The Causal Relationship between Trade
Openness and Government Size in South Africa[1]

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Abstract: This study empirically examines the causality between government size and trade openness including economic growth as an intermittent variable from 1980 to 2018 in South Africa. The study employed the Johansen-Juselius cointegration and Granger causality test. The results revealed that there is a long-run relationship between government size and trade openness. The Granger causality test revealed that there is a unidirectional causality from trade openness to government size. Therefore, the study does find support for a compensation hypothesis in South Africa.

Keywords: government size; trade openness; economic growth; granger causality

JEL Classification: F10; H11

1. Introduction

It has been argued in literature that higher government spending undermines the economic growth by providing goods and services that can be efficiently provided by the private sector. The basis for this argument is that as government spending increases - government will then need to raise revenue to finance its increasing expenditures. However, if the government is unable to raise revenue through the increasing taxes, it will have to borrow and this could lead to a budget deficit. Some studies have found that as the size of government increases in relative terms, it reduces the growth of per capita income (Landau, 1983 & Barro, 1991). Mavrov (2007) also states that if an economy wants to achieve a higher economic growth, it needs foreign investment although foreign investors prefer countries with low taxes and less government spending. Based on this argument therefore, countries should aim at reducing their government spending.

In some previous literature, trade openness has been argued as a force driving government size over the years. Abizadeh (2005) further states that trade

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liberalisation may lead to new economic activities that can change the share of government expenditure. Thus, many studies have found trade openness to have a positive impact on government size. These studies include Rodrik (1998) who was among the first to conduct an empirical investigation on the relationship between trade openness and government size. Rodrik (1998) argued that as the country becomes more open, there is greater exposure to external risk and it may lead to an increase in the size of government to compensate for increasing external risk. The studies that support Rodrik (1998) results include those of Garrett (2001), Adsera and Boix (2002) and Epifani and Gancia (2008), among others.

The direction of causality between trade openness and government size has received a considerable amount of debate for some time. Empirical work has been conducted on the subject, but with conflicting results. Mourao (2007) has listed the three hypothesis that can explain the causality between trade openness and government size. These are, compensation hypothesis, efficiency hypothesis, and deindustrialisation hypothesis. The compensation hypothesis predicts a positive causality running from trade openness to government size. Cameron (1978) proposed the compensation hypothesis and Rodrik (1998) concluded that there is unidirectional causality that goes from openness to government size that can be explained by the compensation hypothesis. On the contrary, the efficiency hypothesis postulates that there is a negative causal relationship between trade openness and government size. Alesina and Perotti (1997) argue that a negative relationship can be expected since the threat of international relocation of increasingly mobile capital and firms undermines the revenue-raising ability of governments. Intriguingly, according to the deindustrialisation hypothesis, there are no direct causal relationship between globalization and government size. In concord with this hypothesis, Iversen and Cusack (2000) argue that there is no direct causal relationship between trade openness and government size.

Despite the significance of knowing the exact relationship between trade openness and government size, literature is varied and inconclusive. Further, regarding causality between government size and trade openness, literature is both scant and inconclusive. Against the above backdrop, the current study re-examines the causality between trade openness and government size in South Africa. This study, therefore, establishes the direction of causality between, trade openness on/and government size using the trivariate Granger-causality model with an error-correction model (ECM) framework which incorporates economic growth as intermittent variable.

The study is significant in South Africa as the country serves as a major trading partner to a number of countries, particularly in the sub-Saharan African region. In addition, South Africa has signed the African Continental Free Trade Area (AfCFTA) launched by the African Union (AU). According to UNECA (2018), the

agreement will require the members to remove tariffs from 90% of goods, allowing free access to commodities, goods, and services across the continent. By removing the tariffs, the agreement anticipates that this will enhance economic growth of the African continent. The other envisaged significance of the current study is that previous studies on trade openness and government size has not been adequately covered in South Africa. To the best of our knowledge, existing studies in South Africa mostly investigate the impact of trade openness on economic growth (see Malefane and Odhiambo, 2018; Sikwila *et al,* 2014).

Since the country is engaging in bilateral and multilateral trade, the study aims to determine the causal linkage of this on the size of government. According to Mallick (2008), trade openness could lead to an increase in the demand for public goods and at the same time reducing the ability of the government to collect taxes when openness is due to tariff cuts. Therefore, the study aims to find out if trade openness has caused an increase in the size of government in South Africa.

The rest of the study is organised as follows: Section 2 reviews literature on the relationship between trade openness and government size. Section 3 presents the methodology used in the study, while Section 4 discusses the empirical analysis and results. Section 5 concludes the study.

2. Literature Review

There are a number of studies that have examined the causality between trade openness and government size and the findings of the studies that have examined trade openness and government size linkage have been inconclusive. The direction of causality between the two is important as it has significant implications for developing policies. Some of the studies that have examined the causality between trade openness and government size include Aydogus and Topco (2013), Amin and Murshed (2016), Ibrahim (2015), Molan *et al.* (2004), Benarroch and Pandey (2008) and Sener *et al.* (2015), among others.

Aydogus and Topco (2013) for example, examined the causality between trade openness and government size in Turkey using co-integration and causality techniques and found that unidirectional causal running from the size of government to trade openness in the short-run which does not support the compensation hypothesis. Amin and Murshed (2016) examined the causal relationship between trade openness and government size in Bangladesh using Johansen cointegration method and the Granger causality test. The results of the study revealed that there is a unidirectional causality running from trade openness to government size in Bangladesh which provides support to the compensation hypothesis.

Benarroch and Pandey (2008) while examining the influence of trade openness on government size using panel data found that larger government size leads to lower

openness. In another study, Benarroch and Pandey (2012) further re-examined the causal association between trade openness and government size using both aggregate and disaggregated government expenditure data of 119 countries from 1972 to 2000. The results of the study indicated that the causality tests provide little or no support for a causal relationship between openness and aggregate or disaggregated government expenditure.

Sener *et al*. (2015) examined the relationship between government size and trade openness under the compensation and efficiency hypotheses in Turkey from 1975 to 2013 using cointegration and Granger causality tests. The study did not find any causality between government size and trade openness and conclude that the compensation and efficiency hypotheses are not valid for Turkey in the long-run. In another study, Molana *et al.* (2004) examined the compensation hypotheses for 23 industrialised OECD countries from 1948 to 1998 and failed to find support for a causality from trade openness to the size of the government. The study also concludes that the compensation hypotheses is not valid. Another study that did not find support for the compensation hypotheses is that of Liberati (2007) who examined the causality between trade openness and government size in some of the developed countries. Bayat *et.al.* (2017) check the validity of the compensation and efficiency hypothesis for G7 countries using panel data for the period from 1980 to 2015. The results revealed that it is only in Japan and Canada where the compensation hypothesis is valid.

In Africa, Ibrahim (2015) investigated the causality between trade openness and size of government in five large economies of Africa. The study found a bi-directional causality between trade openness and government size in Nigeria and Algeria while in South Africa it found a unidirectional causality running from trade openness to government size. In Egypt, it found that there is a unidirectional causality running from government size to trade openness and in Angola it found that trade openness does not cause government size causality in Angola and Egypt. Another study by Aregbeyen and Ibrahim (2014) investigated the nexus between trade openness and government size by disaggregating government expenditure into total government expenditure as a share of GDP; recurrent expenditure as a percentage of GDP; and capital expenditure as a percentage of GDP in Nigeria using the bounds testing approach to cointegration within an ARDL framework. The study revealed that total government expenditure and recurrent expenditure affects trade openness but capital expenditure does not have an impact in the long-run. However, all the measures of government expenditure were found to have an impact in the short-run and the study concluded that the compensation hypothesis holds for Nigeria.

As can be seen from the reviewed studies, the empirical evidence on causality between trade openness and government size is inconclusive and this is due to the estimation methods used as well as the sample period and countries studied. It can

also be seen that there is no study that have looked at the trivariate causality between trade openness and government size in South Africa.

3. Research Methodology

The study employs cointegration and Granger causality test based on the error correction model to examine the direction of causality between trade openness and government size. The error-correction based causality is different from the conventional Granger causality method as it allows for the inclusion of the lagged error correction term derived from the cointegration equation (Odhiambo, 2005). Before variables are subjected to cointegration tests, the order of integration must be established. For this purpose, the study utilises the standard Dickey-Fuller (DF), Augmented Dickey-Fuller (ADF), and the Phillips-Perron (PP) tests.

Given the weakness associated with the bivariate causality framework, which have been pointed out in previous studies (see Odhiambo, 2008), the current study employs a trivariate causality test by including economic growth as intermittent variables. To investigate the causal relationship in a trivariate framework, the long run relationship between trade openness and government size must be established. The Johansen cointegration test will be used to establish the long-run relationship between trade openness and government size. If trade openness and government size are cointegrated, then causality must exist in at least one direction (Granger, 1988). The study will determined the direction of the causality using the Granger causality test.

3.1. Trivariate Granger-Causality Model

The Granger causality test determines whether one time series is useful in forecasting another (Granger, 1969). Carneiro *et.al.* (2005) states that if adding to lagged values of Y, current and lagged values of another given variable X, can obtain better predictions of a given series Y, then X is said to Granger-cause Y. For example, if trade openness causes size of government, the changes in trade openness should precede the changes in size of government.

The dynamic causal relationship between trade openness and size of government is tested within an ECM-based Granger causality framework, where economic growth is included as an intermittent variable. Theoretically and empirically, economic growth is linked to both government size and trade openness. The choice of economic growth is based on that it is a potential determinant of both trade openness and government size. Trade openness and economic growth may have a direct influence on the size of government. The economic growth which is measured by GDP per capita also has an influence on both trade openness and government size.

Studies by (Huang and McDonnell, 1997; Fielding, 1997) have found that there is a positive relationship between economic growth and government size. Regarding the relationship between trade openness and economic growth, a study by Anoruo and Ahmad (1997) have found that there is a bi-directional causality between economic growth and openness in the ASEAN countries. Following Odhiambo (2008), trivariate causality models for this study are expressed as follows:

$$\Delta G_t = a_0 + \sum_{i=1}^{n} a_{1i} \Delta G_{t-i} + \sum_{i=1}^{n} a_{2i} \Delta TO_{t-i} + \sum_{i=1}^{n} a_{3i} \Delta Y_{t-i} + \alpha_4 ECM_{t-1}$$
$$+ \mu_{1t} \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (2)$$

$$\Delta TO_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i} \Delta G_{t-i} + \sum_{i=1}^{n} \beta_{2i} \Delta TO_{t-i} + \sum_{i=1}^{n} a_{3i} \Delta Y_{t-i} + \beta_4 ECM_{t-1}$$
$$+ \mu_{2t} \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (3)$$

$$\Delta Y_t = \partial_0 + \sum_{i=1}^{n} \partial_{1i} \Delta G_{t-i} + \sum_{i=1}^{n} \partial_{2i} \Delta TO_{t-i} + \sum_{i=1}^{n} \partial_{3i} \Delta Y_{t-i} + \partial_4 ECM_{t-1}$$
$$+ \mu_{3t} \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (4)$$

Where G represents government size, TO is trade openness, Y is economic growth and 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.

The data used in the study consists of annual time series data spanning from 1980 to 2018 and is obtained from World Bank Development Indicators (2019) except for government size that was obtained from the South Africa Reserve Bank (SARB).

4. Empirical Results

4.1. Stationarity Tests Results

The results of the stationarity tests carried out for all variables in levels and in first difference are reported in Table 1. The results reported in Table 1 show that all the other variables are non-stationary in levels irrespective of the type of the stationarity test. However, after first differencing, the results then indicate that all the variables are stationary.

Table 1. Stationarity Test Results of Variables

Levels						
Intercept				Trend and Intercept		
	ADF	DF-GLS	PP	ADF	DL-GLS	PP
$ln\,GE$	-1.719	-0.493	-1.752	-1.953	-1.756	-2.065
$ln\,TO$	-1.676	-1.531	-1.742	-2.959	-2.193	-2.917
$ln\,Y$	-0.878	-0.914	0.649	-2.701	1.798	-1.801
First Difference						
$ln\,GE$	-6.854***	-6.951***	-6.804***	-6.801***	-6.994**	-6.757***
$ln\,TO$	-5.596***	-5.267***	-5.686***	-5.604***	-5.689***	-5.857***
$ln\,Y$	-3.714***	-3.445***	-3.762***	-4.145***	-3.800***	-4.225***

Source: Author's computation based on Eviews 9

*Note: *, ** and *** denote 10%, 5% and 1% level of significance respectively*

4.2. Cointegration Test Results

The results of Johansen cointegration test are reported in Table 2.

Table 2. Johansen-Juselius Co-integration Test Results

Trace Statistic				Maximum Eigenvalue Statistic			
Null	Alternative	Statistics	95% Critical Value	Null	Alternative	Statistics	95% Critical Value
r = 0	r ≥ 1	39.300	29.797	r = 0	r = 1	27.625	21.132
r ≤ 1 r ≤ 1	r ≥ 2	11.675	15.495	r ≤ 1	r = 2	10.773	14.265
r ≤ 1 r ≤ 2	r ≥ 3	0.902	3.841	r ≤ 2	r = 3	0.902	3.841

Source: Author's computation based on Eviews 9

Note: r stands for the number of cointegrating vectors

The optimal leg length is 2 and determined by the Akaike Information Criterion (AIC). Both the Trace and the Maximum Eigenvalue tests result suggest one cointegrating equation at the 0.05 percent level of significance rejecting the null hypothesis of no cointegration. Based on both the test statistics results, it can be

concluded that the variables are cointegrated and there is a long-run relationship between trade openness and government size.

4.3. The Error Correction Model Results

The results of the error correction model are reported in Table 3.

Table 3. Error Correction Model Results

Dependent Variable	ECM_{-1}	t-statistic	Prob
ΔlnG	-0.178	-3.163	0.002***
$\Delta lnTO$	-0.247	-1.753	0.083*
ΔlnY	0.043	1.185	0.240

*Note: *, ** and *** denote 10%, 5% and 1% level of significance respectively*

The ECM is negative and significant in both the government size and trade openness equation except in the economic growth equation. This implies that there is a long-run causal relationship between trade openness and government size.

4.4. The Causality Test Results

The Granger causality test the null hypothesis that there is no causality against the alternative that there is causality. If the p-value is less than 0.05 percent level of significance, the null hypothesis is rejected and it can be concluded that there is causal relationship. The results of the causality test are reported in Table 4.

Table 4. Granger Causality Tests Results

Dependent variable: D(LGE)			
Excluded	Chi-sq	Df	Prob.
D(LTO)	6.600029	2	0.0369
D(LY)	0.503686	2	0.7774
Dependent variable: D(LTO)			
Excluded	Chi-sq	Df	Prob.
D(LGE)	0.135866	2	0.9343
D(LY)	8.560046	2	0.0138
Dependent variable: D(LY)			
Excluded	Chi-sq	Df	Prob.
D(LGE)	1.035767	2	0.5958
D(LTO)	4.682716	2	0.0962

Source: Author's computation based on Eviews 9

In the government size equation, the empirical results reported in Table 4 show trade openness causes government size, as the p-value is less than 0.05 percent. This confirms that in South Africa, there is unidirectional causality from trade openness

to government size. The results also suggest that economic growth does not cause government size in South Africa.

In the trade openness equation, the results suggests that government size does not cause trade openness as the p-value is greater than 0.05 percent. However, the results reveal that there is a significant relationship between economic growth and trade openness. This suggests that there is a unidirectional causality from economic growth to trade openness in South Africa.

In the economic growth equation, the p-value of both government size and trade openness are greater than the 0.05 percent level of significance. Therefore, the null hypothesis cannot be rejected. The results suggests that both government size and trade openness does not cause economic growth in South Africa. This concludes that there is no direction of causality from government size or trade openness to economic growth

5. Conclusion

The current study employs cointegration and Granger causality based on error correction model to examine the causal relationship between government size and trade openness in South Africa during the period 1980 to 2018. This was partly driven by the fact that South Africa is one of the anchors of trade in sub-Saharan Africa, contributing significantly to the intra-regional exports and imports. To overcome some of the weakness associated with the bivariate causality framework; this study employs a trivariate causality test in which economic growth is treated as intermittent variable. The findings from the study reveal that there is unidirectional causality from trade openness to government size in South Africa.

Therefore, the study concludes that trade openness does cause government size in South Africa. Based on the findings, the study recommends that as the country is looking for ways to reduce government expenditure, it should come with strategies that will ensure that there is a moderate increase in government size as the country becomes open. In order to boost economic growth the government, should reduce spending on consumption expenditure and spend more on investment expenditure. Further studies could examine the impact of trade openness on disaggregated government expenditure in South Africa.

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