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The Impact of Government Debt on Consumption Expenditure in South Africa: A NARDL Approach

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Abstract: This study investigated the impact of economic crises and government debt on consumption expenditure in South Africa, using quarterly time-series data from 1993Q1 to 2020Q4 from the South African Reserve Bank (SARB) and Quantec (Easy Data). The study used both a linear and non-linear autoregressive distributed lag model (ARDL and NARDL). The study's variables included consumption expenditure, total foreign debt, national government debt, government expenditure, government expenditure for social protection, the fuel levy, value-added tax (VAT), personal income tax, gross domestic product (GDP), and inflation. The NARDL shows that in the short run, national government debt is significant. However, in the long run the variable shows itself to be insignificant. The NARDL also finds, that government expenditure, government expenditure for social protection, and the fuel levy all increase consumption expenditure. Thus, it would be prudent for the government to adopt additional tax strategies to ease pressure on consumers. The study's Granger causality test shows unidirectional causality from consumption expenditure to all variables, except inflation.

Keywords: Consumption expenditure; government debt; Granger causality; Non-linear Autoregressive Distributed Lag Model

1. Introduction

Government borrowing can be beneficial only if it is for growth-enhancing activities. However, if this is not the case, it can make the country vulnerable to economic and financial shocks as well as an increase debt service costs. Hlongwane and Daw (2022) support this notion for the South African context. The traditional functions of government are threefold. They are to stabilise the economy, where it increases borrowing when the economy is in recession, while reducing borrowing when that is not the case. Secondly, the government has a bridging function which is called tax smoothing and lastly, the burden sharing function (Holtfrerich et al., 2016).

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The latter function of burden sharing implies that when governments borrow, they must make their repayments and service their debt, by passing on the costs to consumers as taxes (Hyman, 2011). This is the crux of the study. Households and individuals are always at the forefront of the tax burden. This is because most of the taxes implemented in South Africa affect individuals and households first, before they affect firms, the government, and other institutions in the economic cycle. For instance, income tax, the fuel levy, and VAT are taxes that hit the consumer's pocket first before they filter through to other stakeholders in the economy. South Africa's unemployment rate continues to climb, leaving even fewer individuals able to contribute to tax revenue.

In a regime switching model of South Africa by Hlongwane and Daw (2022), two regimes are tested regarding determinants of public debt. Regime 1 is the global economic crisis and regime 2 is the COVID-19 induced recession. For regime 1, they find that a 1% increase in government expenditure will increase public debt by 1.49%, and by 0.25% in regime 2.

It is the norm for governments to borrow more than usual during economic crises, and it is understood to cushion the blow of an economic downturn and redirect government spending according to newly realised priorities. According to Hlongwane and Daw (2022), South Africa's estimated debt-to-GDP ratio stood at 82.76% in 2021, and between 2022 and 2023, the national debt was R4,38 trillion. Much of this government debt has been acquired because of borrowing, however, over time, it has its own adverse effects, one of which is on consumption expenditure.

Much of the debt that is accumulated by government is one that cannot be paid back in one lifetime, thus it falls on several generations (Broadstock, Wang & Zhang, 2014; Ang, 2001; Islam & Siwar, 2005). This debt becomes a burden on households, as some of it is passed on to them through taxes. Thus, the problem is how this issue is affecting consumption expenditure, especially since it accounts for nearly 60% of South Africa's GDP. There are limited South African studies that focus on the impact of economic crises and government debt on consumption expenditure, and thus this question begs for investigation.

2. Theoretical Literature: Government Debt

There are several government debt theories, and they illuminate the importance of prudence when it comes to debt management by governments. The most pertinent of these theories are the Keynesian debt management theory (1936), the New Keynesian default risk theory and Ricardian Equivalence.

2.1. Keynesian Debt Management Theory

Keynesian debt management theory has always asserted that debt should be used for productive capacities. According to Gordon (1981), a weakening of the budget balance is sometimes necessary to improve the economy. That is, debt is not necessarily a bad phenomenon, only when it is used for productive activities which will benefit the economy in future (Keynes, 1936). This is supported by Otaki (2015), who found in his study that public debt lowers the well-being of future generations. Appiah-Kubi et al also add that government borrowing is a double-edged sword where overborrowing and improper allocation of borrowed funds can lead to debt overhang. A productive capacity could be public capital expenditure, which is better known as infrastructure development (Nkosi, 2020). So,

Keynes (1936) advocated debt accumulation for only a short period of time to benefit the economy in the long run. Keynes' notion on the impact and use of debt has been the fundamental principle of how other schools of thought understand or interpret government debt today. One such school is the New Keynesian school. It is also worth noting that Keynes had his own thoughts considering the possible influence of debt trajectories on the term structure of interest rates (Aspromourgos, 2018). This is interesting because it is known that one of the influences on consumption expenditure is the interest rate. And so, Keynes reveals another channel through which government debt affects consumption, apart from taxation which has been the main thrust of the study.

2.2. New Keynesian Sovereign Default Risk Model

Post Keynesian theories of crisis have existed for a few decades. They are centred on Minsky's financial instability hypothesis and Godley's stock-flow consistent approach (Keen, 2015). These theories are interesting and assert that private debt is what caused the global economic crisis of 2008. However, the theories do extend further. Arellano, Bai and Mihalache (2020) have pioneered a New Keynesian model which factors in default risk and how that impacts the consumer. In this study, one of the variables is foreign debt, which puts forward the notion of the likelihood for governments to default on debt. A unique stance that the model postulates is that the interest rate affects both the government and the consumer. This is because of the interest payments that come with borrowing and that the interest rate influences consumer spending behaviour (Blanchard, 2018). This is supported by Ndou and Gumata (2023), who find that government debt has a detrimental effect on household consumption due to a credit constraint brought about by the debt. As such, the study takes on this stance as far as government debt theory is concerned.

While it is not one of the theories at the focal point, one can go further to introduce the notion that even debt overhang not only crowds out private investment but also has an adverse effect on private spending. Just as it reduces incentives to invest, it also does the same to the consumer when spending is concerned.

2.3. Ricardian Equivalence

There are other theories which explain the relationship between government debt and other economic variables, which in this case is consumption. One such theory is the Ricardian Equivalence. The government can support its expenditure through taxation or deficit financing (Hyman, 2011). According to Ricardian equivalence, the expansion of fiscal policy has no impact on the economy because consumers have myopic foresight (Barro, 1979). That is, when they note an increase in government debt, they adjust their spending accordingly and there is no adverse impact of the new debt level. Many studies, such as those of Sunge, Mufandaedza and Matsvai (2015), Osodiuru et al. (2018), and Wheeler (1999) refute the Ricardian Equivalence Hypothesis. And by extension, these studies support the notion that government debt is harmful to consumption expenditure. This study also refutes the hypothesis.

3. Empirical Literature on Government Debt and Consumption Expenditure

Government debt has several implications on the economy and how it upholds its debt agreements has an influence on overall risk. Kim (2019) investigates the relationship between debt accumulation and default risk for the Eurozone during 2000 – 2015 using dynamic Ordinary Least Squares (OLS) modelling (OLS) and fully modified OLS. He finds that the government has a tendency to default during the sovereign debt crisis and before the global economic crisis.

The impact of government debt on consumption is imperative to discuss. The study by Berben and Brosens (2007) found a non-linear relationship between government debt and consumption. In an ARDL model of the OECD countries from 1983 – 2003, they found that in countries with high government debt, an expansion in fiscal policy is crowded out by a fall in consumption. This firmly supports the New Keynesian default theory.

Pozzi, Heylen and Dossche (2002) also found that high government debt has the tendency to discourage private consumption because it tightens credit conditions. This corroborates the study by Ndou and Gumata (2023). Albuquerque and Krustev's (2018) study find that indebtedness has a detrimental impact on consumption in 51 of the states of America using a panel regression from 1999Q1 – 2012Q4. In an empirical study by Hong, Wan and Sun (2025), which uses panel data analysis, it is found that government debt significantly reduces consumption, where a 1% increase in government debt results in 0.22% decline in consumption. This was a Chinese study compiled through panel data analysis using data from 2012-2018. Another study by Lv and Zhang (2026) support these findings by noting that government debt also increases household consumption inequality. In Hayo and Neumier's (2017) study using a logit model, they also find that consumers make significant changes to their consumption after an increase in government debt.

4. Research Methodology

Creswell and Creswell (2017) assert that research design can be divided into three types: qualitative, quantitative, and mixed methods. Quantitative studies include statistical or empirical research designs. This is an empirical study that will use an ARDL model to establish a long-run relationship among the study variables. According to Nkoro and Uko (2016), the ARDL model is useful in many respects. Firstly, the ARDL model is applicable to test for cointegration amongst variables of different orders, namely I (0) and I (1). Secondly, the ARDL model resolves endogeneity issues (Mothibi & Mncayi, 2019). Lastly, the model allows a researcher to use a small sample size, which is useful for this quarterly study of 1993 – 2020. The non-linear ARDL model is also utilised in the study, whose benefits include the ability to test for nonlinearity or symmetry.

5. Empirical Analysis

Table 1 shows several characteristics of the variables, namely the order of integration, the lag selection and the unit root tests conducted using an Augmented Dickey Fuller test and Phillips Perron test. The variables are a combination of orders of integration, namely I(0) and I(1). The Schwarz Information Criterion (SIC) was chosen for the model selection of unit root testing because of its computational simplicity and its effective performance in modeling frameworks (Schwarz, 1978). It places a greater

penalty on the parameters than other modeling criteria, such as the Akaike information criterion, for instance. Furthermore, it has been chosen because it assumes that observed data is independent, identically distributed and arising from a probability distribution in the regular exponential family (Cavanaugh & Neath, 1999).

5.1. Unit Root Tests

Table 1. Augmented Dickey Fuller (ADF) and Phillips Perron (PP) Unit Root Tests

Variables/ Order of Integration	Lag selection	Model	ADF		PP	
			Level First Difference		Level First difference	
			t-statistic	t-statistic	t-statistic	t-statistic
CE / I(1)	0	Trend & Intercept	2.062	-2.689	3.0934	-2.735
	0	Intercept	-6.144***	-0.391	-6.144***	0.487
	0	None	-0.151	-1.331	8.316	-1.397
TFD/ I(1)	0	Trend & Intercept	-1.399	-6.484***	-1.279	-6.532***
	0	Intercept	2.923	-5.829***	-1.595	-5.799***
	0	None	1.575	-4.074***	2.891	-4.155***
NGD/ I(0)	1	Trend & Intercept	-3.415*	-1.835	-2.009	-1.836
	1	Intercept	-0.889	-1.855	-0.988	-1.855
	1	None	1.370	-1.094	5.022	-1.135
GDP/ I(1)	0	Trend & Intercept	1.811	-2.588	-0.739	-21.151***
	0	Intercept	-2.242	-1.009	-3.143**	-15.525***
	0	None	0.402	-1.306	7.694	-11.753***
GEX/ I(0)	6	Trend & Intercept	-3.959**	-3.036	-1.768	-3.067
	1	Intercept	-1.519	-2.717*	-1.642	-2.610
	1	None	2.053	-1.059	11.202	-0.961
GEX_SP/ I(0)	0	Trend & Intercept	-3.532*	-5.319***	-3.518**	-14.848***
	0	Intercept	-1.897	-6.401***	-4.791***	-6.986***
	0	None	4.510	-0.926	5.205	-3.777***
ITAX/ I(1)	1	Trend & Intercept	-2.326	-3.801***	-1.789	-3.775***

	0	Intercept	-1.089	-3.791***	-1.013	-3.770***
	0	None	10.073	-1.533	10.072	-1.308
VAT/ I(1)	0	Trend & Intercept	-2.229	-6.222***	-2.337	-6.235***
	0	Intercept	-3.055**	-5.964***	-3.009**	-5.890***
	0	None	6.938068	-1.718*	5.952	-3.239***
FL/ I(1)	0	Trend & Intercept	0.3064	0.1587	0.1299	0.000***
	0	Intercept	0.9522	0.0448**	0.9758	0.000***
	0	None	0.9970	0.140	1.0000	0.000
INFL/ I(0)	0	Trend & Intercept	-5.527***	-9.989***	-5.5305***	-15.866***
	0	Intercept	-5.113***	-10.186***	-5.1132***	-15.820***
	1	None	-1.485	-10.310***	-1.8751*	-15.244***

** Statistically significant at a 10% level*
*** Statistically significant at a 5% level*
**** Statistically significant at a 1% level*

Source: Author (2024) using E-Views 13

Table 2 shows Granger causality tests where unilateral or bilateral causality is tested amongst the variables of the study (Gujarati & Porter, 2009). It also tests whether there is independence. This implies that it tests whether a variable contains past values of another variable (Granger, 1969). The study's Granger causality test shows a unidirectional causality from consumption expenditure to all variables apart from inflation.

Table 2. Granger Causality

1993Q1 – 2020Q4	Consumption expenditure → National Government Debt
	Consumption expenditure → GDP
	Consumption expenditure → Government Expenditure
	Consumption expenditure → Government Expenditure on Social Protection
	Consumption expenditure → Income Tax
	Consumption expenditure → VAT
	Consumption expenditure → Fuel Levy
	Consumption expenditure ← Inflation

Source: Author from E-Views 13 (2024)

5.2. Empirical Specification

$$\Delta C_t = \partial_0 + \rho C_{t-1} + \theta^+ NGD^+_{t-1} + \theta^- NGD^-_{t-1} + \sum_{J=1}^{p-1} \partial_j \Delta C_{t-j} + \sum_{j=0}^{q-1} (\sigma_j^+ \Delta NGD^+_{t-j} + (\sigma_j^- \Delta NGD^-_{t-j}) + \mu \quad (1)$$

Where $\partial_0; \rho; \theta^+; \theta^-; \sigma_j^+; \sigma_j^-$ are parameters;

The first term is the intercept

The second term is the first lag of the dependent variable ;

The third and fourth terms are the partial sum of positive and negative change of national government debt.

The fifth term and sixth are some lags for first difference of consumption expenditure.

Equation (1) shows the NARDL for the study where C_t is consumption expenditure and NGD_t is the national government debt. The third and fourth terms are constructed by decomposing the partial sum of an explanatory variable, which in this case, national government debt (Hussein & Hmood, 2024).

5.3. ARDL Model

The study has used a NARDL for its empirical analysis. A NARDL can only be run after an ARDL model has been estimated. Table 3 shows the results for the long run estimates of the ARDL model. In the long run all the variables are statistically significant at a 1% level of significance apart from the lag of national government debt which is significant at a 5% level of significance. The F-statistic shows that the model is jointly significant.

Table 3. Long Run Estimates of the ARDL model

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
NGD	0.038857	0.013565	2.864439	0.0051
NGD(-1)	-0.033629	0.013725	-2.450098	0.0160
GDP	0.773398	0.031893	24.24967	0.0000
GDP(-1)	-0.643212	0.053692	-11.97961	0.0000
GEX_SP	0.027954	0.008561	3.265399	0.0015
GEX_SP(-1)	-0.025176	0.008679	-2.900936	0.0046
ITAX	0.088678	0.019013	4.664186	0.0000
ITAX(-1)	-0.083887	0.019553	-4.290182	0.0000
C	0.070957	0.070236	1.010267	0.3148
R-squared	0.999946	Mean dependent var	13.90220	
Adjusted R-squared	0.999941	S.D. dependent var	0.735374	
S.E. of regression	0.005662	Akaike info criterion	-7.424481	
Sum squared resid	0.003237	Schwarz criterion	-7.180380	
Log likelihood	422.0587	Hannan-Quinn criterion	-7.325457	
F-statistic	206195.2	Durbin-Watson stat	1.890938	
Prob(F-statistic)	0.000000			

Source: Author (2024) using E-Views 13

(i) A 1% increase in the national government debt will increase consumption expenditure by 0.038%. Consumption expenditure increases as governments take on more debt during economic crises and it is not to the benefit of consumers but to their detriment. This is because, as more debt is acquired, it is later passed on to consumers in the form of tax thereby increasing their consumption expenditure (Zhang, 2017; Erero, 2022).

(ii) A 1% increase in GDP will increase consumption expenditure by 0.77% which is expected as GDP is a strong driver for positively influencing consumption expenditure (Mothibi & Mncayi, 2019).

(iii) A 1% increase in total expenditure on social grants will increase consumption expenditure by 0.027%. This is because social grants are a burden on the taxpaying consumer (Ridzuan et al., 2014).

(iv) When personal income tax is increased by 1%, consumption expenditure will increase by 0.088% (Visagie & Posel, 2013).

Table 4 presents the error-correction model of the ARDL (Asteriou & Hall, 2016; Johansen, 1988). All variables are significant in the short run; however, GDP is significant in the long run. The error correction term is negative and significant which is expected according to theoretical assumptions. It also indicates that the economy will return to its steady state at a slower speed of 0.15%. This is a slow convergence relative to quarterly data.

Table 4. ARDL Model Error Correction Model Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CE(-1)*	-0.152186	0.054042	-2.816062	0.0058
NGD(-1)	0.005228	0.003365	1.553770	0.1234
GDP(-1)	0.130186	0.044197	2.945593	0.0040
GEX_SP(-1)	0.002778	0.005749	0.483275	0.6299
ITAX(-1)	0.004792	0.007458	0.642459	0.5220
C	0.070957	0.070236	1.010267	0.3148
D(NGD)	0.038857	0.013565	2.864439	0.0051
D(GDP)	0.773398	0.031893	24.24967	0.0000
D(GEX_SP)	0.027954	0.008561	3.265399	0.0015
D(ITAX)	0.088678	0.019013	4.664186	0.0000
R-squared	0.982351	Mean dependent var	0.021426	
Adjusted R-squared	0.980779	S.D. dependent var	0.040836	
S.E. of regression	0.005662	Akaike info criterion	-7.424481	
Sum squared resid	0.003237	Schwarz criterion	-7.180380	
Log likelihood	422.0587	Hannan-Quinn criterion	-7.325457	
F-statistic	624.6450	Durbin-Watson stat	1.890938	
Prob(F-statistic)	0.000000			

Source: Author (2024) using E-Views 13

Table 5 shows the results of post estimation diagnostic tests such as no serial correlation (Breusch, 1978; Godfrey, 1978a, 1978b); no heteroscedasticity [ARCH-LM (Bera & Higgins, 1993)]; Normality (Jarque-Bera, 1987) and Stability (Ramsey Reset Test, 1969).

Table 5. Post Estimation Diagnostic Tests

Post Estimation Diagnostics				
Test	Null hypothesis	Test statistic	P-value	Conclusion
Jarque Bera	Normality	888	0.00	Reject Null, Residuals not normally distributed.
ARCH LM Test	No Heteroskedasticity	0.221835	0.6386	Fail to reject null hypothesis, no heteroskedasticity
Breusch Godfrey	No serial correlation	0.421034	0.6575	Fail to reject null hypothesis, no serial correlation
Ramsey RESET Test	No misspecification	1.398365	0.2398	Fail to reject null hypothesis, no misspecification

Source: Author (2024) using E-Views 13

5.4. NARDL

Table 6 shows the results of the NARDL. The purpose of a NARDL is to test whether there is linearity between variables and whether a specific variable is suitable to be included in a model (Uche, Chang & Effiom, 2022). It is also used to test whether short-run and long-run impacts of a variable differ in their effect on the dependent variable, whether positive or negative. In this case, the study is referring to national government debt. The NARDL shows that in the short run, national government debt is significant. However, in the long run the variable shows itself to be insignificant. This raises questions about whether the variable should be included in the model. Nevertheless, a more precise way to determine this is to use a symmetry test.

Table 6. Nonlinear Autoregressive Distributed Lag (NARDL) model results

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
CE(-1)	-0.155025	0.054974	-2.819967	0.0058
GDP(-1)	0.133988	0.045391	2.951876	0.0040
GEX_SP(-1)	0.003076	0.006096	0.504543	0.6150
ITAX(-1)	0.004865	0.007599	0.640210	0.5235
@CUMDP(NGD(-1))	0.004449	0.004041	1.100861	0.2737
@CUMDN(NGD(-1))	0.089057	0.232865	0.382442	0.7030
C	0.112401	0.089911	1.250137	0.2142
D(GDP)	0.783643	0.032352	24.22227	0.0000
D(GEX_SP)	0.031445	0.008802	3.572652	0.0006
D(ITAX)	0.089930	0.019012	4.730104	0.0000
@DCUMDP(NGD)	0.029144	0.014381	2.026568	0.0454
@DCUMDN(NGD)	0.928235	0.453537	2.046659	0.0434
R-squared	0.983008	Mean dependent var	0.021621	

Adjusted R-squared	0.981101	S.D. dependent var	0.040971
S.E. of regression	0.005632	Akaike info criterion	-7.417880
Sum squared resid	0.003109	Schwarz criterion	-7.123282
Log likelihood	419.9834	Hannan-Quinn criterion	-7.298389
F-statistic	515.4029	Durbin-Watson stat	1.892041
Prob(F-statistic)	0.000000		

Source: Author (2024) using E-Views 13

Table 7 shows the results for the NARDL's symmetry test, whose theoretical underpinning comes from the BDS test (Broock et al., 1996; Baum, Hurn & Lindsay, 2021). It shows that national government debt only has a short-run adverse impact on consumption expenditures. This brings attention to the notion of Ricardian Equivalence, that in the long run, consumers have myopic foresight and adjust their spending accordingly (Barro, 1979). Therefore this study proves that the Ricardian Equivalence holds for South Africa in the long run.

Table 7. Symmetry Test Results

Variable	Statistic	Value	Probability
Long Run			
NGD	F-statistic	0.129511	0.7197
	Chi-square	0.129511	0.7189
Short Run			
NGD	F-statistic	3.849049	0.0526
	Chi-square	3.849049	0.0498
Joint (Long-Run and Short-Run)			
NGD	F-statistic	1.935297	0.1499
	Chi-square	3.870594	0.1444

Source: Author (2024) using E-Views 13

Figure 1 below tests the stability of the NARDL. Since the series falls within the stability bands, it can be confirmed that the model is stable. In order for a a CUSUM test o be robust or reliable, the variables in the study should have OLS properties, stationarity and homoscedasticity. All of these properties have been ensured and verified using the unit root tests and diagnostic tests.

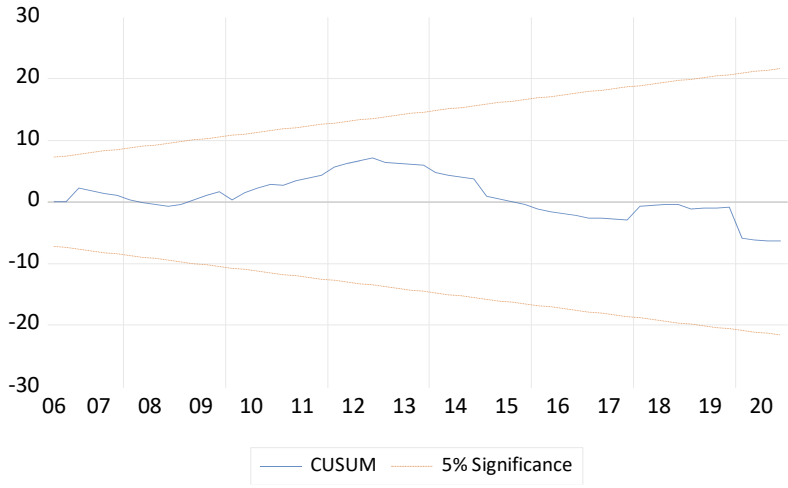


Figure 1. CUSUM Test

6. Conclusion

This study has performed a NARDL which found that national government debt is insignificant in the long run but significant in the short run. This means government debt does increase the burden of consumption expenditure, but only in the short run. This confirms that the Ricardian Equivalence holds in South Africa in the long run. Further studies would need to be conducted to analyse the long run impact of government debt on consumption expenditure.

This paper has been compiled from a thesis titled: *The impact of economic crises and government debt on consumption expenditure in South Africa* submitted at the University of South Africa in November 2025 by Dr. Lerato Nkosi.

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