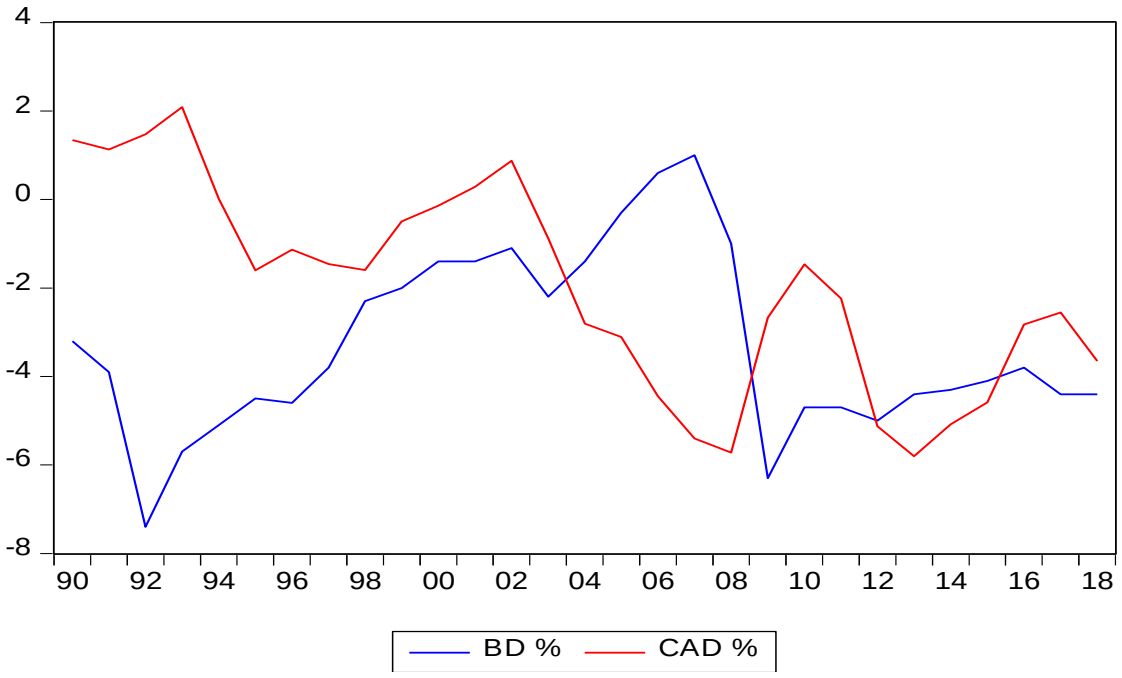
CHAPTER 8

RICARDIAN EQUIVALENCE AND TWIN DEFICIT IN SOUTH AFRICA

8.1 Introduction

South Africa, with a fragile and vulnerable economy, is a significant chance to test a dynamic interaction between BD and CAD. The presence of both the deficits illustrates South Africa's domestic and external stability. The gap between these deficits rose between 1990 and 2018 (see figure 8.1 below).

Figure 8.1: Trend of BD and CAD in South Africa



Note: Author Compilation

The budget deficit is below 5% of GDP, and 60% of the domestic debt is below GDP. South Africa's low tax collection and rising spending continue to drive the budget deficit higher than expected. The CAD raises to 2.9% of GDP in 2018, from 2.1 percent in 2017. South Africa's poor economic output has decreased export growth, increased import growth and deteriorated exchange rates.

The objectives of this chapter are as: The first objective is to explore the linkage in the macroeconomic context between the BD and CAD by applying ARDL approach. Secondly, we use Bernheim (1987) consumption function to validate Ricardian equivalence hypothesis by applying ARDL bound testing approach. Thirdly, we investigate the cause-and-effect association from y to x with the help of Wald causality. Finally, a novel attempt is made to investigate the time way or (input and output behavior of the system) of these components and their responses to shocks from the selected macroeconomic variables. Based, on the Granger causality outcomes, policy makers cannot predict the future policy based on the present results. Secondly, these results can be clarified with sample tests that may give more explanation on the dynamic properties of this relationship Masih and Masih (1995). This approach requires the calculation of unexpected changes in time t in one variable X (the impulse) and the estimation of its effect on the other variable Y in time t, t1+t2+t3+t4...).

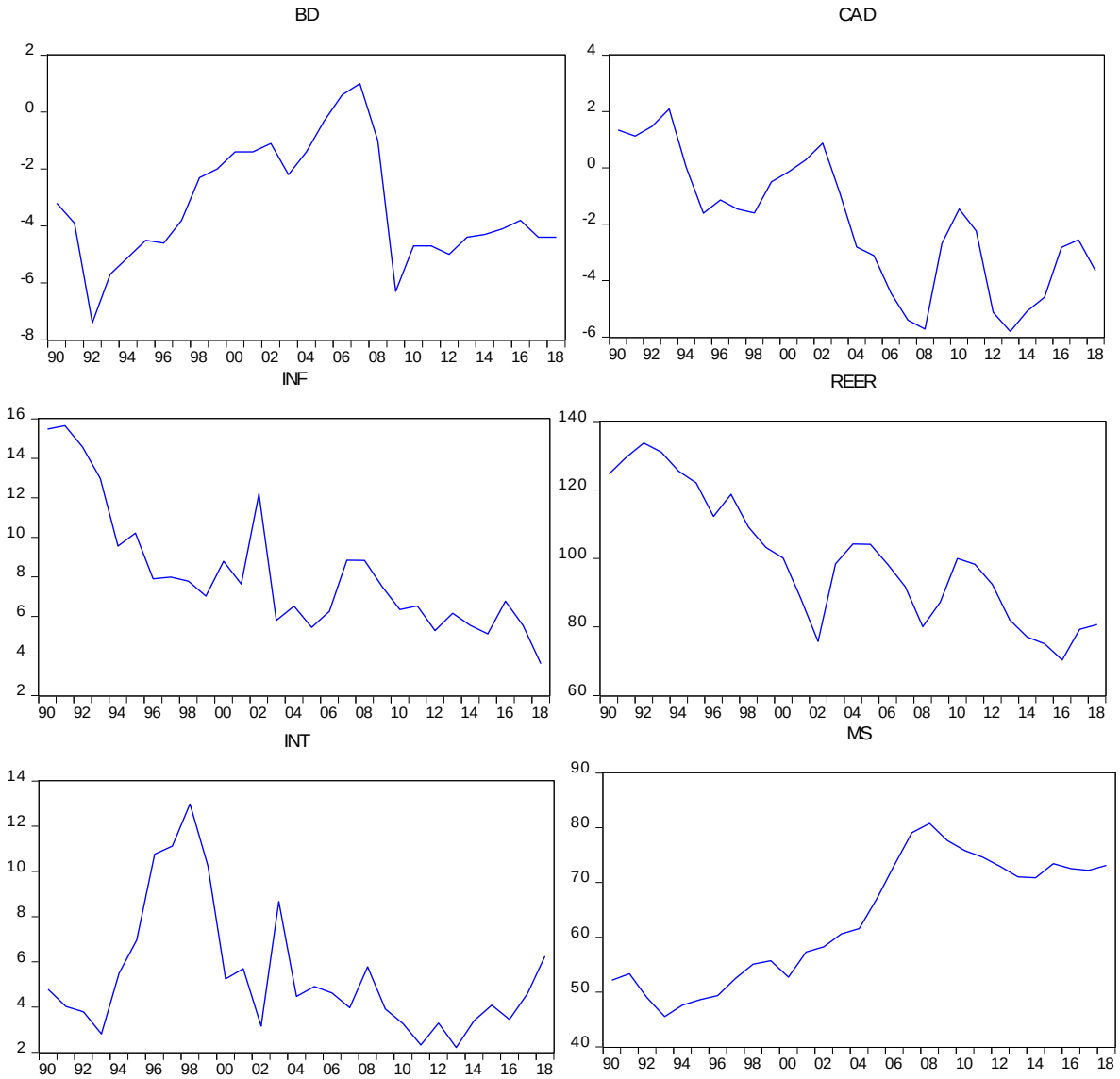
The remainder of chapter 8 is arranged as: Section 8.2 gives economic outlook for the South Africa. Section 8.3 gives data related information. Section 8.4 gives methodology for this chapter. Section 8.5 provides empirical results. Section 8.6 gives conclusion.

8.2 An economic outlook of South Africa

The slow economic growth in South Africa is due to the constrained investment, unemployment, poverty integrated with weal global chain in the form of trade and innovation. Growth in GDP rose from 1.3% in 2017 to 1.4% in 2018. Over the years from 1990 to 2018, South Africa has seen high budget deficits combined with high current account deficits. Figure 8.2 provides an overview of South Africa's internal and external role. From 1990 (-3,2) percent of GDP to (-4,4) percent of GDP, the budget deficit has continuously increased. On the other hand, in 1990 (1.34) per cent of GDP, the CAB was in surplus. The current account balance starts moving in deficits from 1995 onwards and reached maximum (-5.72) percent of GDP in 2008 may be due to the strong wind fall effect of financial crises. The current account balance widened to (-3.65) percent of GDP in 2018 compared to the (-2.55) percent of GDP in 2017. The increase in budget deficit will reduce the rate of economic growth, and higher current account deficit will reduce export, reduction in investment for innovation and lower foreign exchange rate reserves. Macroeconomic policy remains a main debate in South Africa with higher inflation of 15.47 and real effective exchange rate of 124.66 in 1990.

However, the steady rise in BD and CAD is dangerous and may contribute to structural weakness and trade in-competitiveness, which can compensate for private spending, savings, weaker economic growth and unemployment. Continuously raising the budget deficit increases national debt and reduces productivity. Figure 8.2 indicates that the current account balance would deteriorate from 2009 if the actual effective exchange rate appreciates.

Figure 8.2: Behavior of some Macroeconomic variables in South Africa over the period of 1990 to 2018



Note: Author compilation

8.3 Data information

To achieve the goals of the thesis, this analysis uses time series data from 1990 to 2018. The budget deficit and the current account deficit have been specifically taken into

account as a proportion of GDP. World Bank and economic trade data on all the variables are collected; the detailed information on the variables is given below.

(a) The current account deficit (CAD) displays the value of imported goods, services and investments as a proportion of GDP relative to exports.

(b) Budget deficit (BD) indicates the spending's and revenue of the government, if expenditure increase than revenue know as budget deficit as a percentage of the GDP.

(c) Real interest rate (RIR): the lending interest rate calculated by the GDP deflator and adapted to inflation is the real interest rate (RIR) as an interest rate proxy (INT).

(d) Inflation (INF) shows the price change of good and services in the economy, it is based on consumer price index.

(e) Broad money (MS) relates to the volume of liquidity in the economies in the form of foreign currency; to the reserves of demand, the time, savings and foreign currency and coins on which the percent of GDP is centered.

(f) The weighted average value of different currencies, separated by the price deflator, is the actual effective exchange rate (REER).

(g) Tax revenue (TR) is the income earned by government on additional income, fines, penalties and social securities as the basis of percentage of GDP.

(h) Private consumption (PC) is the household total consumption, which include market value of all goods and services as the percentage of GDP.

(i) Government consumption (GC) is the expenditure on education, capital, current and transfer as the percentage of GDP.

8.4 Methodology

8.4.1 Model specification

We test the dynamic relationship in the macroeconomic framework between the two deficits and the Ricardian equivalence hypothesis for South Africa over the period 1990-2018. The study estimates two regression models; the first model is based on Bernheim (1987) consumption function to estimate Ricardian theorem as given: C = f (TR, BD, G, INT)

Where C is the private consumption, BD is the budget deficit, TR is the tax revenue and G is the government consumption. The second regression is to test the twin deficit hypothesis based on the theories reviewed, and the equation is given as: BD = f (CAD, REER, INF, INT, MS).

8.4.2 Unit root test

We need to apply the unit root test for the entire data series before applying econometric models to verify cointegration and causality, since stationarity is the problem with time series. If the sequence is non-stationary, the Gujarati & Porter regression results would be spurious (2009). We need to separate the variables to create uniform stationery. Specifically, while the ADF tests use parametric autoregression in the test hypothesis to estimate the ARMA structure, the PP tests do not take serial regression correlation. The equation for ADF and PP is given below.

$$\Delta y_t = \alpha + \beta t + \gamma y_{t-1} + \delta 1 \Delta y_{t-1} + \delta 2 \Delta y_{t-2} + u_t \qquad \text{ADF equation (1)}$$

$$\Delta y_t = \beta' D_t + \pi y_{t-1} + u_t \qquad \text{PP equation (2)}$$

α is constant β is coefficient and u_t is the term of error. Serial correlation and heteroskedasticity in the regression equation is corrected in the PP u_t error word.

8.4.3 ARDL model

Due to its ability to consolidate small series, the ARDL bound testing method. Secondly, the ARDL strategy can be applied to the series with distinct integration order (Pesaran and Pesaran 1997). Thirdly, we get both short-run and long-run ties among the factors at the same time. The most effective methodology for this analysis is based on the above qualities of this approach with distinct integration order and limited sample size. In order to assess an ARDL model, there are four stages. The first phase examines the cointegration with the help of bound test approach. The ECM version of ARDL model can be as.

$$\Delta Y_t = \alpha_0 + \sum_{i=1}^{P-1} \alpha_i \Delta Y_{t-1} + \sum_{j=0}^{P-1} \alpha_j \Delta X_{t-j} + \beta_1 Y_{t-1} + \beta_2 X_{t-1} + \varepsilon_t \qquad (3)$$

The dependent variable is Y_t, the independent variable is X_t, and the residual term is ε_t. The ECM for the equation 3 is given below:

$$\Delta \mathrm{BD}_i = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta BD_{t-i} + \sum_{i=0}^{n} \alpha_{2i} \Delta CAD_{t-i} + \sum_{i=0}^{n} \alpha_{3i} \Delta INF_{t-i} + \sum_{i=0}^{n} \alpha_{4i} \Delta REER_{t-i}$$

$$+ \sum_{i=0}^{n} \alpha_{5i} \Delta INT_{t-i} + \sum_{i=0}^{n} \alpha_{6i} \Delta MS_{t-i} + \beta_1 BD_{t-i} + \beta_2 CAD_{t-i} + \beta_3 INF_{t-i}$$

$$+ \beta_4 REER_{t-i} + \beta_5 INT_{t-i} + \beta_6 MS_{t-i} + \varphi ECt - 1$$

$$+ \varepsilon_t \qquad (4)$$

8.4.4 Granger causality

The Causality Method examine the linkage between the BD and CAD and certain macroeconomic variables. Results of Granger causality explain that the change in one variable is attributable to another variable's change. One of the three possible outcomes is given by the results of the model: bidirectional causality, unidirectional causality and no causality. Whether the causality is from the BD and CAD, meaning the acceptance of the Keynesian proposal, or from the CAD to BD, meaning the acceptance of the Ricardian preposition, meaning compliance with the national accounting principle, and whether no causality exists. The model can be written as.

$$\Delta \mathrm{BD}_t = \alpha_1 + \Sigma\beta_1 \Delta \mathrm{CAD}_{t-i} + \Sigma\theta_1 \Delta \mathrm{INF}_{t-i} + \Sigma\gamma_1 \Delta \mathrm{REER}_{t-i} + \Sigma\delta_1 \Delta \mathrm{INT}_{t-i} + \Sigma\lambda_1 \Delta \mathrm{MS}_{t-i} + \varepsilon_t$$

(5)

$$\Delta \mathrm{CAD}_t = \alpha_2 + \Sigma\beta_2 \Delta \mathrm{BD}_{t-i} + \Sigma\theta_2 \Delta \mathrm{INF}_{t-i} + \Sigma\gamma_2 \Delta \mathrm{REER}_{t-i} + \Sigma\delta_2 \Delta \mathrm{INT}_{t-i} + \Sigma\lambda_2 \Delta \mathrm{MS}_{t-i} + \varepsilon_t$$

(6)

$$\Delta INF_t = \alpha_3 + \Sigma\beta_3\Delta BD_{t-i} + \Sigma\theta_3\Delta CAD_{t-i} + \Sigma\gamma_3\Delta REER_{t-i} + \Sigma\delta_3\Delta INT_{t-i} + \Sigma\lambda_3\Delta MS_{t-i} + \varepsilon_t \quad (7)$$

$$\Delta REER_t = \alpha_4 + \Sigma\beta_4\Delta BD_{t-i} + \Sigma\theta_4\Delta CAD_{t-i} + \Sigma\gamma_4\Delta INF_{t-i} + \Sigma\delta_4\Delta INT_{t-i} + \Sigma\lambda_4\Delta MS_{t-i} + \varepsilon_t \quad (8)$$

$$\Delta INT_t = \alpha_5 + \Sigma\beta_5\Delta BD_{t-i} + \Sigma\theta_5\Delta CAD_{t-i} + \Sigma\gamma_5\Delta INF_{t-i} + \Sigma\delta_5\Delta REER_{t-i} + \Sigma\lambda_5\Delta MS_{t-i} + \varepsilon_t \quad (9)$$

$$\Delta MS_t = \alpha_6 + \Sigma\beta_6\Delta BD_{t-i} + \Sigma\theta_6\Delta CAD_{t-i} + \Sigma\gamma_1\Delta INF_{t-i} + \Sigma\delta_6\Delta REER_{t-i} + \Sigma\lambda_6\Delta INT_{t-i} + \varepsilon_t \quad (10)$$

8.5 Empirical results

In order to test the Ricardian theorem and twin deficit hypothesis for South Africa, first we understand the features of data with the help of descriptive statistics given in table 8.1 below.

The descriptive analysis reveals that the mean value of BD (-3.30) is greater than CAD (-1.98) because the most of the series of BD is negative and greater than CAD. The mean value of BD is more than CAD, which means South Africa should more focus on fiscal management. The standard deviation of BD (2.056) and CAD (2.344) is greater than 2 meaning that the data observations are spread out. The maximum value of CAD (2.08) is greater than BD (1.00) and minimum value of BD (-7.40) is greater than CAD (-5.80) is due to the fact that BD series is negative most of the years as compared to the CAD.

Table 8.1: Descriptive Statistics of Variables for South Africa

	BD	CAD	INF	INT	TAX	MS	REER
Mean	-3.303	-1.985	8.204	5.389	24.63	63.23	99.77
Median	-3.900	-1.603	7.504	4.580	24.38	61.59	98.38
Maximum	1.000	2.087	15.65	12.99	27.56	80.79	133.6
Minimum	-7.400	-5.804	3.604	2.208	20.62	45.50	70.35
Std. Dev.	2.056	2.344	3.179	2.792	1.954	11.27	18.81
Skewness	0.330	-0.044	1.106	1.332	-0.111	-0.045	0.273
Kurtosis	2.450	1.946	3.322	3.830	2.000	1.480	1.954
Jarque-Bera	0.892	1.351	6.045	9.412	1.254	2.800	1.683
Probability	0.639	0.508	0.048	0.009	0.533	0.246	0.431

Note: Author's Calculations.

8.5.1 Unit root

We used unit root test (ADF and PP) to verify the level of stationarity. It helps to apply a suitable method for estimating outcomes. ARDL is the effective method for robustness of outcomes if they are implemented at level and first difference, Pesaran et al., (2001).

The findings of the ADF and PP unit suggest that when we take intercept and pattern in ADF, some of the variables such as (CAD, INF and TAX) are stationary as given in table 8.2. However, often the outcomes of ADF and PP. differ, the outcomes of ADF are reliable over the outcomes of PP in view of the fact that Arltova and Fedorova (2016) "ADF is a dependable choice for unit root testing," and they further emphasize that its

results are superior to any other procedures for unit root testing, particularly because of the greater number of observations.

Table 8.2: Results of unit root test for South Africa								
	Augmented Dickey-Fuller (ADF)				**Phillips-Perron (PP)**			
Variable	**Intercept**		**Intercept and Trend**		**Intercept**		**Intercept and Trend**	
	I_0	**I_1**	**I_0**	**I_1**	**I_0**	**I_1**	**I_0**	**I_1**
BD	-1.89	-4.87	-1.84	-4.80	-1.89	-4.87	-1.84	-4.80
CAD	-2.29	-4.43	-4.18	-	-1.51	-3.33	-1.65	-7.07
MS	-0.99	-3.24	-2.26	-4.49	-0.87	-3.24	-1.66	-7.21
INF	-2.34	-7.77	-4.19		-2.23	-7.72	-3.12	
REER	-1.32	-4.54	-3.19	-4.49	-1.07	-4.63	-2.20	-5.06
INT	-2.16	-6.19	-2.33	-6.07	-2.16	-6.13	-2.42	-6.01
TAX	-1.14	4.62	-3.58	-	-1.22	-4.62	-2.99	-4.52
PC	-1.35	-4.50	-3.11	-4.33	-1.45	-4.32	-2.54	-4.13
G	-1.40	-4.62	-1.43	-4.64	-1.59	-4.62	-1.61	-4.65

Overall, the ADF test results suggest that the variables have different degrees of integration and can proceed with the method of ARDL.

8.5.2 Ricardian equivalence

We used Bernheim (1987) equation to test the Ricardian equivalence for South Africa. Most of the empirical literature estimate Euler equation or reduced form of the

consumption equation. But we apply the reduced form of the consumption function as given below in table 8.3.

$$PC_t = \beta_0 + \beta_1 BD + \beta_2 TAX_t + \beta_3 G_t + X_t\beta + \varepsilon_t \quad (11)$$

BD is the budget deficit, tax is the tax revenue, and G is the government spending, where PC is the private consumption. For long-run relationships, we applied the ARDL bound research technique. David Ricardo's point was that while governments attempt to fund their deficits, private spending is not affected.

Table 8.3: Results of REH for South Africa (Private Consumption (PC))

Variables	Coefficient	t-value	Prob
TAX	.40828	1.7523	.094***
TAX(-1)	-.65044	-2.5200	.019**
G	2.0294	2.9529	.007*
BD	.52695	2.5396	.019**

Note: Superscripts "*" "**" "***" denote 1%, 5% and 10% significance level.

The findings show that there is a substantial relationship between BD and government spending on private consumption, based on the above statement (PC). The variable TAX is significant and coefficient is negative, meaning that with the increase in TAX private consumption will decrease which is consistent with the findings of Leiderman and Assaf Razin (1986), Mika Arola (1996), Ghatak and Ghatak (1996) and Tagkalakis (2008).

8.5.3 ARDL Bounds testing results

First, the implementation of the ARDL regression includes the selection of lags based on the Akaike Knowledge Criterion (AIC). The following stage is to measure the presence of the variables of the long-run association. The F = 7.1978 statistics is larger than upper bound 4.0647 and lower bound 2.6139, suggest cointegration association.

Table 8.4: Results of Cointegration Bound test

Calculated F-statistic	95% LB	95% UB	90% LB	90% UB
***F*= 7.1978**	2.6139	4.0647	2.0947	3.3557
W- Stat = 43.18	15.6832	24.3883	12.5685	20.1343

After discovering evidence of cointegration using the ARDL method, in Tables 8.5 and 8.6 the long-run coefficients are shown. The findings show a strong long-term association between the BD and CAD.

These results recommend twin deficit holdings in South Africa in the long term. This indicates a detrimental and significant association between the two deficits and some other macro-economic indicators in the long term. The Keynesian forecasts indicate that the method to fund the fiscal deficit is important to the country's long-run economic efficiency. The coefficient of interest rates, which is optimistic and significant, indicates that the rise in budget deficits would bring greater pressure on interest rate and increase capital inflow and exchange rate appreciation, contributing to a current-account deficit. This line focuses on Keynesian absorption theory. The exchange rate coefficient -.031851 is negative and significant, meaning that the actual balance reduces as the exchange rate

deteriorates. The inflation coefficient .11522 is optimistic and important, indicating that an inflation rise would minimize long-term budget deficits. Money supply has a negative -.029570 coefficients and a clear budget deficit connection implies a rise in the money supply would increase the long-term budget deficit.

Table 8.5: Results of ARDL model of South Africa (BD)

Variables	Coefficient	t-value	Prob
BD(-1)	-.18118	-.94779	.358
BD(-2)	.24549	1.9550	.069***
CAD	-.49520	-2.5523	.022**
CAD(-1)	.43147	2.6385	.019**
INT	-.31927	-3.4965	.003*
INT(-1)	. 11223	1.0567	.307
INT(-2)	.37027	3.7125	.002*
INF	.11522	1.9916	.092***
MS	.40768	5.4145	.000*
MS(-1)	-.17499	-1.1538	.267
MS(-2)	-.26035	-2.0817	.055***
REER	-.029803	1.9785	.067***

Note: Superscripts "*" "**" "***" denote 1%, 5% and 10% significance level.

The short-run results are given in table 8.6. All the variables have major short-run relationships, the results find. The CAD coefficient is negative and important, which means that a 1% rise in CAD would increase the budget deficit by -.49520%. As cyclical

fluctuations in the domestic market are due to the global economy and stained financial growth, the budget deficit cannot be used as a replacement for monetary policy to maintain internal balance.

Table 8.6: Results of ARDL Long-run and Short-run (∆BD)

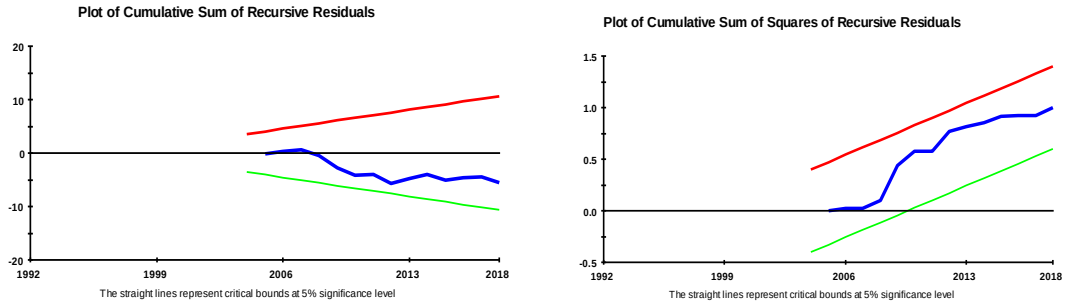
	Variables	Coefficient	t-statistic	P- Value
Long Run	CAD	-.068111	-.43198	.067***
	REER	-.031851	-1.9772	.067***
	INF	.012314	.099133	.009*
	INT	.17446	1.6947	.011**
	MS	-.029570	-1.7499	.010**
	ECM(-1)	-.93569	-6.4264	.000*
Short Run	∆ BD	-.24549	-1.9550	.066***
	∆ CAD	-.49520	-2.5523	.020**
	∆ INT	-.31927	-3.4965	.003*
	∆ INT (-1)	-.37027	-3.7125	.002*
	∆ INF	.11522	.99161	.092***
	∆ MS	.40768	5.4145	.000*
	∆ MS(-1)	.26035	2.0817	.052***
	∆ REER(-1)	-.029803	-1.9785	.063***
R-squared = 0.8628 F-Stat = 11.7955(.000) DW Stat = 2.5457 Serial Correlation: 8.277(.121) Normality: .7017(.704) Heteroscedasticity: 10.96 (.145)				

Note: Superscripts "*" "**" "***" denote 1%, 5% and 10% significance level.

The above findings are based on the fact that there is a negative correlation between the BD and the CAD. Variables such as the actual effective exchange rate and interest rate have a negative and important relationship with the budget deficit, meaning an interest rate rise of 1 percent and the exchange rate would increase the budget deficit by -.31927 and -.029803, which is consistent with the Keynesian preposition hypothesis. The supply of inflation and money has a supportive and critical relationship with the BD in the short-run.

The results are compatible with the Keynesian preposition and remove the Ricardian premise that the BD is not associated with CAD. The adjustment speed is given by the error correction term (ECM); the negative value with P-value significance will converge rapidly towards equilibrium. The ECM value at 1 percent level is (-.93569) negative and important, meaning that at a rate of 93 percent the model will reach equilibrium. The below part of table 8.6 below gives diagnostic statistic in the form of Jarque-Bera normality test confirm normality of the model, Durbin Watson test confirms no Serial correlation, Breusch-Pagan–Godfrey confirm there is an absence of Heteroscedasticity and figure 8.3 gives (CUSUM) (CUSUMSQ) model confirm that the model is stable.

Figure 8.3: Stability test (CUSUM and CUSUMSQ)



8.5.4 Granger Causality

We reviewed 6 Granger causality test equations for South Africa. However, the key justification for this analysis is to evaluate the route of causality between variables. The findings show that there are two-way causalities from BD to CAD (Table 8.7). The results find that the surge in the budget deficit triggers the trade deficits and the increase in the CAD.

Table 8.7: Results of causality Wald test for South Africa

Equation	Chi^2-test	P-value	Null-Hypothesis
CAD to BD	5.1822	0.075***	Accepted
BD to CAD	2.5782	0.054***	Accepted
INF to BD	49.437	0.000*	Accepted
BD to INF	1.7876	0.409	Rejected
INF to CAD	11.166	0.004*	Accepted
CAD to INF	.04017	0.980	Rejected
REER to BD	9.1979	0.010**	Accepted
BD to REER	.62162	0.733	Rejected
REER to CAD	5.4645	0.065***	Accepted
CAD to REER	1.1003	0.577	Rejected
INT to BD	9.6599	0.008*	Accepted
BD to INT	.41863	0.811	Rejected
INT to CAD	9.2154	0.010**	Accepted
CAD to INT	.48656	0.784	Rejected
MS to BD	14.928	0.001*	Accepted
BD to MS	26.59	0.000*	Accepted
MS to CAD	2.5105	0.285	Rejected
CAD to MS	13.426	0.001*	Accepted
REER to INF	6.4794	0.039**	Accepted

INF to REER	4.9957	0.082***	Accepted
INT to INF	8.0757	0.018**	Accepted
INF to INT	36.467	0.000**	Accepted
MS to INF	12.264	0.002*	Accepted
INF to MS	30.054	0.000*	Accepted
INT to REER	2.3044	0.316	Rejected
REER to INT	6.1284	0.047**	Accepted
MS to REER	.3931	0.822	Rejected
REER to MS	20.545	0.000*	Accepted
MS to INT	8.3539	0.015**	Accepted
INT to MS	33.231	0.000*	Accepted

Notes: Superscripts "*" "**" "***" denote 1%, 5% and 10% significance level.

The results suggest that increase in tax rates will decreased budget deficit and import demand due to reduction in the disposable income. Therefore, tightening fiscal policy can reduce the budget deficit but, on the hand, will reduce private investments, reduction in government spending's, increase in unemployment and lower economic growth in South Africa. However, the macroeconomic imbalances may lead to current account deficit, due to sharp alterations in real effective exchange rate, domestic demand, inflation and many other factors (Forbes, Hjortsoe, and Nenova 2017). The sluggish demand for exports is a structural danger to the current account balance, as exports are struggling to get momentum and maintain pace with global trade. The demand for exports and productivity is not gaining momentum in South Africa. This leads to a devaluing exchange rate, especially in manufacturing and mining sector. The depreciation in currency value reflects poor integration with the global economy, and uncertainty discourages investments. It leads to lower invocation transfer of technology and fewer

imports of technology-intensive goods. A difference in productivity between the world and South Africa makes capital goods more expensive for both consumers and industries based on exchange rate deprecating approach. Higher inflation can also cause CAD, and our findings show unidirectional impact from inflation to CAD.

Higher inflation will increase the price of good and services domestically; meaning domestic market becomes less competitive as compared to the global market and worsens current balance (e.g., Turkey where inflation was 9% and CAD 5% of GDP).

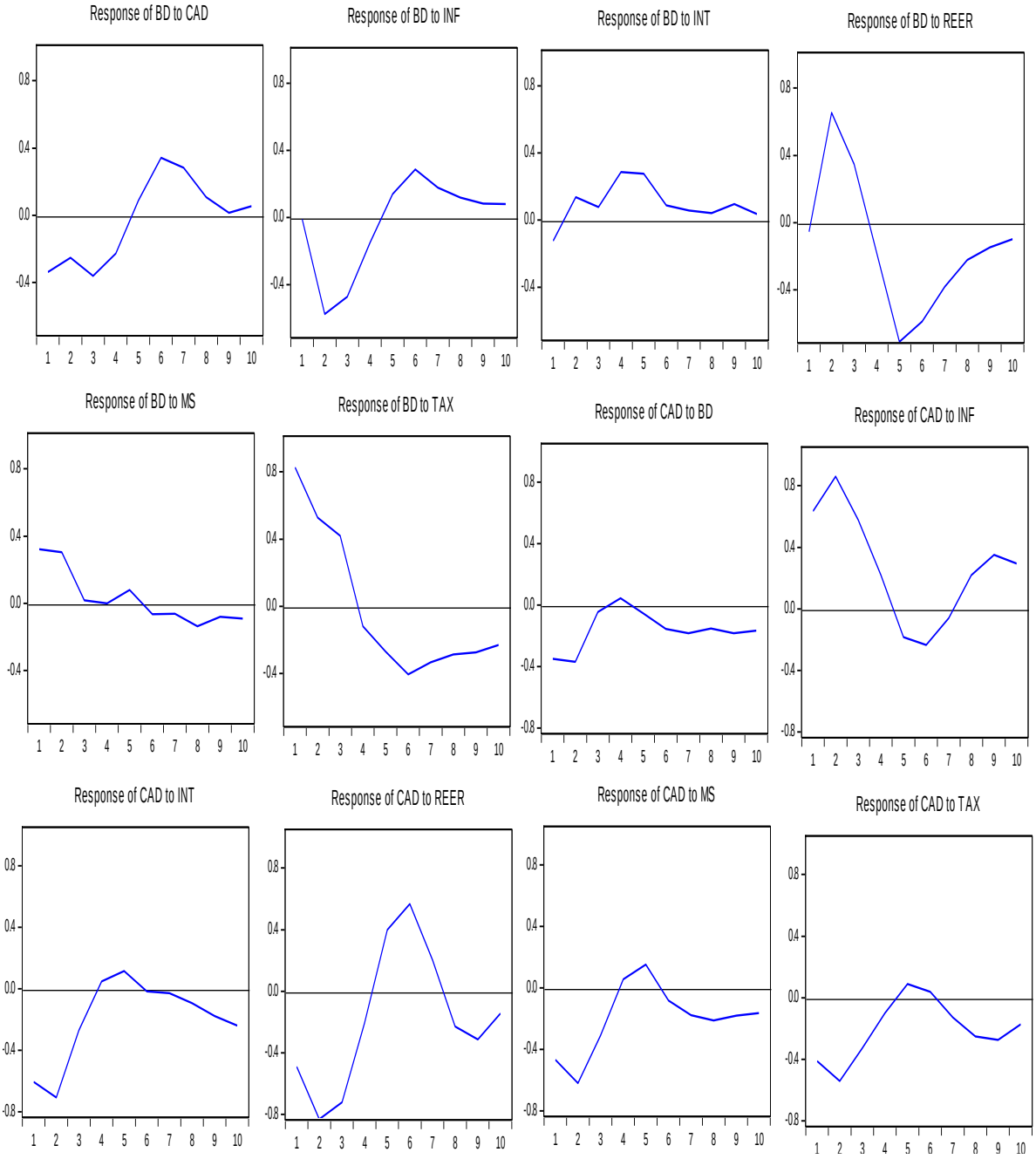
The results of our study favor Keynesian preposition than Ricardian Equivalence theorem in the light of above data. All the variables (inflation, real effective exchange rate, interest rate, money supply) causes' BD and CAD at 5% level of significance. The results are consistent with Ahmad and Aworinde (2015), Abbas et al. (2011), Badinger et al. (2017) and Afonso et al., (2018).

8.5.5 Generalized Impulse Response of South Africa

Based, on the above results, it is imperative to take note that there are restrictions in Granger causality tests, especially for policymaking purposes. These outcomes don't demonstrate the future time impact over the variables. Second, these outcomes can be explained within sample tests which may give little clarification on the dynamic properties of the framework Masih and Masih (1995). We applied to generalize response functions (GIR). The GIR investigation is a procedure that follows through time the impacts of a one-time shock to every factor in the framework Fischer, Hall & Taylor (1981). Figure 8.4 gives the GIR response of BD to CAD, INF, INT, REER, MS, TAX

and the second GIR response of CAD to BD, INF, INT, REER, MS, TAX for 10 years horizon.

Figure 8.4: Response to Generalized OBD S.B. Innovations



The budget deficit worsens for the first 4 years, a positive blow to the CAD, and then improves the BD over the next 6 years. A positive shock to the BD, CAD is gradually worsening. This is reliable with most hypothetical models' standard theorems and compatible with Granger causality results.

The optimistic inflation shock worsens the budget deficit for the first 4 years and then boosts the budget deficit. However, the current-account gap improves first for five years, then worsens for a year and indicates further improvements. The positive impact of interest rate shocks on the budget gap is positive. However, the interest rate affects the current-account deficit negative, which implies that an interest rate increase contributes to foreign inflows and the actual exchange rate appreciation, eventually culminating CAD. The optimistic impact on the budget gap for the first 3 years from actual successful exchange rates and then deepens the budget deficit for the next 6 years. Nevertheless, over the first four years, the detrimental impact of a successful real exchange rate on the current account gap indicates stabilization over the next three years and adverse effects afterwards. The beneficial effects of the allocation of money on the budget deficit for the first five years and then on the budget deficit for the next five years have deteriorated. On the other hand, for several years, the negative effect of the supply of money on the current account deficit has been constant. Finally, for the first 4 years, the tax shock on the budget deficit showed a positive effect and then worsened for the next six years. The positive relationship over the first few years may be attributed to the improvement in the tax system that has raised government revenue and decreased the deficit over the first few years. However, negative association between taxes and CAD, which means that the CAD will worsen with the rise in the tax rate.

8.6 Conclusion

This chapter tests the twin deficit hypothesis and Ricardian equivalence theorem in a macroeconomic framework. We investigate direct impact of BD on CAD in the macroeconomic framework. Secondly, we also test Ricardian hypothesis by using Euler consumption function. Thirdly, we check the causal association between the variables and their direction. Finally, we applied impulse response function to check input and output relationship for policy making and robustness of results.

As all the variables (tax, budget deficit and government expenditure) had a substantial relationship with private consumption, the findings do not support the Ricardian hypothesis.

The findings from the ARDL model support the long-term co-integration between the two deficits and embrace the Keynesian preposition and do not seek any evidence based on this in the Ricardian equivalence hypothesis. Due to liquidity pressures and decreasing market resilience, the main motivation for such a differential effect of BD and CAD may be anticipated in a developing world such as South Africa. The other variables used in this model (CAD, INF, INT, REER, MS and TAX) considered to be both long-lasting and short-lasting.

Granger causality findings suggest two-way association between the two deficits. The Granger causality gives unidirectional causality of BD and CAD to INT, REER and INF. However, the macroeconomic imbalances may lead to current account deficit, due to sharp alterations in real effective exchange rate, domestic demand, inflation and many other factors (Forbes, Hjortsoe, and Nenova 2017). The sluggish demand for exports is a structural danger to the current account balance, as exports are struggling to get

momentum and maintain pace with global trade. The demand for exports and productivity is not gaining momentum in South Africa. This leads to devaluation in exchange rate, especially in manufacturing and mining sector. The depreciation in currency value reflects poor integration with the global economy, and uncertainty discourages investments.

The result of Impulse response supports the results of Granger causality and found exchange rate, inflation and tax causes both BD and CAD for the future 10 years. Based on the results if causality and Impulse, we can say low inflation and stability in exchange rate is important to reduce CAD. From the fiscal point of view, there should be a balance tax structure which should not hamper consumption and government revenue. Based on these policy measures, it will reduce the uncertainty in investment, which will boost consumer demand, business, and exports, that will improve current account balance and fiscal balance.