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IMPACT OF TRADE OPENNESS ON GOVERNMENT EXPENDITURE IN SOUTH AFRICA: AN ARDL APPROACH

Glenda Maluleke

University of South Africa
e-mail: malulg@unisa.ac.za
ORCID: 0000-0002-5234-3115

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Abstract

Research background: Numerous studies have been conducted on the relationship between trade openness and government expenditure in several developing countries including African countries, however, the studies are limited in South Africa. Therefore, South Africa does not have adequate empirical studies regarding the impact of trade openness on government expenditure, which could assist in developing their trade policies.
Purpose: The study examines the relationship between trade openness and government expenditure in South Africa for the period 1980 to 2021.
Research methodology: The study uses the autoregressive distributed lag (ARDL) bounds testing approach to cointegration for estimation of the three Models in the study.
Results: The estimation results of all of the three models found that in the short run trade openness has a positive and significant impact on government expenditure in South Africa. The results also suggest that the increase in government expenditure seems to be as a result of trade openness, urbanisation and dependency ratio in the short run while inflation also leads to an increase but only in the long run.
Novelty: The study uses three proxies of trade openness which are total trade, ratio of exports, and ratio of imports as a percentage of GDP. To the best of our knowledge, the study may be the first of its kind to empirically examine the impact of trade openness on government expenditure in South Africa using three proxies in a single study.

Keywords: Government expenditure, Trade openness, Cointegration, ARDL, South Africa

JEL classification: F14, F41, H50

Introduction

The South African government's spending reached the R2 trillion mark in the 2020/21 financial year and the biggest drivers behind the increase were spending on social protection, general public services and health (Stats SA, 2022). Over the years, government expenditure has been continuously increasing in South Africa. Over the period from 1980 to 2019, as a percentage of gross domestic product (GDP) it increased from 12.22% to 19.65% (World Bank, 2023). This continuous trend is alarming especially as the government is looking for ways to curb the increase in government expenditure.

The relationship between trade openness and government expenditure has attracted numerous studies in recent decades. According to Abizadeh (2005), most of the debate related to the effect of trade liberalisation has centred on economic growth and development but there are many studies that have been done to understand the relationship between trade openness and government expenditure. Although the relationship between trade openness and government expenditure has generated a considerable amount of debate for many years, there is no consensus on the results. Rodrik (1998) conducted an empirical investigation on this relationship and argued that as a country becomes more open, there is greater exposure to external risk and it may lead to an increase in the size of the government to compensate for increasing external risk. The study concluded that there is a positive relationship between openness and the size of the government. However, in recent years, studies such as Dixit (2014) have found a negative relationship which means that trade openness leads to a decrease in government expenditure.

Several studies have been conducted on the relationship between trade openness and government expenditure in a number of developing countries including African countries, however, the studies are limited in South Africa. Therefore, South Africa does not have adequate empirical studies regarding the impact of trade openness on government expenditure, which could assist in developing their trade policies. To fill this gap, the current study aims to examine the impact of trade openness on government expenditure in South Africa, using the autoregressive distributed lag (ARDL) bounds-testing approach to cointegration. The study uses three proxies of trade openness which are total trade, the ratio of exports, and the ratio of imports as a percentage of GDP. To the best of our knowledge, the study may be the first of its kind to empirically examine the impact of trade openness on government expenditure in South Africa using three proxies in a single study.

The study is significant in South Africa as it is a relatively open economy that is engaging in bilateral and multilateral trade. The findings of this study would enable policymakers to understand the impact of trade openness on the economy and assist it when they develop short and long run economic growth and trade policies. There is also a limited empirical literature on the relationship between trade openness and government expenditure in South Africa, as the debate has not yet received significant attention. Thus, the study will attempt to fill this gap and contribute to the existing literature on trade openness in South Africa.

The rest of the paper is organised as follows: the next section presents the trends of trade openness and government expenditure in South Africa. Section 2 reviews the literature on the relationship between trade openness and government expenditure. Section 3 presents the model specification and the methodology used while, Section 4 covers the empirical analysis and results; and the last section concludes the paper.

1. Trade Openness and Government Expenditure in South Africa

South Africa is a relative open economy as shown by the ratio of trade openness that has been increasing over the years. The trade openness average of 43.19% was for the period 1980 to 1994 while government expenditure was 16.32%. After the democratic election trade openness averaged 51.30% and government expenditure was 17.87% from 1995 to 2021. Government expenditure is measured by government expenditure as a share of GDP while trade openness is expressed as the ratio of exports plus imports to GDP. Figure 1 below shows the trends in government expenditure and trade openness in South Africa between 1980 and 2021.

As can be seen from Figure 1, trade openness as a percentage of GDP was high with 56.51% in 1980, however there are some years in the 1990s when it was decreasing, and it reached its lowest in 1992 when it was 34.32% percent of GDP. This could be due to the period when the country was faced with sanctions. In 2008, it reached its highest level of 65.97% for the period between 1980 and 2021, nevertheless, it declined to 49.59% in 2009 when many countries were affected by the global recession. Thereafter, the trade openness rate improved from 50.41% in 2010 to 59.50% in 2014 but it started to decline again to 53.54% in 2017. As it started to increase in 2018, it declined to 50.69% in 2020. The decline in 2020 could be due to the negative impact of the coronavirus pandemic on world trade, even so it eventually increased to 56.22% in 2021.

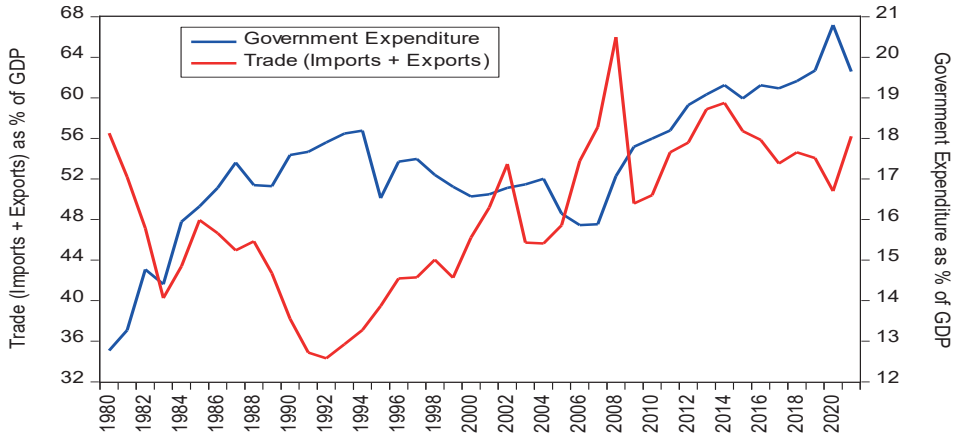


Figure 1. Government Expenditure and Trade Openness as a Percentage of GDP in South Africa

Source: own compilation from World Bank Development Indicators (2023).

On the other hand, government expenditure has expanded over the years, after 1994 when it was 18.19%, it decreased to 16.53% in 1995 before increasing again to 17.42% in 1996. It then continued to fluctuate between 16% and 17% between 1997 and 2005 before it decreased to 15.86% in 2006. It then started to increase again from 15.88% in 2007 and continued to increase until it reached 20.79% in 2020. The policy reforms that took place after 1994 were focused on reducing poverty and inequality and this has caused government expenditure to increase. Most of the budgets had been allocated to social services that included education, social welfare, housing, and health and for the 2013/14 period, the budget increased by about 8.9% to R1.15 trillion and this was the first time that it reached a trillion (National Treasury, 2013). For the 2017/2018 budget, government spending increased to R1.71 trillion which was R116 billion more than the R1.59 trillion spent in 2016/17 and this increase was mainly because of spending on general public services, education and health (Stats SA, 2019).

2. Literature Review

There are two hypothesis that can explain the relationship between trade openness and government expenditure and these are the compensation hypothesis and efficiency hypothesis (see Meinhard, Potrafke, 2012). The compensation hypothesis states that trade openness encourages higher demand for social insurance against associated risk with the openness of the

economy which will lead to an increase in government size. The efficiency hypothesis states that trade openness reduces government size and the capacity to finance the welfare state.

The relationship between trade openness and government expenditure has been conducted in a number of studies and the results are inconsistent. Some studies have found a positive relationship while others found a negative relationship between the two variables. There are also other studies that have found that there is no relationship between the variables. The studies that have found a positive relationship which support the compensation hypothesis includes Adserà and Boix (2002) and Kueh *et al.* (2009). This implies that as the country opens, the size of the government will increase. In a study for 14 OECD countries, Bretschger and Hettich (2002) found that globalisation leads to an increase of social expenditure.

Kueh *et al.* (2009) examined the relationship between trade openness and government expenditure in the ASEAN 4 countries using the ARDL bounds testing approach for the period from 1974 to 2006. The findings indicate that there is a significant positive long-run relationship between trade openness and government expenditure of all the ASEAN-4 countries. The findings imply that government intervention in an open economy is crucial in cushioning the risks associated with trade liberalization.

In Pakistan, Shahbaz *et al*. (2010) examined the impact of trade and financial openness on government size using the utilized FMOLS for cointegration and the Ng-Perron for unit root estimation along with ECM for short run dynamics. The results reveal that there is a positive relationship between trade openness and government size. On the other hand, using the Generalized Method of Moments (GMM) estimation technique, Zakaria and Shakoor (2011) found the same results for Pakistan that support the compensation hypothesis.

Other studies such as Dixit (2014) have found a negative relationship which support the efficiency hypothesis. This means that government expenditure will decrease as a country becomes open. On the other hand, there are studies that have failed to find a relationship between trade openness and government expenditure. For example, in Turkey, Aydogus and Topcu (2013) examined the relationship between trade openness and the size of the government for the period from 1974 to 2011 and failed to find evidence of a long run relationship while using the residual-based co-integration approach. The study also did not find causal support of a compensation hypothesis in the Turkish economy.

There are also studies that have been conducted in African countries. In Nigeria, using the ARDL framework, Aregbeyen and Ibrahim (2014) investigated the relationship between trade openness and government size by disaggregating government expenditure into total government expenditure as a share of GDP; recurrent expenditure as a share of GDP; and

capital expenditure as a share of GDP. The findings revealed that total government expenditure and recurrent expenditure had both a positive and significant relationship with trade openness while capital expenditure does not have an impact in the long run.

Ibrahim (2015) investigated the causality between trade openness and size of government in five large economies of Africa, which are Nigeria, South Africa, Egypt, Algeria and Angola. The study found that trade openness does not have the same impact on government size in the five countries. A positive relationship was found between trade openness and government size for Nigeria and Algeria while in South Africa a negative relationship was found and there was no causality for Angola and Egypt. In South Africa, Maluleke (2020) found a long run relationship between trade openness and government size for the period from 1980 to 2018 using the Johansen-Juselius cointegration approach. Using the ARDL methodology, Obiakor *et al.* (2021), found that the impact of trade openness on government expenditure was not significant in the short run while the efficiency hypothesis was confirmed in the long run in Nigeria.

There are also studies that have also addressed the impact of openness on government size using different measures of openness finding mixed results. For example, de Mendonca and de Oliveira (2019) examined the relationship between openness and government size using three measures of openness which are measures of trade openness, financial openness, and globalization. The study was for a sample of 124 countries for the period from 1980 to 2016, with several panel data regressions. The findings indicate that trade openness may increase the government consumption expenditure in developing countries but not in high-income countries. They also did not find evidence that financial openness is significant enough to affect government size. Using the same three measures of openness, Nguea (2020) conducted a study for 40 Sub-Saharan African (SSA) countries and found mixed results. When using the fixed effects Model, it was found that trade openness confirms the evidence of the compensation hypothesis while financial openness and globalization confirm the efficiency hypothesis. When using the System Generalized Method of Moments (SGMM), the study found that trade openness supports the compensation hypothesis, while financial openness support the efficiency hypothesis, and globalization was found not to have a significant effect on government size.

The empirical evidence on the relationship between trade openness and government expenditure is inconclusive. The literature indicates that there are studies that have found support for the compensation and efficiency hypothesis while some studies did not find support for the relationship between the variables. These mixed results could be due to the measure of trade openness used in the studies. It can also be seen that the majority of the previous

studies have examined the impact of trade openness on government expenditure with less attention on the other measures of trade openness. Therefore, this study will explore the impact of other measures of trade openness to see if the findings will be different. There are also few studies that have been conducted in South Africa and it can be seen that the literature on the relationship between trade openness and government expenditure in South Africa is limited.

3. Methodology

The study employs the autoregressive distributed lag (ARDL) - bound testing approach developed by Pesaran *et al.* (2001). The ARDL approach is chosen as it has some empirical advantages over other cointegration techniques. The first one is that the ARDL does not need all the variables under study to be integrated in the same order. Another advantage is that it is efficient in the case of small samples. However, before variables are subjected to cointegration tests, the order of integration must be established. For this purpose, the study utilises the Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) tests. Several diagnostic tests are also conducted. These include the serial correlation, normality, misspecification and heteroskedasticity associated with the model. In addition, we perform the Cumulative Sum of Recursive Residuals (CUSUM) and Cumulative Sum of Squares of Recursive Residuals (CUMUMSQ) to check the overall stability of the model. The study uses Eviews for the analysis of the study.

To determine the impact of trade openness on government expenditure, the study uses government expenditure as a dependent variable. Government expenditure is measured by government consumption expenditure as a percentage of GDP. The use of this measure is also consistent with other empirical studies such as Kimakova (2009), de Mendonca and de Oliveira (2019) and Nguea (2020). The study has three indicators of trade openness, which are the sum of exports plus imports to GDP (TO1); the ratio of exports to GDP (TO2) and the ratio of imports to GDP (TO3). In addition to trade openness, other control variables which determines government expenditure are included in the model. The variables are economic growth, investment, inflation, urbanisation, and age dependency rate. Therefore, following Zakaria and Shakoor (2011), the empirical model used in this study is expressed as follows:

$$GOV_t = \alpha_0 + \beta_1 TO_t + \beta_2 Y_t + \beta_3 INV_t + \beta_1 INF_t + \beta_2 URB_t + \beta_3 DEP_t + \mu_t \quad (1)$$

where GOV is government expenditure, TO is trade openness, Y is economic growth, INV is investment, INF is inflation, URB is urban population and DEP is the age dependency ratio.

The dependent variable is government expenditure and several control variables that can determine the level of government expenditure are included to prevent omitted variable bias in the specification. The inclusion of the control variables in the government expenditure model is underpinned by the literature. The three measures of trade openness, which are total trade (exports plus imports), the ratio of exports, and the ratio of imports as a percentage of GDP are expected to have a negative or positive impact on private investment. Economic growth measured by real GDP annual growth is included in the model and the prior expectation is that economic growth will have a positive relationship with government expenditure in this study. Investment measured by gross fixed capital formation has been found to have a negative relationship with government expenditure (Iwegbunam, Robinson, 2019). According to Zakaria and Shakoor (2011), inflation reduces the real value of government revenues, thereby limiting the government's ability to spend; therefore, a prior expectation is that inflation will have a negative relationship with government expenditure in this study.

Urbanisation, which is the share of total population living in urban areas (World Bank, 2023). Studies such as Kimakova (2009) have found that urbanisation leads to an increase in government size. However, other studies have found that it has a negative impact on government expenditure (see Zakaria, Shakoor, 2011; Maluleke, 2018). Therefore, urban population is expected to have either a positive or negative impact on government expenditure. The study also includes an age dependency ratio which is defined as the ratio of dependents that is people younger than 15 and older than 65 as a percentage to the working-age population (those ages 15–64). Studies such as de Mendonça and Oliveira (2019) have found the age dependency ratio to be positively associated with government size. Therefore, the prior expectation is that the age dependency ratio is a positive determinant of government expenditure.

The data for all the variables is obtained from the World Bank (2021). The selection of the study period was based on the availability of reliable and complete data on the variables included in the study for South Africa. The definitions of the variables, measurements, and a prior expected signs for the explanatory variables are presented in Table 1.

Table 1. Definitions of variables and expected signs

Variables	Definitions of variables (Measurements)	Expected signs
1	2	3
Government expenditure (GOV)	General government final consumption expenditure (percent of GDP)	
Trade openness (TO1)	Exports + Imports (percent of GDP)	±
Trade openness (TO2)	Imports of goods and services (percent of GDP)	±

Trade openness (TO3)	Exports of goods and services (percent of GDP)	±
Economic Growth (Y)	GDP growth (annual percent)	+
Investment (INV)	Gross fixed capital formation (percent of GDP)	–
Inflation (INF)	Consumer price index inflation (annual percent)	–
Urbanisation (URB)	Urban population (percent of total population)	±
Dependency ratio (DEP)	Age dependency ratio (percent of working-age population)	+

Source: own elaboration.

Following Pesaran *et al.* (2001), the ARDL model specification of equation 1 is specified as follows:

$$\begin{aligned}\Delta GOV_t = {} & \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta GOV_{t-i} + \sum_{i=0}^{n} \alpha_{2i} \Delta TO_{t-i} + \sum_{i=0}^{n} \alpha_{3i} \Delta Y_{t-i)} + \\ & + \sum_{i=0}^{n} \alpha_{4i} \Delta INV_{t-i} + \sum_{i=0}^{n} \alpha_{5i} \Delta INF_{t-i} + \sum_{i=0}^{n} \alpha_{6i} \Delta URB_{t-i} + \\ & + \sum_{i=0}^{n} \alpha_{7i} \Delta DEP_{t-i} + \sigma_1 GOV_{t-1} + \sigma_2 TO_{t-1} + \sigma_3 Y_{t-1} + \sigma_4 INV_{t-)} + \\ & + \sigma_5 INF_{t-1} + \sigma_6 URB_{t-1} + \sigma_7 DEP_{t-1} + \mu_t\end{aligned} \tag{2}$$

where:

α_0 – constant,

α_1–α_7 and σ_1–σ_7 – short-run and long-run regression coefficients, respectively,

Δ – change,

n – lag lengths,

μ_{1t} – white-noise error term,

t – time period.

The first stage of the ARDL procedure involves testing for cointegration. The null hypothesis to test for no cointegration is given by:

$$H_0: \sigma_1 = \sigma_2 = \sigma_3 = \sigma_4 = \sigma_5 = \sigma_6 = \sigma_7 = 0$$

This is tested against the alternative hypothesis that there is cointegration:

$$H_1: \sigma_1 \neq \sigma_2 \neq \sigma_3 \neq \sigma_4 \neq \sigma_5 \neq \sigma_6 \neq \sigma_7 \neq 0$$

The outcome of the cointegration test is determined by the computed F-statistic and this approach suggests two critical bounds for all specified regressors, namely, the upper bound and the lower bound. One set of critical values assumes that all variables included in the ARDL model are I(0), while the other is calculated on the assumption that the variables are I(1)

(Pesaran *et al.*, 2001). According to Pesaran *et al.* (2001), if the computed test statistic exceeds the upper critical bounds value, then the H_0 hypothesis will be rejected. If the F-statistic falls into the bounds, then the co-integration test becomes inconclusive. If the F-statistic is lower than the lower bounds value, then the null hypothesis of no co-integration cannot be rejected.

The second stage of the ARDL procedure involves the estimation of the coefficients of the long-run relationships. The short-run coefficients will be obtained by estimating the error-correction model (ECM) associated with long-run estimates. The ECM model is specified as follows:

$$\begin{aligned}\Delta GOV_t = {} & \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta GOV_{t-i} + \sum_{i=0}^{n} \alpha_{2i} \Delta TO_{t-i} + \sum_{i=0}^{n} \alpha_{3i} \Delta Y_{t-i} + \\ & + \sum_{i=0}^{n} \alpha_{4i} \Delta INV_{t-i} + \sum_{i=0}^{n} \alpha_{5i} \Delta INF_{t-i} + \sum_{i=0}^{n} \alpha_{6i} \Delta URB_{t-i} + \\ & + \sum_{i=0}^{n} \alpha_{7i} \Delta DEP_{t-i} + \theta_1 ECM_{t-1} + \mu_t \end{aligned} \tag{3}$$

where GOV is government expenditure, TO is trade openness, Y is economic growth, INV is investment, INF is inflation, URB is urban population and DEP is the age dependency ratio, α_0 is a constant, α and θ are respective coefficients, ECM_{t-1} is the error correction term lagged once, μ_t is residual, Δ is the difference operator and n is the lag length. The coefficient of the lagged error correction term is expected to be negative and statistically significant to further confirm the existence of a cointegration relationship.

4. Empirical Results

4.1. Descriptive statistics and correlation matrix

The study conducted a series of diagnostic tests, including descriptive statistics, correlation, and unit root tests before the analysis. Table 2, presents the findings of the descriptive statistics and correlation matrix, respectively.

The descriptive statistics results indicate that the dependency ratio (DEP) is more spread out with a standard deviation of 10.667 followed by trade openness (TO1). Government expenditure (GOV) has the lowest standard deviation of 1.645. The results further show that government expenditure and all three measures of trade are normally distributed. This is shown by the probability values of the Jarque–Bera statistics that are higher than the 0.05 level of significance. The correlation results indicate that government expenditure has a negative correlation with inflation and investment which is consistent with a priori expectations. However, the negative correlation with the age dependency ratio and economic growth is contrary to prior

expectations. The results also indicate that government expenditure has a positive association with trade openness and urbanisation, which is consistent with prior expectations.

Table 2. Descriptive statistics and correlation matrix

	GOV	TO1	TO2	TO3	Y	INV	INF	URB	DEP
Panel A: Descriptive statistics									
Mean	17.315	48.406	23.180	25.225	2.101	18.137	8.540	57.424	63.327
Median	17.253	47.688	23.043	25.793	2.443	17.502	7.048	57.130	63.708
Maximum	20.792	65.975	33.720	32.255	6.621	27.324	18.655	67.847	76.553
Minimum	12.771	34.321	15.366	18.955	–6.342	13.184	–0.692	48.425	50.412
Std. Dev.	1.671	7.475	4.509	3.436	2.596	3.710	4.659	6.127	10.667
Skewness	–0.519	–0.009	0.164	–0.039	–0.801	1.087	0.405	0.093	–0.020
Kurtosis	3.590	2.374	2.313	2.267	4.016	3.425	2.158	1.741	1.182
Jarque-Bera	2.491	0.687	1.015	0.951	6.303	8.587	2.387	2.833	5.790
Probability	0.288	0.709	0.602	0.621	0.043	0.014	0.303	0.243	0.055
Observations	42	42	42	42	42	42	42	42	42
Panel A: Correlation matrix									
GOV	1								
TO1	0.171	1							
TO2	0.176	0.955	1						
TO3	0.142	0.922	0.766	1					
Y	–0.412	0.250	0.275	0.183	1				
INV	–0.663	0.105	0.076	0.129	0.016	1			
INF	–0.458	–0.372	–0.490	–0.167	–0.198	0.633	1		
URB	0.754	0.616	0.661	0.472	–0.070	–0.577	–0.805	1	
DEP	–0.554	–0.749	–0.789	–0.595	–0.048	0.377	0.760	–0.920	1

Source: own elaboration.

4.2. Stationarity tests results

The ADF test shows that all the variables except for economic growth are stationary in first difference. The PP test reveals that exports and economic growth are stationary in levels while all the other variables are stationary in the first difference. The results reported show that some variables are stationary in levels while others are stationary at the first difference depending on the type of stationarity test. The results of the stationarity tests carried out for all variables in levels and in the first difference are reported in Table 3.

Table 3. Stationarity test results of variables

Variable	Levels		First difference	
	intercept	trend and intercept	intercept	trend and intercept
Augmented Dickey-Fuller (ADF)				
GOV	–2.552	–2.737	–6.621***	–6.653***
TO1	–1.950	–2.913	–5.331***	–5.249***
TO2	–1.782	–2.768	–6.954***	–6.916***
TO3	–2.558	–2.907	–6.444***	–6.439***
Y	–5.149***	–5.023***	–	–
INV	–2.159	–2.770	–4.276***	–4.325***
INF	–1.461	–1.443	–3.155**	–5.551***
URB	–0.415	–5.176***	–3.780***	–3.986***
DEP	–0.976	–2.682	–3.21**	–3.778**
Phillips-Perron (PP)				
GOV	–2.572	–2.735	–6.621***	–6.652***
TO1	–1.983	–3.350*	–6.800***	–7.134***
TO2	–1.652	–2.588	–7.046***	–7.038***
TO3	–2.695*	–3.856**	–	–
Y	–5.138***	–5.009***	–	–
INV	–1.918	–1.888	–4.274***	–4.277***
INF	–1.431	–2.914	–9.349***	–10.730***
URB	2.115	–7.620***	–3.256**	–6.099***
DEP	–0.900	–1.455	–6.918***	–8.005***

Notes: *, ** and *** denote statistical significance at 10%, 5% and 1% levels respectively.

Source: own elaboration.

4.3. Co-integration results

Since it has been confirmed that the all the variables in the study are stationary, the study proceeds to perform a cointegration test using the ARDL bounds testing procedure. The results of the ARDL bounds test show that the calculated F-statistics for all the models are higher than the critical value bounds at the 1% level of statistical significance. Therefore, we reject the null hypothesis of no cointegration and conclude that there is cointegration among the variables used in all the models and a long-run relationship among the variables. The co-integration results for the models are reported in Table 4.

Table 4. ARDL bounds test results

	F-Statistic		Cointegration Status			
Model 1	6.053***		Cointegrated			
Model 2	5.971***		Cointegrated			
Model 3	5.414***		Cointegrated			
Pesaran *et al.* (2001), pp. 300, Table CI(iii) Case III	Asymptotic critical values					
	10%		5%		1%	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
	2.12	3.23	2.45	3.61	3.15	4.43

Note: *** denote statistical significance at the1% level.

Source: own elaboration.

4.4. Long-run and short-run results

After confirming cointegration, the study estimates the long and short run relationship between trade openness and government expenditure. The results of the long and short run estimates are presented in Table 5.

The long run results reveal that all the measures of trade openness in models 1 and 2 have a positive impact on government expenditure while in model 3 it is found that the impact is negative but statistically insignificant. However, in the three models, the impact is found to be positive and statistically significant in the short run. This suggests that government expenditure will increase given an increase in trade openness, irrespective of the measure. The findings imply that the South African government is spending more on incentives to boost trade in the country. Some of the incentives includes the Export Marketing and Investment Assistance (EMIA) Programme which is designed to partially compensate exporters for the qualifying costs that they incurred with regard to activities aimed at developing export markets for the country (Department of Trade, Industry and Competition, 2021).

Contrary to earlier expectations, the coefficient of economic growth is found to be negative and statistically significant in the long run for model 3 while it is statistically insignificant for model 1 and 2. On the other hand, it is found to be negative and statistically significant for only model 1 and 2 in the short run. Consistent with the expectations of the study, the coefficient of investment is found to be negative and statistically significant only in the short run for all the three models. This suggests that as capital investment increase, government consumption expenditure decreases.

Table 5. Long-run and short-run results

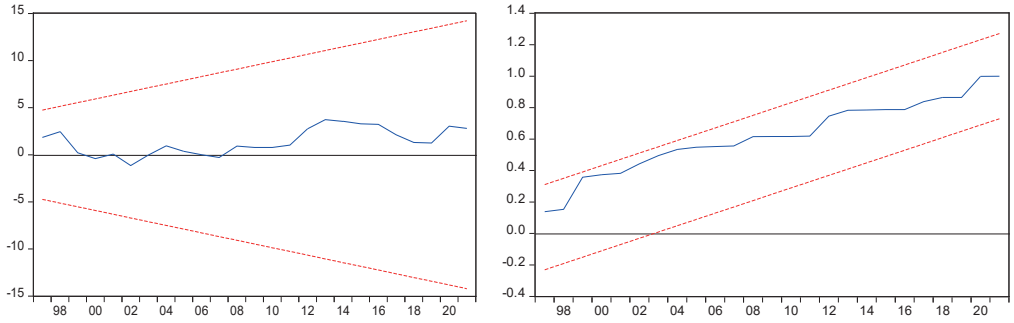
Regressor	Model 1		Model 2		Model 3	
	Coefficient	*t*-stat [p–value]	Coefficient	*t*-stat [p-value]	Coefficient	*t*-stat [p-value]
Long-Run Results						
TO	0.009	0.180 [0.858]	0.008	0.079 [0.938]	–0.145	–1.468 [0.156]
Y	–0.084	–0.458 [0.651]	0.134	0.945 [0.353]	–0.128*	–1.722 [0.099]
INV	–0.073	–1.114 [0.276]	–0.039	–0.438 [0.665]	0.034	0.435 [0.668]
INF	0.358***	4.418 [0.000]	0.335***	5.120 [0.000]	0.469***	4.466 [0.000]
URB	0.416***	4.621 [0.000]	0.482***	4.999 [0.000]	0.402***	6.620 [0.000]
DEP	0.032	0.811 [0.425]	0.065*	1.823 [0.079]	–0.056	–0.893 [0.382]
Short-Run Results						
C	–7.114***	–7.131 [0.000]	–11.253***	–7.093 [0.000]	–2.031***	–6.161 [0.000]
ΔGOV(–1)	–	–	–	–	–0.335***	–3.068 [0.006]
ΔGOV(–2)	–	–	–	–	–0.237***	–2.086 [0.049]
ΔTO	0.086***	3.801 [0.001]	0.139***	3.590 [0.001]	0.072*	2.027 [0.055]
ΔTO(–1)	–	–	–	–	0.151***	3.440 [0.002]
ΔTO(–2)	–	–	–	–	0.116***	3.205 [0.004]
ΔY	–0.054*	–1.967 [0.060]	–0.056**	–2.122 [0.043]	–0.089**	–2.178 [0.040]
ΔY(–1)	0.104***	3.047 [0.005]	–	–	–	–
ΔINV	–0.357***	–4.594 [0.000]	–0.371***	–5.538 [0.000]	–0.131**	–2.309 [0.031]
ΔINV(–1)	0.251***	3.471 [0.002]	–	–	–	–
ΔINF	0.026	0.787 [0.439]	0.040	1.354 [0.189]	0.011	0.316 [0.755]
ΔINF(–1)	–0.090**	–2.632 [0.014]	–0.089**	–2.692 [0.012]	–0.240***	–4.289 [0.000]
ΔINF(–2)	–	–	–	–	–0.095**	–2.250 [0.035]
ΔURB	0.279***	3.563 [0.002]	0.316***	3.679 [0.001]	0.278**	2.724 [0.013]
ΔDEP	0.022	0.791 [0.437]	0.043*	1.756 [0.091]	–0.039	–1.051 [0.305]
EMC(–1)	–0.671***	–7.249 [0.000]	–0.656***	–7.148 [0.000]	–0.692***	–6.945 [0.000]
Test statistics and diagnostic tests						
R-Squared	0.750		0.722		0.745	
R-Bar-Squared	0.685		0.672		0.654	
F-Statistic [Prob]	11.642 [0.000]		14.326 [0.000]		8.437 [0.000]	
Normality	1.133 [0.568]		0.217 [0.897]		0.203 [0.904]	
Serial Correlation	1.703 [0.204]		2.367 [0.114]		1.027 [0.376]	
Heteroscedasticity	0.857 [0.609]		0.911 [0.549]		1.150 [0.374]	
Functional Form	0.099 [0.756]		0.450[0.508]		0.004 [0.951]	

Notes: *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

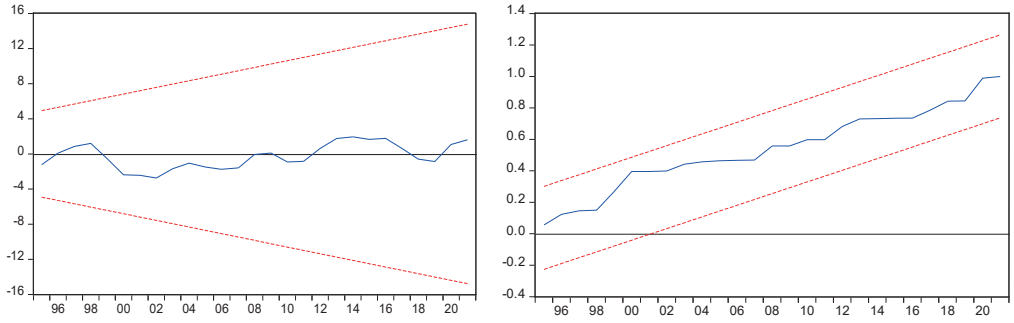
Source: own elaboration.

Inflation is found to have a positive and significant impact on government expenditure in the long run and statistically insignificant in the short run for all the three models. This implies that government expenditure will increase as inflation increases. The coefficient of urbanisation

Model 1



Model 2



Model 2

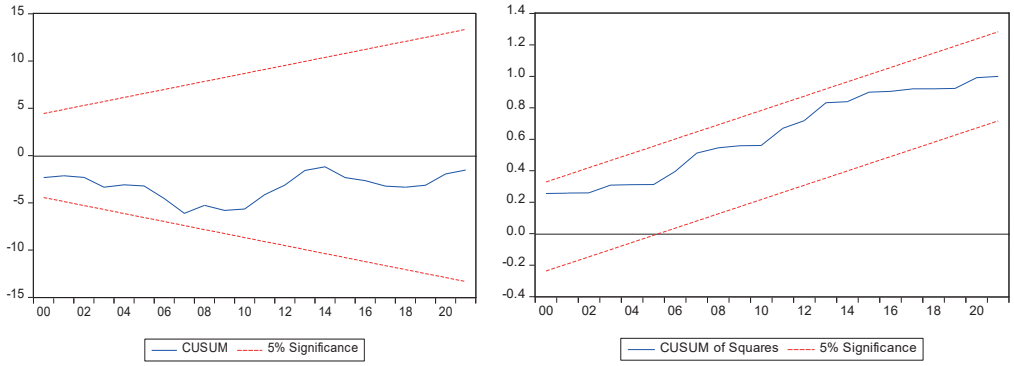


Figure 2. CUSUM and CUSUMSQ graphs

Source: EViews.

is positive and statistically significant in all the three models in the long and short run. These findings imply that urbanisation does lead to an increase in government expenditure in South Africa. When imports as a percentage of GDP is used as a measure of trade openness, the coefficient of age dependency ratio is positive and statistically significant irrespective of whether the estimation is in the long run or short run. This shows that the number of people dependent on the government play an important role in determining government expenditure. The South African government does provide a child support grant and older person grant to assist with basic needs, so as the number of people dependent on these grants increase, the spending by the government especially on consumption expenditure will also increase.

The coefficients of the error correction term are negative and statistically significant at the 1% level of significance for all the three models. This confirms a long-run relationship among the variables. The F-statistic for all the three estimated models is significant at the 1% level, which implies that the coefficients are jointly significant. The results of the diagnostic tests also confirm that the estimated models pass all the tests of serial correlation, functional form, normality and heteroscedasticity. The plots of CUSUM and CUSUMQ indicate that the model is stable as the residual's plots are within the boundaries at the 5% level of significance.

Conclusions

This study has examined the impact of trade openness on government expenditure in South Africa for the period from 1980 to 2021, using the autoregressive distributed lag (ARDL) bounds testing approach. Government consumption expenditure is used as a proxy for the dependent variable which is consistent with other empirical studies. To measure trade openness, the study used three indicators which are the sum of exports plus imports to GDP, the ratio of exports to GDP and the ratio of imports to GDP. The study included economic growth, investment, inflation, urbanisation, and dependency ratio as control variables in the model. The results reveal that there is cointegration among the variables used in the model and a long-run relationship among the variables.

The estimation results for the three models show that economic growth has a negative and statistically significant impact on government expenditure in the long run only for model 3 while in the short run, it is negative and statistically significant for all the three models. On the other hand, investment is found to be negative and statistically significant only in the short run for all the three models which is consistent with the expectations of the study. Inflation is found to have a positive and significant impact on government expenditure in the long run and

statistically insignificant in the short run for all the three models. The coefficient of urbanisation is positive and statistically significant in all the three models while the age dependency ratio is positive and statistically significant only in model 2 when trade openness is measured by imports in both the long and short run.

The coefficient of trade openness was found to be positive and statistically significant in the short run for all the three modes which offers support for the compensation hypothesis. The findings suggest that trade openness does play an important role in determining the South African government's expenditure in the short run. Therefore, as the country continues to benefit from the openness of the economy and trading with other countries, it should ensure that trade policies are beneficial for the economy and creates employment which could reduce the number of the people that are dependent on the government. The study also recommends that future research needs to examine the impact of trade openness on disaggregated government expenditure.

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