore integrated of order one (1).

In Table 2, it shows that both Trace test and Maximum Eigenvalue test fail to reject the null hypothesis of no cointegration at 5% level of significance. Hence acceptance of the null, that there is no co-integration equation, as all the p-value is greater than 5%. The meaning of these results is that there is no long-run relationship between the lending interest rate and the volume of credit to households in Namibia. A relationship between the lending rate and credit availability to households exist in the short run.

As reflected in Table 3, an increase in current account deficit leads to an increase in the budget deficit in this regard. This simply shows that there exists a positive relationship between budget deficit and current account deficit in Namibia, which runs from current account deficit to budget deficit. This was confirmed by the one-way causality which was determined earlier. The results are in line with the Current account targeting theory that an increase in current account deficit brings about an increase in the budget deficit. The shock in the current account deficit is transitory for about a year and a half and become permanent thereafter. This is in support with the work of [24] who did the study on the Democratic Republic of Congo for the period between 1980 and 2013 using ARDL approach.

### 4.2 Impulse Response Function

The results of the impulse response function of budget deficit to changes in current account deficit s are presented in Fig. 1 below.

**Table 1. Unit root tests: ADF and PP in levels and first difference**

| Variable | Model specification | ADF | | PP | | Order of Integration |
|---|---|---|---|---|---|---|
| | | Level | 1st difference | Level | 1st difference | |
| BD | Intercept | -3.354128 (-2.891234)** | -3.421200 (-2.892536)** | -2.160359 (-2.890926) | -4.287645 (-2.89123)** | 1 |
| | Trend & Intercept | -3.324316 (-3.15398)*** | -3.454133 (-3.15516)*** | -2.150830 (-3.455842) | -4.278401 (-3.45631)** | 1 |
| CAD | Intercept | -1.450807 (-2.891234) | -4.407570 (-2.891234)** | -0.789396 (-2.890926) | -4.490812 (-2.89123)** | 1 |
| | Trend & Intercept | -2.334003 (-3.456319) | -4.439306 (-3.456319)** | -2.196465 (-3.455842) | -4.540191 (-3.45631)** | 1 |
| LNEXC | Intercept | -1.233721 (-2.890926) | -7.951420 (-2.891234)** | -1.282890 (-2.890926) | -7.959869 (-2.89123)** | 1 |
| | Trend & Intercept | -1.936489 (-3.456319) | -7.921279 (-3.456319)** | -1.892321 (-3.455842) | -7.927341 (-3.45631)** | 1 |
| LNINT | Intercept | -1.605747 (-2.891234) | -6.762979 (-2.891550)** | -1.271346 (-2.890926) | -6.315857 (-2.89123)** | 1 |
| | Trend & Intercept | -3.284450 (-3.15398)*** | -6.730465 (-3.456805)** | -2.579442 (-3.455842) | -6.282226 (-3.45631)** | 1 |

*Note: (* represents 10%) (** represents 5%) (*** represents 1%) denotes a rejection of the null hypothesis*

**Table 2. Hypotheses table**

| | Trace test | | | Maximum eigenvalue test | | |
|---|---|---|---|---|---|---|
| **Hypothesized No. CE(s)** | **Trace statistic** | **0.05% Critical value** | **Probability value** | **Maximum eigenvalue statistic** | **0.05% Critical value** | **Probability value** |
| None | 39.17755 | 47.85613 | 0.2533 | 23.66643 | 27.58434 | 0.1468 |
| At most 1 | 15.51112 | 29.79707 | 0.7461 | 10.19140 | 21.13162 | 0.7265 |
| At most 2 | 5.319721 | 15.49471 | 0.7740 | 4.948963 | 14.26460 | 0.7483 |
| At most 3 | 0.370758 | 3.841466 | 0.5426 | 0.370758 | 3.841466 | 0.5426 |

*Trace and Maximum eigenvalue indicates no co-integration at the 0.05 level*

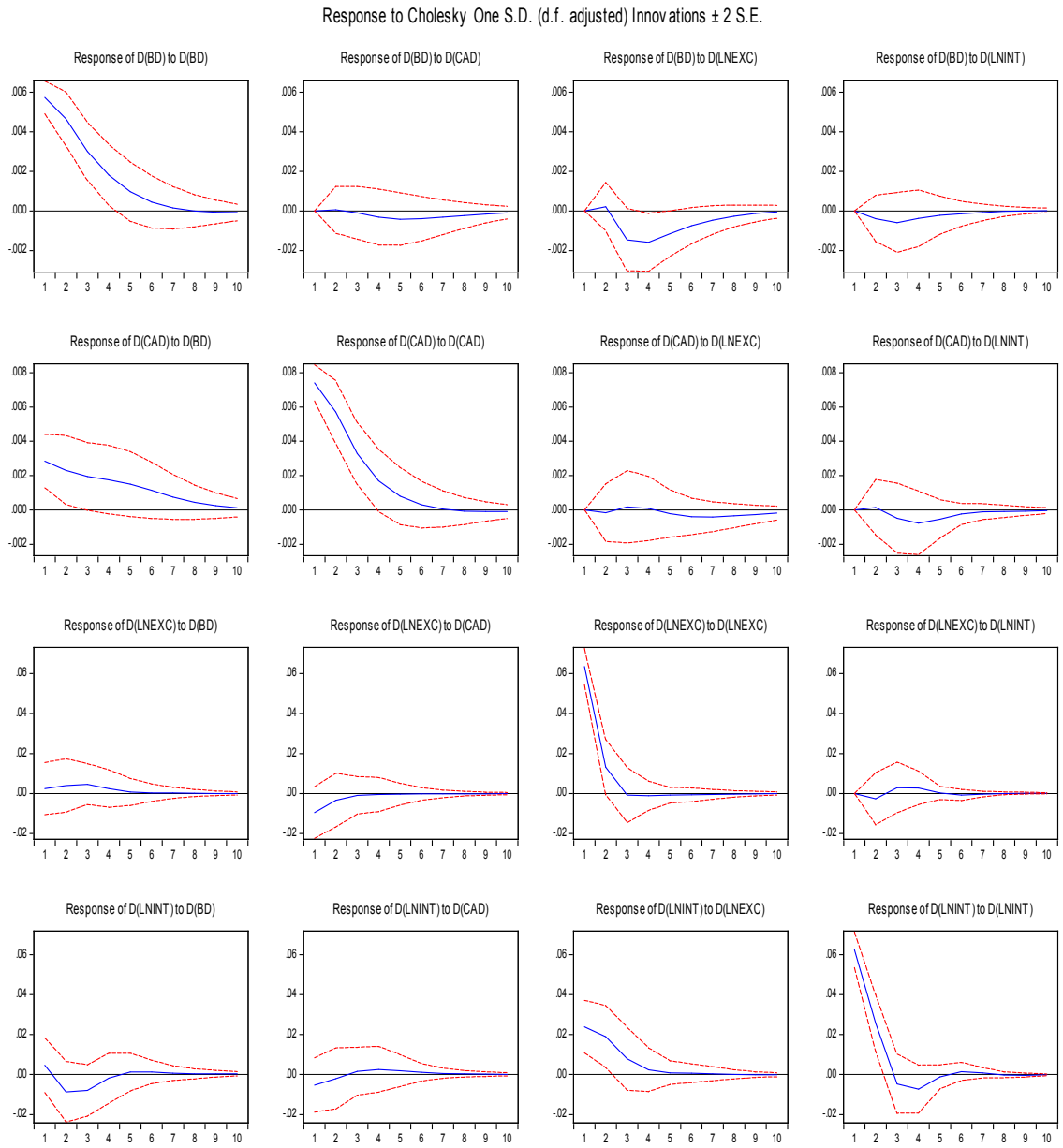


**Fig. 1. Impulse response function**

**Table 3. Causality test**

| Hypothesis | Probability |
|---|---|
| BD does not Granger cause CAD | 0.1641 |
| CAD does not Granger cause BD | 0.0347 ** |
| BD does not Granger cause INT | 0.1063 |
| BD does not Granger cause EXC | 0.7949 |
| CAD does not Granger cause INT | 0.2638 |
| CAD does not Granger cause EXC | 0.8594 |
| INT does not Granger cause BD | 0.0560 |
| INT does not Granger cause CAD | 0.1108 |
| INT does not Granger cause EXC | 0.6297 |
| EXC does not Granger cause BD | 0.2844 |
| EXC does not Granger cause CAD | 0.7403 |
| EXC does not Granger cause INT | 0.0314** |

*Source: Authors' compilation using Eviews. Note: ** denotes the rejection of the null hypothesis at 5% level of confidence*

While Granger causality procedure presented in the previous section provides a wealthy structure for which causality may be tested, it may not depict a complete picture about the interaction between variables in the system. As a means of measuring the relative robustness of the variables and the transmission mechanism responses, a shock to one variable is transmitted to all of the endogenous variables through the dynamic VAR system. It is often interesting to know the responses of one variable to an impulse of another variable in the system that involves other more variables.

An increase in current account deficit leads to an increase in the budget deficit in this regards. It brings about a sharp increase in the first two and a half years and then a decline after the second year and as the number of years increases. This simply shows that there exists a positive relationship between budget deficit and current account deficit in Namibia that is confirmed by the one-way causality which was determined earlier. The results are in line with the theory that an increase in current account deficit brings about an increase in the budget deficit. A shock in the current account deficit is short-lived for six quarters and return to initial equilibrium in a long-run, as shown in the graphs above.

## 5. CONCLUSION

This study looked at the causal relationship between budget deficit and current account deficit in Namibia. The unit root, cointegration, Granger causality and Impulse response function techniques were used in the analysis, using data between 1990 quarter1 and 2014 quarter4. The results show that all four variables were stationary. The study revealed that there was no long run but only a short run relationship among them. Current account deficit was found to explain budget deficit in Namibia while the budget deficit was unable to explain current account deficit. This is in support of the current account targeting theory. The positive reaction of current account deficit to the budget deficit, as well as one way causal impact, coming from current account deficit to budget deficit means that the authorities in Namibia should consider stabilising the current account deficit problem as a way of managing the budget deficit problem. The consolidation of public finance in Namibia requires a good command of the current account as the predictability of the current account balance is improved when the public deficit is included in the analysis of economic policy to be implemented.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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