PUBLIC EXPENDITURE AND ECONOMIC GROWTH IN KENYA:
A MULTIVARIATE DYNAMIC CAUSAL LINKAGE

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Sheilla Nyasha¹ and Nicholas M. Odhiambo

Abstract
This study empirically examines the dynamic causal relationship between government size and economic growth in Kenya during the 1970-2017 period, using the error-correction based autoregressive distributed lag bounds testing approach. A multivariate Granger-causality model was utilised in order to eliminate variable-omission-bias from the results. Domestic investment and trade openness were used to this end – as intermittent variables between government size, proxied by government final consumption expenditure, and economic growth. The results of the study are consistent with the Keynesian view as they reveal that in Kenya, there is unidirectional Granger-causality from government size to economic growth – both in the short run and in the long run. Thus, in Kenya, it is the government expenditure that leads while the real sector follows. Based on these results, policy makers in Kenya are recommended to increase the national government size in order to stimulate economic growth.

Keywords: Government Size, Government Expenditure, Economic Growth, Granger-causality, Kenya

1. Introduction

Since the days of Adam Smith (1776) to this day – more than two centuries later – economists and politicians alike are still battling to find a silver bullet for economic growth, as they push forward the ‘improved standards of living and wellbeing of the citizens’ agenda.

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Government size is one of the hotly contested drivers of economic growth – arguments intensifying since the ballooning of most governments in the 1990s.

The trust of the debate is centred on whether increased government size is good or bad for economic growth. Some argue that without government, there is no state; and that the government plays a significant role in driving economic growth (see, among others, Ram, 1986; Ghali, 1998; Loizides and Vamvoukas, 2005). This argument is consistent with the Keynesian theory which states that government size has a positive impact on economic growth. According to this theory, an increase in government expenditure leads to an increase in economic growth through the expansionary fiscal policy channel since increased in government expenditure are associated with increases in production and aggregate demand, which ultimately translates to higher levels of GDP and welfare of the citizens.

On the extreme contrary are those that claim that a bigger government is not good for economic growth. Those who hold this view assert that the bigger the size of the government, the lower the levels of economic growth and the welfare of the citizens, since a bigger government spends more to inefficiently provide goods and services that could have been otherwise provided efficiently by the private sector (Barro, 1991). However, in the middle ground are those that assert that increasing government expenditure is good for economic growth until a certain point, where further increases to the government expenditure become detrimental to the economy.

The same arguments have been extended to the causal relationship between government size and economic growth, where the thrust of the arguments is whether causality runs from government size to economic growth or from economic growth to government size. Three views have been found to be dominant as well. The first view is that which is consistent with the Keynesian view, where direction of causality runs from government size to economic growth. Thus, the government size leads while the economic growth follows, making the former a leading indicator of the latter (see Abu-Bader and Abu-Qarn, 2003; Ghosh and Gregoriou, 2008).

To the contrary of this view is the second view, consistent with Wagner's law (Wagner 1883; 1912), which posits that the direction of causality runs from economic growth to government size, instead (see Dritsakis, 2004; Kumar et al., 2012). According to Wagner’s law, the
government has a propensity to increase its expenditure as the national incomes increases as administration costs increase with the growing economy; welfare spending also increases; and inevitable increases in state’s social functions (Wagner 1883; 1912). Then, there is the third strand that acknowledges both the Keynesian theory and Wagner’s law and concludes that government size and economic growth are mutually causal (Cheng and Lai, 1997; Sideris, 2007; Wu et al., 2010).

Given the need to know with certainty the causal relationship between government size and economic growth, on the one hand, and the inconclusiveness on the outcomes of studies undertaken to establish the direction of causality between the two, on the other, a revisit on the topic cannot be overemphasised – since the outcome has key policy implications for growth in Kenya and many more countries, alike. Further, although a number of studies have attempted to examine the causal link between government size and economic growth, most of these studies are mainly based in Latin American, European and Asian economies, leaving Africa in general and Kenya in particular with little to no coverage. In addition, the previous studies on the government size-growth causality nexus were based on cross-sectional and bivariate methodologies even when it is now well known that the former ignores country-specific effects while the latter produces results that are not free from variable-omission-bias.

Given this backdrop, the objective of the current study is to empirically examine the direction of causality between government size and economic growth in Kenya, using data from 1970 to 2017. The uniqueness of this study comes from the use of modern econometric techniques – autoregressive distributed lag (ARDL) bounds testing approach with an error-correction model (ECM) framework. Furthermore, the study utilises a multivariate Granger-causality model which incorporates domestic investment and trade openness as intermittent variables – in order to eliminate omission-of-variable bias from the results. The rest of the study is organised as follows: Section 2 discusses the dynamics of government size and economic growth in the study country. Section 3 reviews literature on the causality between government size and economic growth. Section 4 presents the methodology used in the study. Section 5 covers the empirical analysis and results; and section 6 concludes the study.

2. Government Size and Economic Growth in Kenya

Over the review period (1970-2017), the Kenyan government expenditure, as measured by government final consumption expenditure as a ratio of GDP, was oscillating between 20%
and 13%; and averaged 16.5% per annum over the same period (World Bank, 2018). The biggest government size achieved in Kenya, in the period under review, was 19.8%, in 1980. However, the smallest government size in the history of Kenya, within the review period, was 13.3%, reached in 2016, following the government’s deliberate effort to cut down its size. From 1970 to 1980, government consumption expenditure in Kenya had an overall upward trend, from 16.3% to 19.8%, respectively – however, with oscillations in-between. From 1981 to 1990, the expenditure was over 18%, except for 1984 and 1985, when it was 17.4% and 17.5%, respectively. Starting from 1991, the size of the Kenyan government continuously and gradually shrank, to settle at 14.3% in 2017 – albeit with pockets of government consumption expenditure growth from 2002 to 2005 (World Bank, 2018).

From the economic growth perspective, Kenya’s economic growth performance was in the positive region on the whole, except in two periods only – 1970 and 1992, when economic growth slowed by 4.7% and 0.8%, respectively (World Bank, 2018). The highest economic growth rate achieved by Kenya within the review period was 22.2%, recorded in 1971, while the lowest was -4.7% registered in 1970. However, the average growth rate of GDP over the review period was 4.6% – with the economic growth rate of the 1970s averaging 7.2% while that of the 1980s and 1990s averaged 4.2% and 2.2%, respectively. In the 2000s, Kenya’s economic growth rate averaged 3.6% while its average was 5.8% between 2010 and 2017. A closer look on the economic growth rate trend for Kenya reveals a downward trend from the beginning of the review period to the 1990s, before a mild recovery in the main, though marred by fluctuations, post the 1990s until the end of the period (World Bank, 2018). Nonetheless, this recovery was not strong enough to match the high economic growth rates of the 1970s and the 1980s – hence an overall downward trend over the review period.

Figure 1 presents trends in government size, proxied by government final consumption expenditure as a ratio of GDP, and economic growth, proxied by the growth rate of GDP, in Kenya over the period from 1970 to 2017.
Of interest to note, and as revealed in Figure 1, government size in Kenya has been decreasing over the years, as was the rate of economic growth. Thus, both government consumption expenditure and economic growth in Kenya trended downwards, in the period under review. However, the rate of decline in the government expenditure was higher than the rate of economic growth decline, as exhibited by the slopes of the linear trends of the two series.

3. Literature review
The need to ascertain the causal relationship between government size and economic growth has given birth to numerous studies as researchers battle to establish the direction of causality between the two economic fundamentals. However, the results have been closer to controversy and inconclusiveness than to anything else, as evidence has become more three-pronged than it has been consistent. To date studies on the causality between government size and economic growth have culminated into three categories. The first category consists of those studies that have found unidirectional causality from government size to economic growth, also known as the “government expenditure-led growth” or the “Keynesian view”. The second category is made up of studies that found support in the growth-led government size, where economic growth leads government size while government size follows economic growth – also known as the “Wagnerian view”. Then there is the third category, where economic growth and government size are mutually causal, confirming bidirectional causality between the two.
Studies that are consistent with the first category – the government expenditure-led growth – include: Ghali (1998), Gupta et al. (2002), Abu-Bader and Abu-Qarn (2003), Loizides and Vamvoukas (2005), Blankenau (2005), Dogan and Tang (2006), Blankenau et al. (2007), Bose et al. (2007), Ghosh and Gregoriou (2008), and Ebaidalla (2013).

Ghali (1998) examined the causality between government expenditure and economic growth in ten Organisation for Economic Cooperation and Development (OECD) countries and found that government size Granger-causes economic growth in all study countries. Gupta et al. (2002) also re-visited the government expenditure-growth causal nexus in 39 low-income countries. The results were consistent with the Keynesian view. Thus, fiscal consolidations and strong budgetary positions were found to be associated with higher economic growth.

Abu-Bader and Abu-Qarn (2003) investigated the direction of causality between government expenditure and economic in three countries – Egypt, Israel and Syria – and found evidence consistent with the first view. In the same vein, Loizides and Vamvoukas (2005) carried out a similar study in three countries as well, but this time, the countries were Greece, the United Kingdom and Ireland. Evidence of government expenditure-led growth was found in two of the three countries – Ireland and the UK.

In 2005, Blankenau (2005) tested the causal relationship between government size, as proxied by government expenditure on college education, and economic growth in the United States of America. The study found evidence consistent with the Keynesian view. In the year that followed, Dogan and Tang (2006) subjected the government expenditure-economic growth nexus to a test in five countries, namely: the Philippines, Indonesia, Malaysia, Singapore and Thailand. A unidirectional causal flow from government expenditure to economic growth was found to predominate, but only in the Philippines.

Another year later, Blankenau et al. (2007) examined the relationship between government expenditure and economic growth in developed and developing countries. The results were in support of the Keynesian view in the developed country sample. However, Bose et al. (2007) found the same results from a sample of developing countries. Ghosh and Gregoriou (2008) also investigated the relationship between disaggregated government expenditure and economic growth in 15 developing countries. The Keynesian view was found to dominate.
The results further showed that government expenditure on operations and maintenance had a stronger positive impact on economic growth than their education and health counterparts.

Ebaidalla (2013) tested the nature and direction of causality between government expenditure and national income in Sudan using Granger-causality test and Error Correction Model (ECM) for the period 1970-2008. The causality test indicated that the direction of causality in the study country ran from government expenditure to national income, both in the short and the long run.


Bohl (1996) examined the causal relationship between government expenditure and economic growth in G7 countries. The results were in support of unidirectional causality from economic growth to government expenditure in the UK and Canada. Dritsakis (2004) carried out a similar study in Greece and Turkey and found similar evidence – in support of Wagner’s view. Loizides and Vamvoukas (2005), in their government expenditure-economic growth nexus on Greece, the UK and Ireland, they found results consistent with the second view, where economic growth was found to Granger-cause government expenditure in Greece and the UK.

Akitoby et al. (2006) tested the direction of causality between government expenditure and economic growth based on a sample of developing countries. They found evidence of unidirectional Granger-causality from economic growth to government expenditure. Two years later, Narayan et al. (2008) examined the relationship between government expenditure and economic growth in China while Mohammadi et al. (2008) carried out a similar study in Turkey. The results of both studies were consistent with Wagner’s Law.

Samudram et al. (2009), in the case of Malaysia, found causality from economic growth to various categories of government expenditure, health and administration. Tang (2009), also in the case of Malaysia, examined the causal relationship between various components of government expenditure and economic growth. The results were in support of the growth-led
government expenditure view where economic growth was found to Granger-cause government expenditure on health, education and defence.

Lamartina and Zaghini (2011) also re-visited the government expenditure-economic growth nexus – this time, in 23 OECD countries. They found results consistent with the second category, giving support to Wagner’s Law. Kumar et al. (2012) also re-visited the same nexus in New Zealand and found evidence of growth-led government expenditure, but only in the long run.

Srinivasan (2013) investigated the causal nexus between public expenditure and economic growth in India over the period 1973 to 2012, using the cointegration approach and error correction model. The empirical results indicated a one-way causality running from economic growth to public expenditure in the short run and in the long run, supporting the Wagner’s law.

Lastly, studies that are in favour of feedback hypothesis – also known as “bidirectional causality” between government size and economic growth – include: Cheng and Lai (1997), Huang (2006), Sideris (2007), Samudram et al.(2009), Tang (2009), and Wu et al. (2010).

Cheng and Lai (1997), in the case of South Korea, examined the direction of causality between government expenditure and economic growth and found evidence consistent with the third category, where there is bidirectional Granger-causality between government expenditure and economic growth. Huang (2006) also empirically investigated the causality between government expenditure and economic growth in China and Taiwan. The results of the study supported the notion that the two were mutually causal.

Sideris (2007) carried out a similar study in Greece and found that there is bidirectional Granger-causality between government expenditure and economic growth. A study by Samudram et al. (2009) in Malaysia, on the causal relationship between government expenditure and economic growth, found similar results – supporting bidirectional causality between economic growth and some components of government expenditure (administration and health expenditures). Tang (2009) also found evidence supporting bidirectional Granger-causality between economic growth and government expenditure on health, in a similar study in the same study country of Malaysia.
In the year that followed, Wu et al. (2010) empirically examined the causal relationship between government expenditure and economic growth in 182 countries. Based on the results, they concluded that government expenditure and economic growth are mutually causal, except for the low-income countries within their sample.

From the studies reviewed it is clear that the causal relationship between government expenditure and economic growth is far from being consistent and conclusive. The results fall into the three categories – government expenditure-led growth, growth-led government expenditure and bidirectional causality. Not one category of the three is outstandingly dominant over others. The causality between the two variables seems to vary depending on the country/region of study, sample size, methodology and proxies used.

4 Methodology
A number of approaches have been used in the past to examine the direction of causality between two variables. These approaches include the simple causality tests already in-build in softwares; and the bivariate approaches. However, the approaches have been known to be weak (Odhiambo, 2015). Unlike most studies that adopted these inferior methodologies, this study empirically examines the direction of causality between government size and economic growth in Kenya using the autoregressive distributed lag (ARDL) bounds-testing approach – enhanced by Pesaran et al. (2001) following its initial proposal by Pesaran and Shin (1999) – within an error correction model framework.

The ARDL approach is well-known for its numerous advantages, and the selected few include its superior small sample properties; less complicated computations as it utilises a single reduced-form equation; ability to automatically control for endogeneity in variables; unrestrictive use of variable integrated of order 0 or 1, and automatic selection of optimal lag per variable.

In addition to the use of the ARDL approach, this study incorporated domestic investment and trade openness as intermittent variable to form a multivariate Granger-causality model. The choice of the multivariate model was motivated by the need to address the omission-of-variable bias associated with bivariate causality models (Loizides and Vamvoukas, 2005; Nyasha et al., 2016).
In this study, economic growth is proxied by the GDP growth rate (Nyasha et al., 2016; 2018). On the other hand, government size is proxied by government expenditure, which is measured by government final consumption expenditure as ratio of GDP. The higher the expenditure, the bigger the size of the government.

Two intermittent variables were added to the government size-economic growth causality model – domestic investment and trade openness. The two variables are linked to both economic growth and government size, theoretically and empirically, prompting their inclusion in the study. Domestic investment is associated with higher growth rates and bigger government sizes; so is the trade openness. Domestic investment was proxied by gross fixed capital formation as a ratio of GDP while trade openness was measured by the sum of imports and exports expressed as ratio of GDP.

The causality model, therefore, consist of \([y, GE, DI, TO]\) where \(y\) is economic growth, \(GE\) is government expenditure, \(DI\) is domestic investment and \(TO\) is trade openness.

Although stationarity testing of variables is not key when using the ARDL-based methodology, variables in this are tested for unit root – to confirm that their highest order of integration is 1. The Phillips-Perron (PP) and the Dickey-Fuller generalised least squares (DF-GLS) tests were utilised for this purpose. Once the ARDL stationarity condition is met, testing for cointegration is the next step, to confirm the existence of a long-run relationship among the variables. A system of cointegration equations associated with the multivariate Granger-causality model for this study, following Pesaran et al. (2001), is expressed as equations 1 to 4.
Cointegration Model

\[ \Delta y_t = \phi_0 + \sum_{i=1}^{n} \phi_{1i} \Delta y_{t-i} + \sum_{i=0}^{n} \phi_{2i} \Delta GE_{t-i} + \sum_{i=1}^{n} \phi_{3i} \Delta DI_{t-i} + \sum_{i=0}^{n} \phi_{4i} \Delta TO_{t-i} + \phi_5 y_{t-1} \]
\[ + \phi_6 GE_{t-1} + \phi_7 DI_{t-1} + \phi_8 TO_{t-1} + \mu_{1t} \ldots \ldots \ldots \ldots \ldots \ldots \ldots (1) \]

\[ \Delta GE_t = \beta_0 + \sum_{i=0}^{n} \beta_{1i} \Delta y_{t-i} + \sum_{i=1}^{n} \beta_{2i} \Delta GE_{t-i} + \sum_{i=1}^{n} \beta_{3i} \Delta DI_{t-i} + \sum_{i=0}^{n} \beta_{4i} \Delta TO_{t-i} + \beta_5 y_{t-1} \]
\[ + \beta_6 GE_{t-1} + \beta_7 DI_{t-1} + \beta_8 TO_{t-1} + \mu_{2t} \ldots \ldots \ldots \ldots \ldots \ldots \ldots (2) \]

\[ \Delta DI_t = \alpha_0 + \sum_{i=0}^{n} \alpha_{1i} \Delta y_{t-i} + \sum_{i=0}^{n} \alpha_{2i} \Delta GE_{t-i} + \sum_{i=1}^{n} \alpha_{3i} \Delta DI_{t-i} + \sum_{i=0}^{n} \alpha_{4i} \Delta TO_{t-i} + \alpha_5 y_{t-1} \]
\[ + \alpha_6 GE_{t-1} + \alpha_7 DI_{t-1} + \alpha_8 TO_{t-1} + \mu_{3t} \ldots \ldots \ldots \ldots \ldots \ldots \ldots (3) \]

\[ \Delta TO_t = \delta_0 + \sum_{i=0}^{n} \delta_{1i} \Delta y_{t-i} + \sum_{i=0}^{n} \delta_{2i} \Delta GE_{t-i} + \sum_{i=1}^{n} \delta_{3i} \Delta DI_{t-i} + \sum_{i=1}^{n} \delta_{4i} \Delta TO_{t-i} + \delta_5 y_{t-1} \]
\[ + \delta_6 GE_{t-1} + \delta_7 DI_{t-1} + \delta_8 TO_{t-1} + \mu_{4t} \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (4) \]

where \( y \) is GDP growth rate (a proxy for economic growth); \( GE \) is government consumption expenditure as ratio of GDP (a proxy for government size); \( DI \) is gross fixed capital formation as ratio of GDP (a proxy for domestic investment); \( TO \) is the sum of imports as exports as ratio of GDP (a proxy for trade openness); \( \phi_0, \beta_0, \alpha_0 \) and \( \delta_0 \) are respective constants; \( \phi_{1-8}, \beta_{1-8}, \alpha_{1-8} \) and \( \delta_{1-8} \) are respective coefficients; \( \Delta \) is the difference operator; \( n \) is the lag length; \( t \) is the time period; and \( \mu_{it} \) is the white-noise error term.

In order to test for the existence of a long-run relationship among the variables making the multivariate Granger-causality model, the two-step ARDL bounds testing approach to cointegration is used. The first stage involves determination of the order of lags of the first
differenced variables in the cointegration equations, followed by comparing the calculated F-statistic with Pesaran et al. (2001) critical values. Should the calculated F-statistic be below the lower-bound level, the decision would be to accept the null hypothesis of no cointegration and conclude that there is no long-run relationship among the considered variables. However, in the event that the calculated F-statistic lies above the upper bound level, the null hypothesis is rejected, implying that the variables are cointegrated. There are also cases where the calculated F-statistics are neither below the lower bound nor above the upper bound, but in-between the bounds. In that case, the results are interpreted as inconclusive.

Granger-Causality Model
The ECM-based multivariate Granger-causality model adopted in this study is expressed as equations 5 to 8.

\[
\Delta y_t = \phi_0 + \sum_{i=1}^{n} \phi_{1i} \Delta y_{t-i} + \sum_{i=1}^{n} \phi_{2i} \Delta GE_{t-i} + \sum_{i=1}^{n} \phi_{3i} \Delta DI_{t-i} + \sum_{i=1}^{n} \phi_{4i} \Delta TO_{t-i} + \phi_5 ECM_{t-1} \\
+ \mu_{1t} \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (1)
\]

\[
\Delta GE_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i} \Delta y_{t-i} + \sum_{i=1}^{n} \beta_{2i} \Delta GE_{t-i} + \sum_{i=1}^{n} \beta_{3i} \Delta DI_{t-i} + \sum_{i=1}^{n} \beta_{4i} \Delta TO_{t-i} + \beta_5 ECM_{t-1} \\
+ \mu_{2t} \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (2)
\]

\[
\Delta DI_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta y_{t-i} + \sum_{i=1}^{n} \alpha_{2i} \Delta GE_{t-i} + \sum_{i=1}^{n} \alpha_{3i} \Delta DI_{t-i} + \sum_{i=1}^{n} \alpha_{4i} \Delta TO_{t-i} + \alpha_5 ECM_{t-1} \\
+ \mu_{3t} \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (3)
\]

\[
\Delta TO_t = \delta_0 + \sum_{i=1}^{n} \delta_{1i} \Delta y_{t-i} + \sum_{i=1}^{n} \delta_{2i} \Delta GE_{t-i} + \sum_{i=1}^{n} \delta_{3i} \Delta DI_{t-i} + \sum_{i=1}^{n} \delta_{4i} \Delta TO_{t-i} + \delta_5 ECM_{t-1} \\
+ \mu_{4t} \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (4)
\]
where **ECM** is the error correction term; $\phi_0$, $\beta_0$, $\alpha_0$ and $\delta_0$ are respective constants; $\phi_{1.5}$, $\beta_{1.5}$, $\alpha_{1.5}$ and $\delta_{1.5}$ are respective coefficients; $\mu_t$ = mutually uncorrelated white noise residual, and the rest are as described in the cointegration equations (1-4).

**Data Source**
The annual time-series data for Kenya from 1970 to 2017 used in this study were sourced from the World Bank (2018).

5. Empirical Analysis

**Unit Root Results**
All variables are stationary either in levels or in first difference – thus ratifying the use of the ARDL methodology. The stationarity results are presented in Table 1.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Stationarity of all variables in levels With Trend</th>
<th>Stationarity of all variables in first difference With Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Without Trend</td>
<td>With Trend</td>
</tr>
<tr>
<td><strong>Panel 1: Phillips-Perron (PP)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>y</td>
<td>-5.492***</td>
<td>-5.827***</td>
</tr>
<tr>
<td>GE</td>
<td>-1.591</td>
<td>-3.326*</td>
</tr>
<tr>
<td>DI</td>
<td>-3.401**</td>
<td>-3.459*</td>
</tr>
<tr>
<td>TO</td>
<td>-2.673*</td>
<td>-3.471*</td>
</tr>
<tr>
<td><strong>Panel 2: Dickey-Fuller Generalised Least Square (DF-GLS)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>y</td>
<td>-3.276***</td>
<td>-4.349***</td>
</tr>
<tr>
<td>GE</td>
<td>-1.692</td>
<td>-2.734</td>
</tr>
<tr>
<td>DI</td>
<td>-3.500***</td>
<td>-3.609**</td>
</tr>
<tr>
<td>TO</td>
<td>-2.676***</td>
<td>-3.547**</td>
</tr>
</tbody>
</table>

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

**Cointegration Results**
Following the confirmation that the variables in the study are integrated of order either 0 or 1, the study proceeded to the testing of cointegration among the variables, based on the cointegration models in equation 1 to 4. Table 2 presents the cointegration results.
Table 2: Bounds F-test for Cointegration

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Function</th>
<th>F-statistic</th>
<th>Cointegration status</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>F(y</td>
<td>GE, DI, TO)</td>
<td>5.71***</td>
</tr>
<tr>
<td>GE</td>
<td>F(GE</td>
<td>y, DI, TO)</td>
<td>0.84</td>
</tr>
<tr>
<td>DI</td>
<td>F(DI</td>
<td>y, GE, TO)</td>
<td>2.67</td>
</tr>
<tr>
<td>TO</td>
<td>F(TO</td>
<td>y, GE, DI)</td>
<td>1.38</td>
</tr>
</tbody>
</table>

Asymptotic critical values

<table>
<thead>
<tr>
<th>Pesaran et al. (2001), p.300 Table CI(iii) Case III</th>
<th>1%</th>
<th>5%</th>
<th>10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>I(0)</td>
<td>4.29</td>
<td>3.23</td>
<td>2.72</td>
</tr>
<tr>
<td>I(1)</td>
<td>5.61</td>
<td>4.35</td>
<td>3.77</td>
</tr>
</tbody>
</table>

Note: *** denote statistical significance at 1% level

The results in Table 2 show that there is cointegration among the variables in the economic growth function. However, no cointegration was found in the other three functions. Since there is at least one cointegration vector, the study proceeds with Granger-causality testing.

**Granger-causality results**

Following the confirmation of a long-run relationship among the variables in at least one of the four cointegration equations, causality tests are carried out within the ECM-based framework. Although an ECM is included in all the four causality equations, only equations which passed the cointegration test (equation 5) are estimated with the ECM. In determining the causality between variables, F-statistics of the explanatory variables as determined by the Wald Test or Variable Deletion and the significance of the coefficient of the lagged error-correction term are considered. While the former determines short-run causality, the latter determines long-run causality. Table 3 reports the results of the ECM-based causality.
As shown in Table 3, the empirical results indicate that in Kenya, there is unidirectional Granger-causality from the size of the government to economic growth – irrespective of whether it is in the short run or in the long run. The short-run causality is confirmed by the government size (GE) in the economic growth function (y), that is statistically significant at 1% level. The long-run Granger-causality, on the other hand, is confirmed by error-correction term (ECT) in the economic growth function, which is also statistically significant at 1% level. The results are consistent with the Keynesian view and are supported by Bose et al. (2007), Ghosh and Gregoriou (2008), and Ebaidalla (2013), among others.

Other results, as reported in Table 3, show that in Kenya, there is bidirectional Granger-causality between domestic investment and economic growth only in the short run. In the long run, causality runs unidirectionally from domestic investment to economic growth. Trade openness was also found to Granger-cause economic growth, both in short run and in the long run. The other results further reveal the existence of a short-run unidirectional Granger-causality from government size to domestic investment; from government size to trade openness; and from domestic investment to trade openness.
6. Conclusion

The dynamic Granger-causal relationship between government size and economic growth in Kenya has been examined in this study, covering the period from 1970 to 2017. To address the methodological weaknesses of the previous studies associated with the residual-based cointegration test (Engle and Granger, 1987) or the maximum-likelihood test (Johansen, 1988; Johansen and Juselius, 1990), this study has used the recently introduced ARDL bounds testing approach (Pesaran et al., 2001), within an error-correction model framework in examining the relationship between government size and economic growth in Kenya. Further, to address the omission-of-variable bias, the study has incorporated domestic investment and trade openness as intermittent variables to form a multivariate Granger-causality model. The results of the study reveal that in Kenya, there is unidirectional Granger-casualty flowing from the government size to economic growth – both in the short run and in the long run, confirming that in Kenya, higher government expenditure stimulates the real sector. Based on these results, policy makers in Kenya are recommended to increase the national government size in order to stimulate economic growth. Other results show that: i) there is a unidirectional causal flow from terms of trade to economic growth in the short run and in the long run; ii) there is bi-directional causality between domestic investment and economic growth in the short run, but a unidirectional causal flow from domestic investment to economic growth in the long run; and iii) government expenditure and domestic investment Granger-causes terms of trade, but only in the short run.

References


