https://doi.org/10.15407/dse2019.03.099
УДК 330.55; 330.56(680)
JEL CLASSIFICATION: O11, O47

M. MALEKA
PhD in economic
University of Johannesburg, South Africa
524, South Africa, Johannesburg, Gauteng, 2006, Auckland Park
E-mail: mrmaleka@uj.ac.za
ORCID 0000-0003-0383-9242

M. BIYASE
PhD in economic
University of Johannesburg, South Africa
524, South Africa, Johannesburg, Gauteng, 2006, Auckland Park
E-mail: mbiyase@uj.ac.za
ORCID 0000-0003-1857-3205

T. ZWANE
PhD in economic
University of Johannesburg, South Africa
524, South Africa, Johannesburg, Gauteng, 2006, Auckland Park
E-mail: ttzwane@uj.ac.za
ORCID 0000-0003-4039-9944

GENERAL GOVERNMENT DEBT AND GROWTH IN SADC COUNTRIES

Previous research regarding the effect that government debt might have on economic growth has produced mixed results. This can be attributed to the fact that the estimated threshold (the idea of debt threshold level –turning point, above which debt starts reducing economic growth) varies from one study to another, providing inadequate insight regarding the optimal debt level. Related to this point is the fact that previous studies have based their analysis on a single aggregate list of countries, regardless of the disparities in levels of development. The aim of this study is to revisit the relationship between government debt and economic growth in a sample of 10 Southern African Development Community (SADC) members from 1995 to 2017. This study attempts to fill the gap by disaggregating the SADC data into different samples: full sample and a sample of non-Heavily Indebted Poor Countries and employs the fixed effects two-stage least squares (FE-2SLS) estimator to account for possible endogeneity bias due to reverse causation between government debt and economic growth. Results are presented for the entire sample and sub-sample (non-Heavily Indebted Poor Countries). While the impacts of government debt

are similar in direction (negatively related to economic growth) for the full and sub-sample, it is not significantly related with economic growth in the sub-sample. That is, the estimated coefficient varies substantially, depending on the particular sample of countries chosen. This implies that government debt has impact on growth when a single aggregate list of countries is analyzed, while it becomes insignificant when a sub-sample of non-Heavily Indebted Poor Countries is considered. In addition, this study also finds that Inflation, military expenditure and trade openness have a negative significant relationship with government debt in SADC. However, population growth and investment were found to have a significant positive relationship with government debt.

Keywords: *Government Debt, Economic Growth, SADC, Fixed Effect.*

М. Малека
канд. екон. наук
Університет Йоханнесбурга, Південна Африка
524, Південна Африка, Йоханнесбург, Гаутенг, 2006, Окленд Парк
E-mail: mrmaleka@uj.ac.za
ORCID 0000-0003-0383-9242

М. Бьязе
канд. екон. наук
Університет Йоханнесбурга, Південна Африка
524, Південна Африка, Йоханнесбург, Гаутенг, 2006, Окленд Парк
E-mail: mbiyase@uj.ac.za
ORCID 0000-0003-1857-3205

Т. Званє
канд. екон. наук
Університет Йоханнесбурга, Південна Африка
524, Південна Африка, Йоханнесбург, Гаутенг, 2006, Окленд Парк
E-mail: ttzwane@uj.ac.za
ORCID 0000-0003-4039-9944

ЗАГАЛЬНИЙ ДЕРЖАВНИЙ БОРГ ТА ЕКОНОМІЧНИЙ РОСТ У КРАЇНАХ SADC

Попередні дослідження щодо впливу державного боргу на економічне зростання дали неоднозначні результати. Це можна пояснити тим, що орієнтовний поріг (ідея рівня порогової заборгованості – точка повороту, над якою борг починає зменшувати економічне зростання) змінюється від одного дослідження до іншого, що дає недостатнє розуміння оптимального рівня боргу. З цим моментом пов'язаний той факт, що попередні дослідження базували свій аналіз на єдиному сукупному переліку країн, незалежно від розбіжностей у рівнях розвитку. Мета цього дослідження – переглянути взаємозв'язок між державним боргом та економічним зростанням у вибірці з 10 членів Південноафриканського співтовариства розвитку (Southern African Development Community – SADC) за період з 1995 до 2017 року. Це дослідження намагається заповнити прогалину, розділивши дані SADC на різні вибірки: повна вибірка та вибірка бідних країн (підвибірка), що не мають великої заборгованості, і використовує оцінювач двоступеневих найменших квадратів з фіксованим ефектом (FE-2SLS), щоб врахувати можливі зміщення ендогенності через зворотну причину між державним боргом та економічним зростанням. Результати представлені для всієї вибірки та підвибірки (бідні країни з заборгованістю). Незважаючи на те, що вплив державного боргу є схожим за напрямом (негативно пов'язаним з економічним зростанням) для повної та підвибірки, він суттєво не пов'язаний з економічним зростанням підвідбірки. Тобто, розрахунковий коефіцієнт суттєво різниться, залежно від конкретної вибірки країн, що обираються. Це означає, що державний борг впливає на зростання, коли аналізується єдиний сукупний перелік країн, в той час як він стає незначним під час розгляду підвибірки бідних країн, що не мають великої заборгованості. Крім того, у цьому дослідженні також встановлено, що інфляція, військові витрати та відкритість торгівлі мають негативний суттєвий зв'язок з державним боргом у США. Однак, було встановлено, що приріст населення та інвестиції суттєво позитивно впливають на державний борг.

Ключові слова*: Державний борг, економічне зростання, SADC, фіксований ефект.*

М. Малека
канд. экон. наук
Университет Йоханнесбурга, Южная Африка
524, Южная Африка, Йоханнесбург, Гаутенг, 2006, Окленд Парк
E-mail: mrmaleka@uj.ac.za
ORCID 0000-0003-0383-9242

М. Бьязе
канд. экон. наук
Университет Йоханнесбурга, Южная Африка
524, Южная Африка, Йоханнесбург, Гаутенг, 2006, Окленд Парк
E-mail: mbiyase@uj.ac.za
ORCID 0000-0003-1857-3205

Т. Звane
канд. экон. наук
Университет Йоханнесбурга, Южная Африка
524, Южная Африка, Йоханнесбург, Гаутенг, 2006, Окленд Парк
E-mail: ttzwane@uj.ac.za
ORCID 0000-0003-4039-9944

ОБЩИЙ ГОСУДАРСТВЕННЫЙ ДОЛГ И ЭКОНОМИЧЕСКИЙ РОСТ В СТРАНАХ SADC

Предыдущие исследования относительно влияния государственного долга на экономический рост дали неоднозначные результаты. Это может быть связано с тем фактом, что расчетный порог (идея уровня порога долга – точка перелома, выше которой долг начинает снижать экономический рост) варьируется от одного исследования к другому, обеспечивая неадекватную информацию об оптимальном уровне долга. С этим связан тот факт, что предыдущие исследования основывали свой анализ на едином агрегированном списке стран, независимо от различий в уровнях развития. Цель этого исследования – пересмотреть взаимосвязь между государственным долгом и экономическим ростом в выборке из 10 членов Сообщества по вопросам развития стран юга Африки (Southern African Development Community – SADC) с 1995 по 2017 год. Исследование пытается восполнить этот пробел путем дезагрегации данных SADC по различным выборкам: полная выборка и выборка бедных стран с большой задолженностью и использует двухэтапную оценку наименьших квадратов (FE-2SLS) с фиксированными эффектами для учета возможного смещения эндогенности из-за обратной причинности между государственным долгом и экономическим ростом. Результаты представлены для всей выборки и подвыборки (бедные страны с большой задолженностью). Хотя влияние государственного долга схоже по направлению (отрицательно связано с экономическим ростом) для полной и подвыборки, оно не имеет существенного отношения к экономическому росту в подвыборке. То есть расчетный коэффициент существенно варьируется в зависимости от конкретной выборки исследуемых стран. Это подразумевает, что государственный долг оказывает влияние на рост при анализе единого совокупного списка стран, но становится незначительным, когда рассматривается подгруппа бедных стран с крупной задолженностью. Кроме того, это исследование также показывает, что инфляция, военные расходы и открытость торговли имеют негативную значительную связь с государственным долгом в САДК. Однако было установлено, что рост населения и инвестиции имеют существенную положительную связь с государственным долгом.

***Ключевые слова**: государственный долг, экономический рост, SADC, фиксированный эффект.*

Description of the research problem and relevance of the article. Although the SADC member state have made good progress in dealing with their debt obligations (from the period 2004 to 2010, SADC managed to halve its average government debt to GDP ratio from nearly 80 % to less than 40 %), it remains high by international standards (Chuhan-Pole et al., 2018). Some of the SADC member countries are classified (by the World Bank) as heavily indebted poor countries. For example, government debt to GDP in Mozambique, Zimbabwe and Zambia exceeded the regional limit in 2018 (IMF, 2018, Chuhan-Pole et al., 2018). Mozambique, Zimbabwe and Angola are the most indebted SADC countries with public debt valued at

110.1 %, 75 % and 75.2 % of their GDP respectively in 2018 (IMF, 2018, Chuhan-Pole et al., 2018).

In view of this, several measures aimed at reducing the debt stock (such as the Heavily Indebted Poor Countries and the Multilateral Debt Relief Initiative) have been proposed. The Heavily Indebted Poor Countries Initiative was launched in 1996 by the International Monetary Fund and World Bank, with an objective of ensuring that no poor country faces a debt burden it cannot manage (Isar, 2012). Since then, the international financial community, including multilateral organizations and governments, have worked together to reduce to sustainable levels the external debt burdens of the most heavily indebted poor countries (Isar, 2012).

The momentous debt issues in developing countries raise serious concerns about its potential negative impact on economic growth. This view is in line with the results of growing empirical literature which shows that there is a negative correlation between public debt and economic growth in advanced and emerging economies (Egert 2015; Calderon & Fuentes 2013; Matiti 2013; Ebernardt & Presbitero 2015; Favour et al. 2017; Moussa &Shawawreh 2017; Matandare &Tito 2018). Other studies find that the results become negative only when government's debt reaches a certain threshold, for example 44.42 % of GDP (see Pattillo et al. 2011; Reinhart & Rogoff 2010; Panizza & Presbitero 2012; Dinca & Dinca 2013; Chirwa & Odhiambo 2017; Pegkas 2018). Al-Zeaud (2014), Owusu-Nantwi and Erickson (2016) find evidence to suggest that government debt is positively associated with economic growth. Thus, understanding the impact of the government debt on economic growth is fundamental to the development process.

The aim of the article and innovation character. Although previous studies have investigated the link between government debt and economic growth, their analysis are based on a single aggregate list of countries, regardless of the disparities in levels of development. The aim of this study is to revisit the relationship between government debt and economic growth in a sample of 10 Southern African Development Community (SADC) members from 1995 to 2017. The contribution of the study to literature is twofold. Firstly, notwithstanding the numerous studies in this field, investigations about the impact of government debt on economic growth in the SADC are very scarce. Even the existing studies, have not disaggregated the SADC data [1] into full sample and sub-sample (i.e. non-Heavily Indebted Poor Countries). This is important given the disparities in levels of development between Heavily Indebted Poor Countries and non-Heavily Indebted Poor Countries. Secondly, the study captures unobserved individual heterogeneity and endogeneity, both via fixed effect, and via the fixed effect two stage least square (FE-2SLS). The remainder of this paper is structured as follows: Section 2 provides a survey of the literature on the relationship between government debt and economic growth. Section 3 describes the data employed. Section 4 outline the estimation method and reports the results and section 5 draws conclusion.

Data and Methodology. Directed by the empirical literature (see for example, Pattillo et al. 2011; Calderon & Fuentes, 2013; Reinhart & Rogoff, 2010; Chirwa & Odhiambo, 2017), we employ the fixed-effects and random-effects estimation techniques to investigate the relationship between the accumulation of government debt and economic growth. The random-effects estimation technique is applied if the country specific-effects are assumed to be uncorrelated with the error term (Baltagi et al., 2003). On the other hand, the fixed-effects estimation technique relaxes this assumption and allows the country-specific effects and the error term, to be correlated (Angrist & Pischke, 2009). The most appropriate estimation tech-

[1] These studies have relied heavily on single aggregate list of SADC countries.

nique between the two depends on whether the country specific-effects are perceived as fixed or random. To choose the most appropriate between the fixed-effects and the random-effect estimation technique, we performed a Hausman specification test propounded by Hausman (1978). The results of the test reject the random-effects estimation technique in favour of the fixed-effects. The results of Hausman test are presented at the bottom of table 2. In this study, we only present the results of the fixed-effects techniques. The mathematical equation in terms of the fixed-effects estimation technique can be expressed as follows:

$$LOG_{Economic\ growth\ it} = \beta_0 + \beta_1 Gvt\ debt_{it} + \beta_2\ Population_{it} + \beta_3\ Democracy_{it} + \beta_4\ Openness_{it} +$$

$$+ \beta_5\ Military\ expenditure_{it} + \beta_6\ Investmant_{it} + \beta_7 Inflation_{it} + \delta_{it} + u_{it}$$

Where $LOG_{Economic\ growth\ it}$ denotes economic growth rate proxied by means of logarithm of GDP per capita of country i at time period t, $Gvt\ debt_{it}$ is the logarithm of government debt to GDP, measured by means of the ratio of general government gross debt to GDP. $Population_{it}$ is the value of total population within the SADC member state, $Democracy_{it}$ indicate the level of democracy within the SADC member states (polity index), $Openness_{it}$ is trade is ratio of imports plus exports to GDP, $Military\ expenditure_{it}$ measures military expenditure as a share of GDP, $Investmant_{it}$ is a measured of gross fixed capital formation, and $Inflation_{it}$ is a measure of macro-economic stability. The subscript δ_{it} captures unobserved country's heterogeneity.

One of the concerns of the empirical techniques discussed thus far is that they do not account for the joint endogeneity that could result from the reverse relationship (economic growth might determine government debt). Although this paper has hypothesised a direct impact resulting from government debt to economic growth, this paper also expects that a reverse causality is also feasible. In such circumstances, an appropriate estimation technique would be the one that addresses the endogeneity bias (see also, Wooldridge, 2002; Angrist & Pischke, 2009). So, our preferred choice of estimation technique that account for a possible endogeneity bias is the fixed-effects two-stage least square (FE–2SLS) estimator. We use the lagged value of government debt as an instrument. We employ the annual data of 10 Southern African Development Community members (the other SADC countries were left out due to lack of data) from 1995 to 2017. The data comes from the World Bank's World Development Indicators, except for the government debt variable which is obtained from the comprehensive database provided by Carmen Reinhart and Kenneth Rogoff website at www.reinhartandrogoff.com/data/.

Literature Review. There is a growing body of theoretical and empirical literature investigating the impact of government debt on economic growth (for example, C. Reinhart & K. Rogoff [33]; U. Panizza & A.F. Presbitero [29]; B. Egert [14]; C. Calderon & J.R. Fuentis [7]; G. Dinca & M.S. Dinca [11]; Matiti, 2013; Al-Zeaud, 2014; Eberhard & Prebitero, 2015; Owusu-Nantwi & Erickson, 2016; T.G. Chirwa & N.M. Odhiambo [9]; T.A. Moussa & A.M. Shawawreh [27]; E.O.O. Favour et al. [15]; M. Comez-Puig & S. Sosvilla-Rivero [17]; P. Pegkas [31]; M.A. Matandare & J. Tito [24]; T. Shahor [35]. However, these studies have produced inconsistent and inconclusive results regarding the nature of the relationship. The inconclusive results can be attributed to econometric models applied in the empirical analyses or the country coverage considered. Some of the studies that have been conducted in developed countries include U. Panizza & A.F. Presbitero [29]; C. Reinhart & K. Rogoff [33]; M. Kumar & J. Woo [23]; T. Herndon & R. Pollin, [20]; B. Egert [14], while other studies have been done in developing countries include the T. Egbetunde [13]; M. Mbate [26]; B. Fincke & A. Greiner, [16]; M.A. Matandare & J. Tito [24].

Among the studies that investigate the impact of government debt on economic growth in developed countries, is that of Reinhart and Rogoff (2010). In their influential paper, Reinhart and Rogoff (2010) examined (through simple correlation statistics) the developments of public (gross central government) debt and the long-term real GDP growth rate in a sample of 20 developed countries over a period spanning about two centuries (1790–2009). They found that; (i) the correlation between government debt and long-term growth was weak for debt/GDP ratios less than the threshold of 90 % of GDP, and (ii) above 90 %, the median growth rate falls by one percent and the average by considerably more (Reinhart & Rogoff, 2010). A similar change in the behaviour of GDP growth in relation to the debt ratio was also reported by Kumar and Woo (2010). Kumar and Woo (2010) investigated the impact of high public debt on long-run economic growth using a panel of advanced and emerging economies over almost four decades. The results suggested an inverse association between initial debt and subsequent growth, controlling for other determinants of growth; on average, a 10 percentage point increase in the initial debt-to-GDP ratio was related to a slowdown in annual real per capita GDP growth of around 0.2 percentage points per year, with the impact being somewhat lesser in advanced economies (Kumar & Woo, 2010).

But when replicating the work of Reinhart and Rogoff (2010), Egert (2015) used the same data set to a formal econometric testing to examine whether public debt has a negative nonlinear effect on growth if public debt exceeds 90 % of GDP. Making use of non-linear threshold models, Egert (2015) revealed that getting a negative non-linear association between the public debt to GDP ratio and economic growth was really problematic and sensitive to modelling choices and data coverage. In the very rare cases when non-linearity of Reinhart and Rogoff (2010) can be detected, the negative non-linear relationship kicks in at very low levels of public debt (between 20 % and 60 % of GDP) (see for example, Egert, 2015).

In a similar study, Herndon and Pollin (2014) also replicated Reinhart and Rogoff's (2010) work. In their study, Herndon and Pollin (2014) criticised the conclusion of Reinhart and Rogoff (2010) arguing that the results were based on incorrect information resulting from data cleaning. They reported problems of selective exclusion of available data, coding errors and inappropriate weighting of summary statistics which all resulted to severe miscalculations that inaccurately represent the relationship between public debt and GDP growth among 20 advanced economies (see for instance, Herndon & Pollin, 2014). Contrary to the results of Reinhart and Rogoff's (2010), Herndon and Pollin (2014) calculated the average real GDP growth rate over 1946 to 2009 for countries carrying a public debt/GDP ratio greater than 90 % and found a positive 2.2 %, not negative 0.1 %.

Checherita and Rother (2010) investigated the impact of government debt on economic growth for 12 European countries over the period 1970 to 2010 using the fixed effects methodology. The results showed a non-linear effect of debt on economic growth, demonstrating that the government debt to GDP ratio has a negative effect on long-term growth when debt is about 90 to 100 percent of GDP (Checherita & Rother, 2010). These results are consistent with those reported by Panizza and Presbitero (2012). In their study, Panizza and Presbitero (2012) also reported a negative causal association between debt and growth in a sample of OECD countries using the instrumental variables approach. Mousa and Shawawreh (2017) investigated the impact of public debt on the GDP growth in Jordan during the period 2000–2015. The study employed Ordinary Least Square (OLS) method and regression model to capture the impact of public debt on economic growth. The results of the analysis indicated that there is a negative impact of total public debt, especially the external debt on economic growth.

Chirwa and Odhiambo (2017) examined the public debt and economic growth nexus, using panel data from ten European countries. The study employed a panel ARDL approach. The results showed that the accumulation of public debt and government consumption are negatively and significantly associated with economic growth in all the countries both in the short and the long run. The study results also showed that debt is non-linear at the 70 % threshold only in the long run, while in the short run the results were consistently negative across the countries. The study by Gomez-Puig and Sosvilla-Rivero (2017) empirically investigated the short and long run effect of public debt on economic growth in the central and peripheral countries of Euro area (EA) for the period 196I to 2013. The study applied Autoregressive Distributed Lag (ARDL) bounds testing approach. The results tend to support the view that public debt always has a positive effect on economic growth on the short run, whilst the impact on the long run is negative.

Other studies have found evidence of a positive causal nexus between public debt and economic growth. For example, Baum et al. (2013) examined the causal association between public debt and economic growth by means of the dynamic threshold panel methodology for 12 European countries for the period 1990 to 2012. The study found a positive and high significant effect of debt on GDP when the debt to GDP ratio was less than 67 %, but after that point, there was no relationship between debt and GDP (Baum et al., 2013). Al-Zeaud (2014) investigated the relationship between economic growth and government debt in Jordan. The study covers the period from 1991 to 2010. The author makes use of Ordinary Least Square regression to examine the relationship between the variables. The results have shown that public debt in Jordan has a positive and significant relationship with economic growth.

Following studies that have been conducted in developing countries, Mbate (2013) examined the impact of public debt on economic growth of 21 sub-Saharan African countries over the period 1985–2010. The author applied a GMM estimation system and found that an increase in domestic debt accelerates economic growth during the surveyed period. Egbetunde (2012) assessed the effect of public debt on economic growth in Nigeria between 1970 and 2012. The results from the vector autoregression model showed a positive association between public debt and growth. In their work, Fincke and Greiner (2013) investigated the causal association between public debt and growth in a panel data of a selected emerging countries over the period 1983–2011. The authors found a positive and significant effect of public debt on growth, reinforcing the work of Egbetunde (2012). In their recent study, Matandare and Tito (2018) examined the relationship between public debt and economic growth in Zimbabwe during the period 1980 to 2016, using Ordinary Least Square method. The study found that there is a negative significant relationship between external debt and economic growth in Zimbabwe for the period under study. The study by Favour et al, (2017) empirically analysed the relationship between public debt and GDP growth rate in Nigeria from 1980–2015 using Vector Error Correction model. The result of the study indicated that, foreign and domestic debt have significant negative impact on economic growth in Nigeria in both the short run and the long run within period under consideration.

Owusu-Nantwi and Erickson (2016) study empirically investigated the long run and short run nexus between public debt and economic growth in Ghana for the period 1970 to 2012. Vector error correction and Johansen cointegration analysis were employed to test for causal relationships between the variables. The empirical results showed a positive and significant long run relationship between real GDP growth rate and public debt. In the short run a bidirectional Grange causality link exist between public debt and economic growth (Owusu-Nantwi and Erickson, 2016).

There are studies that have investigated the impact of government debt on economic growth in both developed and developing countries. Such studies include the work of Eberhardt and Presbitero (2015) who investigated the long-run relationship between public debt and economic growth in 118 developing and advanced economies over the period 1960 to 2012. The authors adopted linear and non-linear specifications, employing novel method. The study found some support for s negative relationship between public debt and long-run growth across countries.

Pattillo et al, (2011) assessed the relationship between external debt on growth using a large panel dataset of 93 developing countries spanning Sub-Saharan Africa, Asia, Latin American and Middle East. The study covers the period 1969–1998. The authors make use of OLS, instrumental variables fixed effect as well as System GMM to assess linear relationship between debt and economic growth. In addition to simple linear regression, the authors employ different specifications to investigate the non-linearity of the relationship between debt and growth. The result of the study is that, debt appears to have a non-linear effect on growth, and the average impact of debt on per capita growth appears to become negative for debt level above 35.40 percent of GDP.

Empirical analysis. Before launching into the discussion of the empirical results obtained through the application of panel data models (fixed effects and FE-2SLS), we start with a basic descriptive analysis. More precisely, we show general government debt as a percentage of GDP in the SADC region. Table 1 suggests that some countries within the SADC region are heavily indebted when compared to others. For instance, countries such as Zambia, Mozambique, Malawi and Mauritius appear to be the major countries that are highly indebted within the SADC region. On the other hand, countries such as Botswana, Swaziland, Namibia and South Africa seem to top the list of countries that are less indebted in the SADC region.

An alternative way of getting a preliminary idea about the relationship between government debt and economic growth is to plot the debt ratio against the yearly GDP growth rate. The evidence presented in figure 1 for the full sample is remarkable: government debt and

Table 1. **General government debt% GDP in SADC countries, 1995–2017**

Country	Mean	STD Dev
Angola	75.83	31.12
Botswana	12.40	5.26
Namibia	25.36	6.93
Swaziland	15.91	4.25
South Africa	40.56	8.08
Mauritius	59.74	4.72
Heavily Indebted Poor Country (HIPC)		
Malawi	58.95	37.35
Mozambique	70.93	31.67
Tanzania	34.96	9.20
Zambia	66.79	75.97

Source: own derived from the IMF data 2019.

economic growth do not appear to have any obvious relationship with one another in the SADC region. Similar results were also observed by Egert (2015) which replicated Reinhart and Rogoff's (2010) work. However, these results should be interpreted with caution since the full sample might be masking a lot of variation in the data set. To verify this statement, we then disaggregated the data and tested this relation by producing the scatter plot for Botswana and Zambia separately. The results from figure 2 do not suggest an apparent negative relationship between government debt and economic growth in Botswana. Therefore, the same conclusions advanced earlier for the full sample also apply to the results presented for Botswana. But when we disaggregate the data further, the general picture changes: what emerges from figure 3 is a strong negative relationship between government debt and economic growth in Zambia. This means that an increasing government debt is detrimental to the overall economic performance of the Zambian economy. This is also evident from table 1 which showed that Zambia was initially categorised by the World Bank as a heavily indebted poor country. While scatter plots present a qualitative measure of the entire association between the two factors, it is only suggestive. In light of the above, the following section will empirically examine the robustness of the scatter plots.

We begin this section by estimating the fixed effect model regression whose results are presented in table 2. Column two of table 2 report our regression results of economic growth

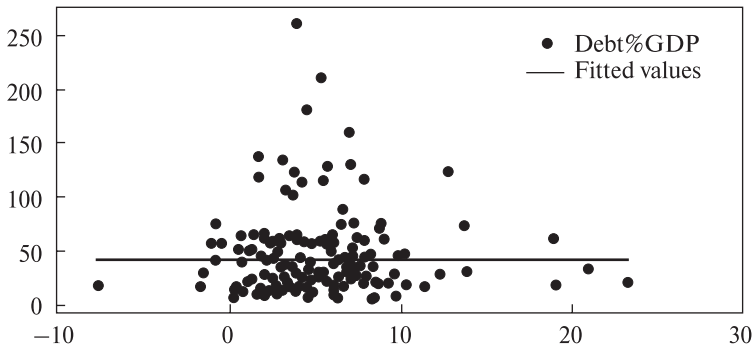

Fig. 1. **General government debt % GDP and growth in SADC, 1995–2017**

Source: own derived from the IMF data 2019.

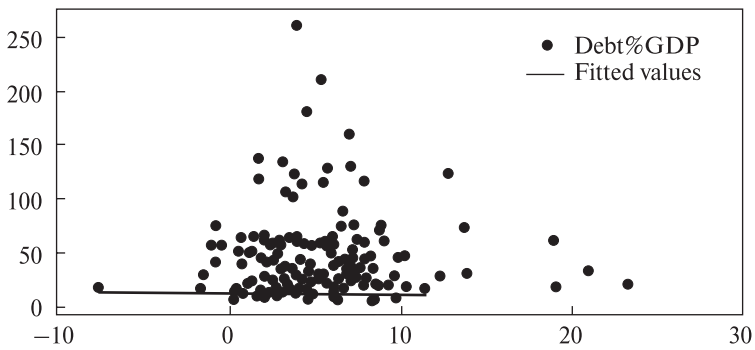

Fig 2. **General government debt % GDP and growth in Botswana, 1995–2017**

Source: own derived from the IMF data 2019.

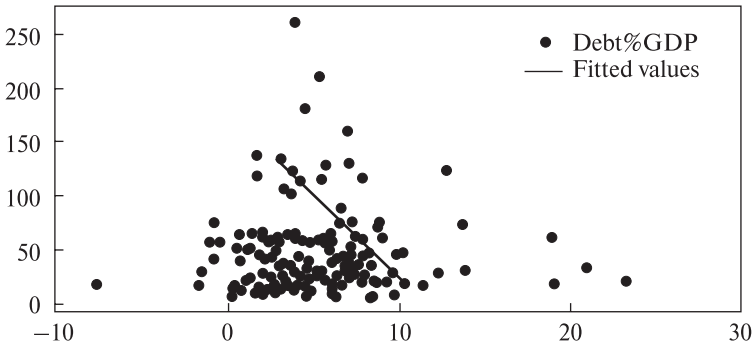

Fig. 3. **General government debt % GDP and growth in Zambia, 1995–2017**

Source: own derived from the IMF data 2019.

coefficient with government debt for the full sample. The remaining control variables are added in stepwise manner from models 2 to 7 for robustness check. The estimated fixed effect results reveal that there is a negative significant relationship between government debt and economic growth in SADC for the period under study. Precisely, FE (1) indicates that government debt is significant ($\beta = -0.292$, $p<0.05$) and has a negative effect on economic growth, a sign that larger government debt is detrimental to economic growth. These results are consistent with the work of Pattillo et al. (2011); Anyanwu and Erhijakpor (2004); Schclarek (2004); Misztal (2010); Kumar andWoo (2010); Reinhart and Rogoff (2010); Dinca and Dinca (2013); Mousa and Shawawreh (2017); Matandare and Tito (2018).

Predictably, population growth rate present positive and statistically significant estimates on economic growth in the SADC region. The empirical findings hold up pretty well when adding other control variables across all models. Nonetheless, these results contradict those of Biyase and Zwane (2016) who reported that population had no statistically significant effect on economic growth on the SADC region. The effect of democracy on economic growth is somewhat unclear. In model 3 and 4 of table 2, democracy present a positive and statistically significant effect on growth – as proposed in some studies in this field.

On the other hand, the inclusion of other variables (i.e. openness, military expenditure, investment and inflation) makes it insignificant. The coefficient estimates for the remaining control variables seem to be mostly in line with our expectations and with those in the relevant literature. In line with our expectations, military spending was found to exert a negative influence on economic growth in the SADC region. These results reinforce those of Biyase and Zwane (2016). Similarly, investment shows the existence of strong positive and mostly significant estimates on economic growth in the SADC region. These results confirm the conclusions of other studies, such as Rabnawaz and Jafar (2015). Inflation also presents the expected sign and the variable is significant at 1st level of significance.

To ascertain whether the results presented in the fixed effect model are not biased due to the problem of endogeneity issue, we estimated a FE-2SLS estimator with an instrument as discussed in the methodology section. We further performed several specification tests to check if the instruments use were valid. We found that the Cragg-Donald F-test was above the value of 10, ruling out the concern of a weak instrument. We also performed an endogeneity test to establish whether we needed to use the FE-2SLS estimator or if a fixed effect model was adequate. The results showed that the FE-2SLS estimator was actual the model we needed to use.

Column 9 of table 2 accounts for the potential endogeneity of government debt and estimate FE-2SLS estimator. Comparing these results to those of the fixed effect model, the

results of the FE-2SLS estimator seems to mimic the same pattern in terms of the direction of the impact and the level of significance as those presented earlier. More precisely, the results in this part show that our variables of interest, government debt negatively influences economic growth at 10 % significance level. These results are consistent with those of the fixed effect model presented earlier, although the coefficient possess a slightly lower magnitude. With regards to the impact of other control variables on growth, the results of the fixed effect two stage least square estimator appear to follow the same trends as those of the fixed effect estimator. Precisely, coefficients for trade openness, military spending, investment and inflation, still matter in explaining economic growth in the SADC region – enters negatively and significantly in the FE-2SLS estimator. Similarly, the coefficients for population and investment remain key factors influencing economic growth economic – enters positively and significantly in the FE-2SLS estimator. Therefore, the same conclusions made for the results presented for the fixed effect, also apply to the findings presented for the FE-2SLS estimator.

Having discussed the effect of government debt on economic growth for the full sample, this part of the study examines the effect of government debt on economic growth on the subsample. In table 3 below, we used the fixed effect model for countries that are less indebted

Table 2. **Fixed effect estimates of the effects of G-debt on economic growth in SADC (full-sample), 1995–2017**

Economic Growth	FE(1)	FE(2)	FE(3)	FE(4)	FE(5)	FE(6)	FE(7)	2SLS FE
DEBT	-0.292***	-0.257***	-0.268***	-0.059**	-0.040	-0.060	-0.078**	-0.075*
	[0.046]	[0.042]	[0.049]	[0.028]	[0.030]	0.027	0.027	0.037
POPULATION		0.936***	0.623**	0.433***	0.406***	0.250	0.318**	0.282**
		[0.137]	[0.267]	[0.141]	[0.146]	0.122	0.123	0.139
DEMOCRACY			0.109*	0.013*	0.0310	-0.006	0.000	0.007
			[0.063]	[0.034]	[0.053]	0.044	0.043	0.043
OPENNESS				-0.764***	-0.702***	-0.688	-0.687***	-0.703***
				[0.044]	[0.050]	0.045	0.044	0.044
MIL_EXPENDITURE					-0.139**	-0.177	-0.182***	-0.175***
					[0.057]	0.047	0.046	0.047
INVESTMENT						0.266	0.243***	0.247***
						0.036	0.037	0.037
INFLATION							-0.001***	-0.001***
							0.000	0.001
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Cragg-Donald Wald F statistic								68.75

Notes: clustered standard errors are reported in parentheses with ***, **, and *, denoting significance at the 1 %, 5 %, and 10% levels, respectively. Columns (1), (2), (3), (4), (5), (6), and (7) are estimated using the fixed effect estimator, with country and year dummies and robust standard errors clustered at the country level. The last column, is estimated using the instrumental variable estimator, with country and year dummies.

Source: author's estimations based on the IMF data.

Table 3. **Fixed effect estimates of the effects of G-debt on economic growth in SADC (sub-sample), 1995–2017**

GROWTH	Coef.	Std. Err.
DBT	-0.0628	0.036542
POP	-0.09984	0.154141
DEMO	0.001902	0.081439
OPEN	-0.77091	0.057027
MIL_EXP	-0.0935***	0.061783
INV	0.318451***	0.057788
INF	-0.011271	0.018642

Notes: clustered standard errors are reported in parentheses with ***, **, and *, denoting significance at the 1 %, 5 %, and 10 % levels, respectively.

Source: author's estimations based on the IMF data.

as classified by the World Bank as a robustness check. The results from this part are discussed in comparison with the estimation results from the full sample presented earlier.

By and large, there are some noticeable differences between the estimates from the full sample and those derived from the sub-sample. The differences are in terms of the level of significance and direction of the impact of explanatory variables on economic growth. The results for the full sample, our variable of interest (government debt) has maintained its negative sign. However, the results are insignificant, indicating that government debt in less indebted countries is not detrimental to economic growth. These results reinforce our basic descriptive analysis presented in figure 2 above. For example, our descriptive analysis of Botswana, one of the less indebted country, showed no obvious relationship between government debt and economic growth.

Conclusions and recommendations. This study empirically investigates the relationship between government debt and economic growth in a sample of 10 Southern African Development Community (SADC) members for the period 1995–2017. The study disaggregates the SADC data into different samples: full sample and a sample of non-Heavily Indebted Poor Countries and employs the fixed effects two-stage least squares (FE-2SLS) estimator to account for possible endogeneity bias due to reverse causation between government debt and economic growth. Looking at the results for fixed effect and those of FE-2SLS estimator we found that while the impacts of government debt are similar in direction (negatively related to economic growth) for the full and sub-sample, it is not significantly related with economic growth in the sub-sample. That is, the estimated coefficient varies substantially, depending on the particular sample of countries chosen. This implies that government debt, at moderate level, has no impact on growth while after a certain threshold the effects become growth reducing. Inflation, military expenditure and trade openness were also found to have a negative significant relationship with government debt in SADC. However, population growth and investment were found to have a significant positive relationship with government debt.

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Article submited on 19.07.2019.

Стаття надійшла до редакції 19.07.2019.