



PUBLIC DEBT AND ECONOMIC GROWTH: DOES INSTITUTIONAL QUALITY MATTER?¹

By

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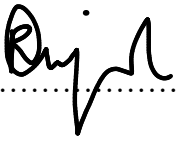
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DECLARATION

I, Mojapelo Mologadi Raesetja declare that “**Public Debt and Economic Growth: Does Institutional Quality Matter?**” is my personal work and effort. Every source that were utilized have been correctly cited and referenced. No prior submission of this work has been made by any individual for the fulfilment of a degree at a different institution.

Signed by:

Mojapelo Mologadi Raesetja



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Date

15 April 2020

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ABSTRACT

The main aim of this research was to assess the public debt and economic growth nexus in the presence of institutional quality in 15 economies that are in the SADC region. The study made use of the POLS model, two-stage least squares and SGMM for the period spanning from 1996 to 2015. The results obtained from the one-step system GMM and Two-Stage Least Squares reveal an adverse connection between public debt and economic growth in two models although not significant. Similarly, the pooled OLS revealed a negative relation between public debt and economic growth. Institutional quality was proxied using six governance indicators and we used the principle components analysis to construct a composite index and found that institutional quality yields a favourable impact on growth. Specifically, a 1% improvement in quality institutions will boost economic growth by approximately 15%. We also found that public debt has a threshold boundary that ranges from 48 to 72% for the region. We failed to obtain any statistically significant mechanism through which public debt exhibits an impact on economic growth. This study explored whether the connection between public debt and economic growth is conditional on quality of institutions using interaction term of public debt and institutions, and we established that the relationship is indeed dependent on institutions as the interaction term of institutions and public debt has a positive impact on the debt-growth relationship. Corruption, government effectiveness and rule of law have an adverse effect on economic growth in the region and we therefore suggest that the countries work on a comprehensive improvement of institutional quality to minimize the negative impact that public debt presents on economic for them to reap the benefits of borrowing. The SADC countries should have stringent policies to assist with the reduction of debt. Our research was restricted by the unavailability of reliable data on public debt for some countries in the SADC region and some missing observations.

Keywords: GDP per capita growth, institutional quality, public debt, threshold, System-Generalized Method-of-Moments, SADC

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ABBREVIATIONS

DBSA	Development Bank of Southern Africa
GDP	Gross Domestic Product
GFC	Global Financial Crisis
HIPC	Heavily Indebted Poor Countries
IMF	International Monetary Fund
PFI	Protocol on Finance and Investment
SADC	Southern Africa Development Communities
SSA	Sub-Saharan African countries

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CHAPTER ONE

INTRODUCTION AND BACKGROUND

Government debt levels in most African countries have been persistent and unsustainable from the commencement of the multi-national debt crisis in the early 1980s (Iyoha, 1999). This condition was further exacerbated by the spillover effects emanating from the global financial crisis. According to Efobi and Osabuohien (2011), poor economic performance in most African countries is attributable to various factors including poor governance and poor institutional quality, amongst others. They further argue that the global financial crisis left many countries including African countries vulnerable and it brought up the importance of strong institutional quality to the fore. Moreover, Mehlum, et al. (2006) observed that institutional consideration is essential in improving economic performance in African countries. With that said, the current report seeks to explore whether the debt-growth link is conditional on existing quality of institutions. According to Siba (2007), institutional quality can be used to explain growth differentials amongst countries and Presbitero (2008) states that institutional quality matters as it ensures that debt is managed efficiently, and poor institutions are likely to impair borrowing decisions and divert the borrowed funds to “fruitless” projects. About five SADC countries are heavily indebted and poor institutional quality in developing countries is used to explain why some of these countries are heavily indebted (Abdullahi, et al., 2019). For this reason, we saw it fit to explore the role of quality institutions in the SADC region.

Understanding this relationship is of crucial significance in policy making and vital to fiscal policy as well. Understanding the implication that public debt displays on the rate of growth is key mostly to policymakers who deal with growing fiscal imbalances (Ferreira, 2009). Even more, determining the aftermath of the national debt on the economy stands indispensable because it directly concerns existing taxpayers, the future generation and can ultimately affect expectations about the future (Georgiev, 2012). According to Mousa and Shawawreh (2017) public debt, both external or internal, is defined as a source of financing that the government banks on to fulfil its economic and social objectives, particularly in situations where there is a large difference between investment and savings, and the much-needed foreign currencies. With quality institutions, countries will be able collect sufficient tax revenue which will enable them to

pay for their projects and borrow less. When borrowing in the presence of quality institutions, countries will be able to manage government debt efficiently, for instance, invest in projects which will yield returns in the long run.

The International Monetary Fund (henceforth IMF) formed an initiative for countries that are heavily indebted in 1996 to ensure that poor countries are not confronted with a debt weight they cannot handle. The purpose for this initiative is to assist poor countries in reducing their debt to more acceptable debt levels (IMF, 2019). The IMF has provided full debt relief to 36 countries and 30 of these countries are in Africa. According to the IMF, debt service paid fell by approximately 1.5 percentage points of GDP between 2001 and 2015. As a result, these countries can now spend more on health and education, and other social spending rather than debt service. According to Buthelezi (2018), the SADC region implemented the Protocol on Finance and Investment (PFI) during the year 2016 and the purpose of this initiative is to try to lower or manage government debt. SADC countries are expected to retain the debt level at or below 60% (AFRODAD, 2014). However, the World Bank Indicators (2016) shows that about 40% of the countries in question have exceeded the set threshold. Hence, the study seeks to find the point or threshold whereby government debt begins to hinder potential economic growth in the SADC economies. As stated by SADC (2011), some of the major objectives of SADC include alleviation of poverty, economic liberalization, trade and the development of infrastructure and the achievement of these requires greater economic progress and development. The Bank of Botswana (2013) stated that SADC has a number of policies in place and they include having a common market area, customs union and a free trade zone and the establishment of a monetary union. To achieve these, SADC member countries have co-ordination amongst each other in relation to macroeconomic variables including inflation rates, fiscal deficits as a share of GDP and public debt to GDP ratio (SADC, 2011).

The implication that government debt possess on economic growth relies on particular skills and competence shown by the government in controlling the existing assets. In other words, it depends on the quality of budgetary and financial management. These can be explained or examined by the criterion evaluating the degree to which there is an inclusive and credible budget that is advised by policy priorities, functional financial management systems that provide certainty that the expenditures sustained are consistent with the approved budget, timely and

accurate fiscal reporting and lastly, a balanced assignment of the revenues and expenditures to each level of government. Quality institutions are linked with high GDP per capita, and high debt ratios are linked with low growth.

Public debt holds both adverse and positive impacts on growth. Public debt is considered as an imperative source for the government in funding public goods. Public debt (% of GDP) is often regarded as a benchmark in determining a government's ability to meet its future commitments. Government debt can be favourable when it is channeled towards research and innovation, training, schooling and investment in promoting growth (Georgiev, 2012). Against this backdrop, this study seeks to evaluate the type of link that economic growth and public debt have for SADC member countries.

Reinhart and Rogoff (2010) in their study titled "Growth in a Time of Debt" investigated the level whereby public debt begins to yield a negative impact on economic growth. They concluded that a country's growth rate slows when the debt-to-gdp ratio is greater than 90%. Their findings encouraged many Eurozone governments to enforce strict budget measures in order to avoid the 90% threshold (Lechtenberg, 2017). The set threshold for SADC member countries is 60%, however, some countries including DRC, Mozambique, Zimbabwe and Seychelles have had periods where debt (% of GDP) was above the 60% threshold hence this study seeks to establish a threshold for the SADC countries that is feasible and the study will test the conclusion reached by Reinhart and Rogoff (2010). In their analysis, Checherita and Rother (2010) found that there is a nonlinear association between public debt and economic growth in a sample of 12 Euro zone countries for the period 1970-2009. This study aims to examine if a nonlinear connection exists between public debt and economic growth and the mechanisms by which public debt influences growth as these issues have not been examined extensively for SADC countries.

The study made use of annual macroeconomic data for the period 1996-2015. The main aim of this research was to establish whether quality institutions play a role in defining the relationship between debt and growth. The study seeks to understand whether the presence of quality institutions defines the impact that public debt holds on growth. The study employs governance indicators including political stability, voice and accountability, regulatory quality, government

effectiveness, rule of law and corruption to understand the role that institutional quality plays in this context. According to Ahmed (2017), quality institutions influence the connection between national debt and growth while North (1990) states that “institutions are seen as one of the most an important determinant in determining the overall economic performance and growth of different economies”. The differences in institutions are the factors that create great disparity among nations with respect to per capita growth rates. The study does not focus only on the relationship between growth and debt, but we also conducted a cross-sectional dependence test which was influenced by the SADC intra-borrowing concept. In addition, this study examined whether the relation between public debt and economic growth in SADC economies is conditional on quality of institutions using an interactive term of public debt and institutions. Interaction comes about when an independent variable has a contradictory impact on the end result depending on the values of another independent variable. The main purpose was to establish whether institutions can influence debt. Moreover, we establish the debt threshold and potential channels across which government debt may influence economic growth.

Empirical work for low-and middle-income countries is limited, and most of the work done related to this study focus much more on external debt. This can be influenced by the unavailability of reliable data on domestic debt for many countries. With that said, the study is conducted for the period spanning from 1996-2015 due to lack of reliable data on public debt for SADC member countries. The study considers both external and public debt as numerous developing countries substituted external debt with domestic debt in the 1990s (Sanusi, et al., 2019). The aim of this study is to provide an insight of the consequences of public debt levels in developing countries by investigating the correlation concerning public debt and economic growth, considering institutional quality.

1.1 Research Question

The study rests upon the research question that seeks to establish whether public debt will boost economic growth in the presence of quality institutions. The study makes use of 15 SADC countries over the period 1996-2015. Moreover, the study aims to find the threshold above which the relationship between public debt and national output changes. According to SADC (2006), the Protocol on Finance and Investment is meant to ensure that the SADC countries retain national debt as a share of GDP to less than or equal to 60 percent although we have seen some

countries going beyond the set threshold. Reinhart and Rogoff (2010) argue that there exists a weak association between economic growth and debt. According to their article, economic growth declines when debt (% of GDP) is 90% for both advanced and emerging market economies. It is worth noting that for emerging markets, the threshold of 60% lowers economic growth and of the SADC countries, only South Africa and Botswana can potentially be classified as “emerging markets” but others are still developing countries. The authors continue by stating that the threshold for debt in developing countries is critical given that it is highly dominated by foreign currency composition. The main idea in this study was to find the level above which public debt begins to impact negatively on economic growth. Lastly, the study aims to establish the mechanisms through which public debt influences economic growth. High debt levels may result in interest rates being very high and this could then crowd out investment and hamper economic growth. The study makes use of the Pooled OLS, System Generalized Method-of-Moments (GMM) and Two-Stage Least Squares (2SLS). The study will also assess whether public debt possesses nonlinear effects on and economic growth. As specified by Checherita-Westphal and Rother (2012), public debt could have nonlinear effects on output through its effect on investment and total factor productivity.

1.2 Research objectives

This study dwells on three main objectives which include:

- The primary goal of our research is to ascertain the relationship and effects that public debt holds on economic growth in the presence of quality institutions.
- Secondly, the study aims to establish a threshold at which the national debt starts to exhibit negative effects on economic growth.
- Lastly, this study aims to find the mechanisms through which the national debt influences economic growth for the countries in question.

1.3 Problem Statement

According to Akram (2015), throughout the previous years, many developing countries have been unable to collect revenue that is sufficient to sponsor their budgets. Consequently, they are confronted by the twin deficits predicament and therefore depend on borrowing to provide for much-needed development activities. It is said that one major problem that African countries has

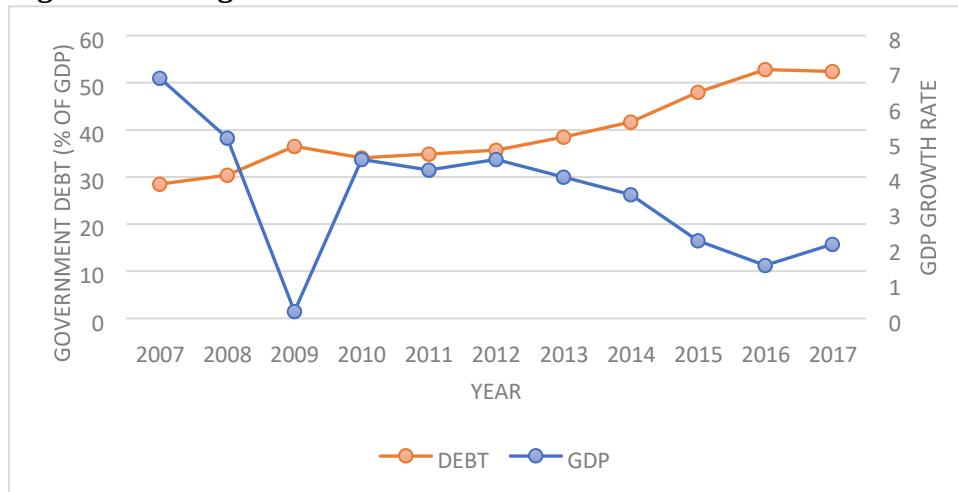
is the problem of over borrowing. Majority of the developing countries within and beyond Africa are faced with the lack of capital and there is a hypothesis that foreign savings should be utilized to raise the stock of capital above and beyond what may perhaps, be supplied by domestic saving (Greene and Khan, 1990).

According to Greene and Khan (1990), African economies experienced great consequences of the debt crisis whereby the growth rates, exports and investment rates have declined sharply since 1980. In addition, Stieglitz (2000) stated that government borrowing tends to crowd out investment, which leads to a reduction in future output and wages, and this will affect the welfare of the citizens.

According to the IMF, by the end of 2015, six of the fifteen SADC states were classified as “Heavily Indebted Poor Countries” and public debt in these countries continues to increase as they are trying to address persistent budget deficits, however, Tanzania received some debt relief and is no longer part of the HIPC which means that there are only five HIPC in SADC (IMF, 2019)². IMF data shows that debt from foreign currency has escalated by 40% from 2010 to 2017 and currently on average constitutes close to 60% of the region’s total public debt. According to Reinhart and Rogoff (2009), countries that rely on borrowing that occurs in the short-term to finance the escalating debt levels are vulnerable to predicaments relating to confidence which can give rise to abrupt and unforeseen financial crises. With that said, it becomes of great importance to study how public debt hampers or promotes economic growth for SADC countries and whether the existence of quality institutions matters.

² Highly Indebted Poor Countries in the SADC region include: Democratic Republic of Congo, Madagascar, Malawi, Mozambique and Zambia

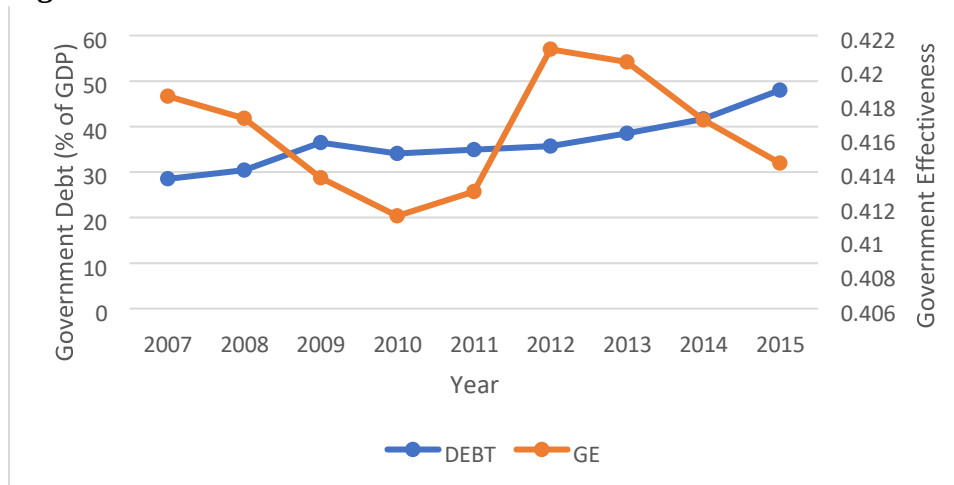
Figure 1: GDP growth vs Public debt trend



Source: Owner's computation using data from SADC selected indicators (2018) and IMF Regional Economic Outlook Database (2019)

Figure 1 represents the trend between GDP growth and government debt. Average SADC values were used. There has been weak economic growth in SADC and highly persistent national debt, and this is greatly caused by the unpleasant Global Financial Crisis aftermath. GDP growth was at its highest in 2007 and has been declining since then and it was at its lowest in 2009 and this could be due to the spillover effects of the global financial crisis (GFS). Such effects have lags hence the effect continued to play a major role in GDP growth years after the crisis. The second lowest value in GDP of 1.5 in 2016. Most countries were affected by the OPEC oil price shock. Government debt has increased substantially over the years and the trend shows that it will continue to rise. Figure 1 provides great motivation behind this study. The European union is one of Africa's major trading partner hence most African countries were affected by the euro debt crisis as the demand for Africa's exports fell. However, the global commodity price volatility had an impact on total earnings (ECA, 2012).

Figure 2: Government Debt vs Government Effectiveness



Source: Owner's computation using data from the IMF Regional Economic Outlook Database (2019) and World Governance Indicators (2019)

Kaufmann, et al. (2010) define government effectiveness as a way of capturing perception of the quality of civil service, the extent of its liberation from political pressure, policy conceptualization quality and execution and finally, the government's credibility to commit to those policies. The period between 2007 and 2009 shows that government effectiveness was declining whilst debt to GDP ratio was increasing. Many economies were left vulnerable during this period due to the global financial crisis and this brought up importance of quality institutions to the fore. From the year 2010 to 2012, government effectiveness started improving and this coincided with a decline in government debt. However, government effectiveness eventually decreased from 2012 to 2015 and this resulted in a increase in the debt (% of GDP) ratio. Figure 2 reveals that an improvement in the day to day running of the government results/coincides in a decrease in government debt and the opposite is true.

1.4 Significance of the study

Determining the effect of public debt on economic growth and also determining the threshold at which debt affects economic growth are essential to know and understand particularly for policy makers in making sound decisions given that the majority of African countries are overborrowing and suffered extreme consequences of the debt crisis. Reinhart and Rogoff (2010) and Pescatoria, et al. (2014) in their research questioned if there exists a public debt turning point beyond which the possibility of economic growth can be undermined in the long run. The PFI set

a threshold of 60% of debt as a percentage of GDP for all SADC members and this came after realizing that debt management was of crucial importance for sustainable economic growth. As a result, most of the SADC countries were below the given threshold except for Zimbabwe and Seychelles (SADC, 2016). It is worth noting that countries that had their debt as a share of GDP below 60% experienced lower growth rates than those who were above the threshold. According to SADC (2016) Zimbabwe and Mozambique had real GDP growth of 3.2% and 3.8% respectively in 2016 and they performed better than countries that had the lowest Debt-to-GDP ratio.

It is worth noting that having the Debt-to-GDP ratio below 60% does not entail higher growth rates as we have seen that some countries exceeded the threshold and still performed better. This shows that satisfying the 60% threshold is only necessary but not sufficient and this provides the motivation of the study in determining which threshold would work for SADC. This study therefore seeks to add to existing literature on public debt and economic growth by including the case study of SADC and unpack the potential mechanism and conditioning the relationship on the institutional quality in the same context. The set macroeconomic targets by SADC for the duration 2008-2018 include increasing the domestic investment as a percentage of GDP to 30% and obtaining a growth rate of 7%. In addition, they also aim to keep public debt to GDP below 60% and inflation to 3 percent (Bank Of Botswana, 2013). Some of the countries continue to struggle in achieving the set targets; this provides great motivation to investigate the performance of the member countries. This study will provide policy makers with valuable insight and prudent debt management is essential in achieving progressive economic growth.

The study is unique in three important strands; (1) it looked at the baseline association between public debt and economic growth in the context that is hugely neglected by many renowned researchers conditioning the analysis to institutional quality, (2) We look for specific threshold at which the public debt becomes harmful to economic growth in the context of SADC and (3), we seek to unpack the mechanisms through which public debt can potentially impact economic growth in SADC.

1.5 Definition of Concepts

According to Amadeo (2019), public debt can be described as “how much a country owes to the lenders outside of itself”. It usually refers to government debt and it is the accumulation of yearly deficits as a consequence of the government spending more than what they have (what they collect through taxes) (Amadeo, 2019). Public debt, which is often referred to as government debt, represents the total unpaid debt of a country’s reserve bank. It is usually stated as a ratio of GDP. Public debt comprises of both external and domestic debt whereby external debt refers to the debt due to lenders beyond the borders of the country and domestic debt refers to the government obligation to domestic lenders.

The public debt overhang refers to the deterioration of an economy because of increased public debt (Reinhart, et al., 2012). Accumulated public debt has a potential negative impact on the economy. Crowding out effect may be defined as the situation whereby government spending fails to give rise to the overall aggregate demand as government spending causes an equal decline in private sector spending and investment. According to Claessens, et al. (1996), a fall in investment is the result of a reduction in a nation's available assets for supporting investment and macroeconomic activity.

1.6 Overview of the study

Chapter one provides a general introduction of the study and it includes the framework of the study, motivation, objectives and the significance of the study. Chapter two provides the theoretical framework that the study adopts and highlights the findings from other studies related to the current study. Chapter three then provides the methodology and econometric techniques employed to accomplish the set goals and objectives of the study. Chapter four provides interpretation of findings, and recommendations, and lastly, chapter five provides a summary of the study, conclusion and policy recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section is split into two and it includes the theoretical framework and the empirical literature. The theoretical framework outlines theories supporting the variables in questions and the empirical literature outlines the findings provided by previous studies related to this study.

2.2 Theoretical Framework

The theoretical framework provides theories about the relation between public debt and economic growth. This study adopts the neoclassical growth theory. The theoretical framework provides a foundation for economic thought.

2.2.1 Neoclassical Growth Theory

It maintains that public debt generates crowding out effects in the short run as the future generation carries the tax burden. These academics theorize budget deficits concurrently initiating a rise in consumption and a reduction in private savings and investment which eventually results in a fall in economic growth. The resulting adverse debt-growth association is attributable to two fundamental theories which include the debt overhanging theory and the liquidity constraint hypothesis. Debt overhang refers to a situation whereby high debt levels act as a tax on future output and it lowers the incentive for saving and investment (Krugman, 1988). According to Fosu (1999), the liquidity constraint hypothesis states that debt servicing decreases available funds which could be used for investment reasons, thus binding liquidity constraints on debt would impede investment.

Solow (1956) introduced the neoclassical growth. The theory asserts that economic growth arises as a result of three factors which include capital, labour and technology. Barro and Martin (2004) also states that economic growth is a function of the three factors mentioned. The function is expressed as follows:

$$Y(t) = AF [K(t), L(t)] \dots\dots\dots (1)$$

Whereby Y represents the economy's GDP, A denotes a determinant level of technology, K denotes the share of capital at time t and L denotes labour at time t. The rate of growth of labour

in the model is similar to the percentage of growth of the exogenous population. We augment equation 1 to include public debt and other variables which have an influence on economic growth.

The augmented production function becomes:

$$Y(t) = AF[K(t), L(t), D(t), X(t)] \dots\dots\dots (2)$$

From equation 2, $D(t)$ denotes public debt at time t and $X(t)$ represents the vector of further independent variables that have an on influence economic growth at time. Population growth is considered as one of the explanatory variables and it can influence economic growth in a positive manner through higher human capital. To obtain capital, we need debt and the acquisition of debt will depend on institutions and their credibility. The study continues by including the six world governance indicators due to the web of association as a proxy of institutional quality however, the study will focus more on corruption and government effectiveness following the study by Makate, et al. on SSA economies (2018). Countries with high corruption levels are expected to perform poorly whilst the countries with higher ratings on government effectiveness will lead to higher growth rates. According to Sani, et al. (2019), poor institutional quality is not the sole reason for dismal economic performance in developing countries, but it also describes why these countries are heavily indebted (six of the fifteen SADC countries were classified as “Heavily Indebted Countries” by the IMF). In addition, we control for gross capital formation (% of GDP) and trade openness as a percentage of GDP and these variables are assumed to have a positive effect on economic growth.

2.3 Empirical Literature

As stated by North (1990), “institutions are the rules of the game in a society or the humanly devised constraints that shape human interaction. These rules of game can be in form of formal institutions such as laws and regulations or informal”. Considering debt, growth, and institutions interaction, Akoto (2013) found that the quality of institutions has an influence on the debt-growth relationship. Acemoglu, et al. (2005) shows that the quality of institutions possesses more imperative effects on long-term growth rather than the short term. Kirkpatrick, et al. (2006) assert that other studies reveal that quality of institutions and governance are essential in elucidating the

rate of investment, as they proposed that economic performance is affected by improving the climate for capital generation.

Reinhart and Rogoff (2010) established that a weak relation between government debt and economic growth exists for countries with debt that is lower than 90% of GDP. On the contrary, for countries that have a ratio of debt-to-gdp that is above 90%, debt can indeed affect economic growth negatively. Caner, et al. (2010) have used threshold regression methods for a large set 101 developed and emerging-market economies for the period 1980-2008. The authors found that a threshold of 77% public debt to GDP ratio is the perilous level at which debt has negative effects on growth. Kumar and Woo (2015) used a panel data set consisting of 38 countries and found heterogeneity in the effect of debt on economic growth. Their results suggested that there is a nonlinear relationship as the level of Debt-to-GDP ratio reached 90%. Checherita and Rother (2010) found a concave relationship between public debt and economic growth rate with the debt turning point of approximately 90 to 100 percent of GDP. This implies that high public debt is associated with lower long-term growth rates for debt levels above 90%. Sachs (1989) is of the opinion that foreign debt may have a negative effect on the levels of investment and as a result on economic growth through debt overhang.

Jalles (2011) examined the impact of democratic accountability and control of corruption upon the debt and growth relationship. The author used 72 developing countries for the period 1970-2005 and found that countries with lower corruption can use debt more effectively. Pattillo, et al. (2002) made use of 93 developing countries for the period 1969-1998 and established that external debt has negative implications on GDP per capita for net present value of debt levels above 35-40% of GDP. Clements, et al. (2003) asserts that high debt levels may affect growth in low income countries adversely. Debt influences growth more through the most efficient use of resources than through the dismal effect it has on private investment. These authors found that external debt has an indirect effect on growth through public investment. Bonga, et al. (2015) recently conducted a study in Zimbabwe using OLS model for the period 1980-2013. They found that public debt negatively affects economic growth in Zimbabwe. Using co-integration test, the findings indicate that all the components of debts have a negative impact on long run economic growth. Munzara (2015) examined the effect of foreign debt on economic growth in Zimbabwe

for the period spanning from 1980-2013. The author determined that external debt and trade openness have a negative impact on economic growth, but capital investment and labour force yield a positive impact.

Empirical Evidence from Various Regions

Regional studies are essential as they cater for the existing gap between economic levels in countries. They also allow for special policies of development to be implemented considering the economic state of the countries in the region. This research is focused on the SADC region and empirical evidence from various regions is therefore brought to the fore and discussed below.

Vianna and Mollick (2018), explored the role of institutional quality in Latin America for a period spanning from 1996 - 2015 using 192 countries. They found that an average improvement of about 0.1 points in institutions leads 3.9 percent increase in per capita output. Similarly, Leon, et al. (2019) observed the effect of public debt on economic growth in Latin American economies for the years 1990-2015. Their findings revealed that public debt to GDP ratio of 75% slows the rate of growth. On the contrary, a ratio of 35% results in a rise in growth volatility. The higher the debt ratio, the more vulnerable the economy is in the short term.

Tarek and Ahmed (2017) explored whether poor institutions lead to an accumulation of public debt across the MENA region. The study revealed that individual governance indicators including political stability, rule of law and regulatory quality yield a statistically significant influence on debt accumulation in the MENA zone. Moreover, the study reveals a significant indirect effect of poor institutions in the deterioration GDP growth rate. In addition, Cecchetti, et al. (2011) investigated the effects of public debt on economic growth using 18 OECD economies for the period 1980 to 2010. They used the threshold regression and established that government debt is not good for economic growth as it results in a fall in growth when the threshold value of 85% of GDP is exceeded.

Makate, et al. (2018) analyzed the relationship between external debt and economic growth using 40 SSA economies. The authors made use of fixed effects, GMM and two stage least squares models and found a negative relationship between external debt and growth. They also found that a nonlinear relation between per capita output growth and foreign debt. Lastly, the authors established that external debt (% of GNI) begins to negatively impact GDP growth at a threshold

of 34% for SSA countries. Iyoha (1999) employed the simultaneous equations model which was evaluated by using two-stage least squares for the years 1971-1994. The author found that there is a significant debt overhang effect and a “crowding out” effect. This generally entails that high external debt and heavy debt service payments have had dismal effects on investment in SSA.

Abdullahi et al. (2019) observed the effects of public debt and institutional quality using 46 SSA countries for the years 2000-2014. Using GMM, the authors found that institutional quality holds both indirect and direct influence on economic growth. Moreover, they found that the interaction term of institutional quality and public debt has a statistically significant impact on the public debt and economic growth relationship.

Evidence from different regions reveal similar results. The evidence shows that public debt has an adverse impact on economic growth and quality institutions matter because they lead to accelerated growth rates and lower public debt. Different debt thresholds are found, and this is attributable to economic conditions and performance in different regions. The differences can be explained by the different techniques that were used and it is important to note that institutional quality explains growth differentials among countries.

2.4 Conclusion

The theoretical outlook regarding this study was discussed. The study adopts the neoclassical growth theory as seen from Barro (2004) and the Solow-Swan model (Solow, 1956) (Swan, 1956). The theoretical framework that this study employs follows the work done by Makate, et al. (2018), and Dombi and Dedak (2018). They examine the crowding out effect of public debt under neoclassical growth models. Solow (1956) introduced the neoclassical growth theory in 1956. It argues that economic growth is a function of three factors which include labour, capital and technology. Barro and Martin (2004) also follow the same notion that economic growth is determined by the three factors and this study will follow suit. Empirical evidence from studies related to the current study were also highlighted. The authors used different techniques from different countries and periods, but they found similar results. Evidence indicates that public debt has a detrimental influence on economic growth. As highlighted earlier, empirical work based on SADC countries is limited and existing work focuses more on external debt while some countries

in SADC member countries depend mainly on domestic debt markets for their financial needs hence this study seeks to add to existing literature and contribute by looking for a specific threshold for the SADC member countries.³

³ According to the African Forum and Network on Debt and Development (2014), SADC countries that rely largely on domestic debt markets include South Africa, Namibia and Mauritius.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

According to Babbie (1992), research methodology is an account of the overall research, research design, collection of data, methods and the statistical analysis that will be conducted during the course of the research. This chapter is devoted to presenting the methodology of the study and outlines the data and description of data. This section also indicates how the data is gathered. It includes the regression model, definition of variables and finally the estimation and testing of the model.

3.2 Data and data description

This analysis utilized yearly secondary data which was collected from secondary sources including World Development Indicators (WDI), International Monetary Fund (IMF) and World Governance Indicators (WGI). Furthermore, the data will be annual, spanning from 1996 – 2015. Such frequency and range are informed by data availability. We would have liked to use recent data but unfortunately, reliable data on public debt ends in 2015 for all countries on the IMF database. The countries used in this analysis is given in the appendix (see table A1).

This study makes use of GDP per capita growth which represents the quality of economic growth and it is the dependent variable in the model. GDP per capita is the gross domestic product divided by midyear population. The explanatory variables include public debt (% of GDP), gross capital formation, population growth, trade openness and the governance indicators. The explanatory variables consist of both our variables of interest and the control variables. Particular variables of interest include public debt, corruption and government effectiveness. Trade openness is measured by trade-GDP ratio and Gross capital formation represents investment.

3.3 Model specification

The model specification of the research is informed and in line with existing empirical literature i.e. Ahmed (2017). The model can be expressed as:

$$\gamma_{it} = \mu + \beta \cdot X_{it} + \varepsilon_{it} \dots\dots\dots (3)$$

Whereby γ is GDP per capita, μ is the constant, β is the slope coefficients of the parameters,

X_{it} is the vector consisting of control variables and ε_{it} is the error term. The equation is further modified and becomes:

$$GDPPC_{it} = \mu + GDPPC_{it-1} + PDEBT_{it} + \beta_1 \sum_{i=1}^n \vartheta_{it} + \beta_2 \sum_{i=1}^n \Omega_{it} + U_{it} + \varepsilon_{it} \dots\dots\dots (4)$$

The i and t index represent country and time respectively. U_{it} measures unobserved time fixed effects that control for variations in technologies over time and other country features unaccounted for. The dependent variable is measured by GDPPC which is GDP per capita measuring household income. ϑ is a vector of control variables comprising of:

$$\vartheta = POP_{it}, GCF_{it}, TOP_{it} \dots\dots\dots (5)$$

PDEBT is public debt as a share of GDP and it is the variable of interest which is expected to be negative. POP is population growth, GCF is Gross Capital Formation, TOP is trade openness. Ω is a vector measuring institutional quality from six dimensions such that:

$$\Omega = POL_{it}, VA_{it}, GE_{it}, REG_{it}, RULE_{it}, CORR_{it} \dots\dots\dots (6)$$

Institutional quality is measured by the six governance indicators which include: political stability (POL), voice and accountability (VA), government effectiveness (GE), regulatory quality (REG), rule of law (RULE) and corruption (CORR). Due to the threat of endogeneity, the study makes use of System GMM and Two-Stage Least Squares. Endogeneity occurs as a result of simultaneity or unobserved heterogeneity. Estimations will also be carried out using fixed effects panel estimators. 3.3.1 The priori expectations

The methodology employed influences the expectation of results. As stated by Hussain, et al. (2015), the connection between public debt and economic growth is dependent on the choice of modelling. Authors such as Makate, et al. (2018), Clements, et al. (2003) and Ahmed (2017) and found an adverse tie amid debt and growth. In this current study, it is also anticipated that public debt will affect economic growth negatively.

Gross capital formation serves as a substitute for investment. Investment drives up economic growth hence a positive relation exists between the two. We anticipate that population growth will have a positive impact on economic growth, and this can be justified in terms of human capital development (Makate, et al., 2018). We say this because human capital has a positive

effect on economic growth as it assists in developing the economy by escalating knowledge and skills of individuals in the country. This in turn, leads to increased productivity. Pelinescu (2015) found a positive relationship that is statistically significant between GDP per capita and innovative capacity of human capital. Table 1.1 below shows some of the signs that are expected and defines variables according to the World Bank. It is worth noting that the governance indicators are captured as scores and a high score reflects better governance. All the governance indicators are anticipated to relate positively to economic growth. However, it is probable that corruption will have a harmful relationship with growth, and this is due to factors such as rent seeking, inefficient investments and uncertainty (Murphy, et al., 1991). According to Hanousek and Kochanova (2015), a decrease in corruption can either increase or lower public investment and this is dependent on the country and its institutions.

Table 1.1 Definition of variables, Measurement and Projected Signs

Variable	Definition	Measurement	Expected sign
GDPPC	It measures the economic output of a country and takes into account the midyear population	GDP per capita growth (annual percentage)	
PDEBT	Public Debt is the amount of money owed by government and it comprises of domestic and external debt.	Debt as a percentage of GDP	Negative
GCF	Gross Fixed Capital Formation measures the level of investment. It also measures an increase in fixed capital.	Gross capital formation as a percentage of GDP	Positive
POP	Population Growth is the exponential rate of growth of persons in a particular country.	Population growth (annual percentage)	Positive
GE	Government Effectiveness measures the quality of public services provided by civil agents. It also shows the quality of policy formation and execution	Government effectiveness estimate as given by WGI from the world bank	Positive
CORR	Control of corruption measures the extent to which public power is used for private gains	Control of corruption estimate from WGI	Positive
POL	Political Stability measures the likelihood of a government to be destabilized due to politically motivated viciousness.	WGI Political stability estimate	Positive
RULE	Rule of Law measures the extent to which agents have confidence in and obey the rules of the government.	Rule of law estimate from WGI	Positive
VA	Voice and Accountability measures the ability of citizens to partake in the selection of its government and to freely express themselves	WGI voice and accountability estimate measured annually	Positive
REG	Regulatory quality measures a government's ability to articulate and implement sound policies	WGI regulatory quality estimate measured annually	Positive

3.4 Estimation techniques

3.4.1 Diagnostic Tests

a) Stationarity test

One of the first steps in econometric assessment is to check the unit roots of the series. For the purpose of this study, we employed the LLC and the IPS tests to inspect the non-stationary assumption as well as to guarantee that spurious results and problems of autocorrelation and heteroscedasticity are avoided. Engle (1987), states that when the variables are stationary at level, they are integrated in the order $I(0)$ and if they are stationary at first difference then they are integrated of order $I(1)$.

i. Levin, Lin and Chu (LLC) test

According to Bornhorst and Baum (2001), LLC test is employed to estimate the unit root in a panel dataset. It assumes that every individual unit in the panel shares the same AR (1) coefficient but it also makes room for individual effects, time effects and a time trend. Levin, Lin and Chu (2002) developed a technique using the pooled t-statistic of the estimator to assess the hypothesis that every individual time series holds a unit root against the alternative hypothesis that each time series is stationary.

ii. Im, Pesaran, Shin (IPS) test

According to Barbieri (2009), IPS suggests a simple unit root testing procedure for panels that allows for concurrent stationary and nonstationary series. The test permits for residual serial correlation and heterogeneity of the dynamics and error variance across groups. Moreover, the test considers the average of ADF statistics estimated for each cross-section unit from the panel when an error term is serially correlated, possibly with distinct serial correlation patterns over cross-sectional units (Im, et al., 2003). The assumption is that all individuals follow a unit root process.

b. Heteroskedasticity

An assumption of the classical linear regression models (CLRM) provides that there is equal variance zero mean (Gujarati, 2010). If heteroskedasticity exists in the model, it will violate the assumption and lead to biased conclusions. This study uses the Breusch-Godfrey test and white test to determine if there is heteroskedasticity. The null hypothesis stating that no heteroskedasticity exists will be rejected if the probability value is below than the critical value of 5%.

c. Serial correlation

According to Williams (2015), serial correlation exists when error terms in a time series move from one period to another. The existence of serial correlation in a model would mean that the model is inefficient as the error term of period t is linked to the error term of period $t-1$. The study uses the Bruesch-Godfrey test to determine if serial correlation exists in the model. The null hypothesis will be rejected if the probability of the test statistic is less than the 5% critical value. Serial correlation will not influence the unbiasedness or consistency of estimators but it affects their efficiency.

3.4.2 System Generalized Method-of-Moments (SGMM)

The control variables used for this study may lead to collinearity and as a result, this study will make use of the GMM technique rather than traditional IV technique in order to cater for collinearity and to control endogeneity. The study uses this particular method as first established by Hansen (1982) and Blundell and Bond (1998). GMM is preferred over a simple IV estimator as the GMM estimator is more efficient when heteroskedasticity is present. Another advantage of GMM technique is that it caters for dynamic qualities of data and also accounts for issues relating to reverse causality (Makate, et al., 2018). According to Wooldridge (2001), the method is also suitable for obtaining efficient estimators to account for serial correlation.

3.4.3 Two-Stage Least Squares (2SLS)

It is known that if the independent variable and error term are correlated, it violates one of the assumptions of the regression framework (Oczkowski and Farrell, 1998). Moreover, by making use of the standard OLS technique, the coefficients will be biased and inconsistent (Cameron and Trivedi, 2005) thus we employ the 2SLS technique to combat this issue. For the purpose of this study, we used 2SLS due to the threat of endogeneity. Endogeneity occurs as a result of simultaneity or unobserved heterogeneity. In our case, the source of endogeneity is the simultaneity between annual population growth and GDP per capita given that a country's economic output is divided by its population to obtain GDP per capita. The public debt variable may also pose a threat of endogeneity through reverse causality. Low or negative growth rate of GDP per capita may prompt countries to increase their debt holding. Moreover, endogeneity can arise between GDP per capita and the quality of institutions. Quality institutions are associated with higher growth rates therefore most countries have to develop their institutions in order to realize higher GDP per capita. In some parts of the

world, particularly the Asian continent, higher GDP per capita and economic growth provided the countries the opportunity and financial power to finance the creation of quality institutions. On the other hand, quality institutions may attract higher debt and having higher debt holdings can allow a country to have economic resources to improve or develop quality institutions.

3.4.4 Principal Component Analysis (PCA)

Our study seeks to investigate whether and how institutional quality influences the nexus between public debt and economic growth and institutional quality is measured using six governance indicators. The composite index will be constructed using PCA and this will be consistent with the study carried out by Makate, et.al (2018) in their paper titled “Economic growth and external debt in selected SSA countries”. According to Dharmawardena, et al. (2015), PCA is famously used for variable reduction. The key notion behind PCA is to lower the dimensionality of a given data set which comprises of a great number of interrelated variables and keeping the variation present in the dataset (Jolliffe, 2002).

3.5 Conclusion

This section discussed the methodology and techniques that will be utilized to determine the relation between public debt and economic growth considering the role of institutional quality. The section explained Generalized Method of Moments, Two Stage Least Squares and Principle Component Analysis. We then continued to discuss the diagnostic tests. All the techniques specified in this study will be applied to yearly SADC data to accomplish the objectives of the analysis. The aim of this assessment was to explore the role of institutional quality in the public debt and economic growth relationship which is largely ignored in the SADC region.

CHAPTER FOUR

FINDINGS, CONCLUSION AND RECOMMENDATIONS

4.1 INTRODUCTION

This segment provides a synopsis of the findings and explanations of all the tests undertaken when assessing the relationship between public debt and economic growth, considering the quality of institutions. Several tests were performed and are extensively discussed below. The conclusion and policy recommendations are provided in chapter five.

4.2 FINDINGS

Table 1.2 Summary statistics for selected variables

Variable	Mean	S-Deviation	Min	Max	Obs
GDP per capita growth (%)	2.42	4.30	-18.49	23.05	300
Public Debt (% of GDP)	62.48	50.73	6.44	262.84	297
Gross capital fixed formation (% of GDP)	22.80	9.53	1.53	55.36	271
Annual population growth (%)	1.96	1.09	-2.63	3.71	300
Trade openness (% of GDP)	86.96	39.33	23.98	225.02	285
Private sector credit	28.66	35.32	0.49	160.12	293
Gross domestic savings (% of GDP)	15.27	15.13	-38.11	57.32	269
Corruption	-0.29	0.70	-1.72	1.22	300
Government effectiveness	-0.38	0.69	-1.88	1.05	300
Political stability	-0.09	0.90	-2.84	1.28	300
Regulatory quality	-0.42	0.73	-2.30	1.13	300
Rule of Law	-0.36	0.76	-2.13	1.08	300
Voice and accountability	-0.28	0.76	-1.73	1.01	300

GDP per capita growth holds an average of 2.43 and a standard deviation of 4.30 while trade openness has the highest average of 86.96 followed by public debt (62.42). Whereas public debt has the highest standard deviation of 50.73 which shows that the spread out from the mean. GDP per capita growth, annual population growth and the governance indicators have low standard deviations, and this implies that the data points are close to the mean.

The pairwise correlation test is provided in table 1.3. The correlation test helps in determining and understanding the correlation between a dependent variable and the explanatory variables. From the test, we can tell that there is a weak correlation between GDP per capita and all the independent variables. Public debt is negatively correlated with GDP per capita and significant at 1%. We observe that the governance indicators are negatively correlated with public debt. This supports the notion by Osabuohien and Efobi (2011) that poor institutional quality affects economic growth in African states. Countries with poor institutions suffer due to borrowing (Ahmed, 2017). Gross capital formation, which is also significant at 1%, is positively and weakly correlated with per capita growth and influence growth more than all the other variables. Trade openness is also highly and negatively correlated to annual population growth.

To solve multicollinearity, the study employed two stage least squares.

Table 1.3: Pearson's Correlation Test

	GDPP	PDEBT	GCF	POP	TOP	CORR	GE	POL	REG	RULE	VA
GDPP	1.00										
PDEBT	-0.21***	1.00									
GCF	0.26***	-0.20***	1.00								
POP	0.03	0.12**	0.11*	1.00							
TOP	0.08	-0.08	0.37***	-0.50***	1.00						
CORR	0.12**	-0.29***	0.37***	-0.47***	0.39***	1.00					
GE	0.13**	-0.24***	0.32***	-0.47***	0.29***	0.92***	1.00				
POL	0.21***	-0.24***	0.44***	-0.33***	0.40***	0.81***	0.78***	1.00			
REG	0.17***	-0.31***	0.35***	-0.28***	0.14*	0.86***	0.89***	0.76***	1.00		
RULE	0.13**	-0.20***	0.36***	-0.40***	0.29***	0.90***	0.92***	0.86***	0.91***	1.00	
VA	0.15***	-0.16***	0.37***	-0.26***	0.12*	0.83***	0.89***	0.77***	0.86***	0.90***	1.00
GDPP – GDP per capita PDEBT – Public debt GCF – Capital formation POP – Population growth TOP – Trade openness CORR – Corruption GE – Government effectiveness POL – Political stability REG – Regulatory quality RULE – Rule of law VA – Voice and accountability											

Asterisks *, **, *** symbolize significance at the 10%, 5% and 1% significance level respectively.

Our findings stand consistent with the outcomes revealed by Abdullahi, et al. (2019). Public debt variable has shown a negative correlation with economic growth. Moreover, our findings show lack of high correlation amongst the explanatory variables (correlation between the explanatory variables and GDP per capita growth is lower than 0.50). However, the governance indicators are highly correlated thus we ran auxiliary models with each indicator separately but in some circumstances we used the composite index (i.e. when running the pooled OLS, serial correlation and heteroskedasticity test). Spearman correlation test is included in the appendices (see table A3).

Table 1.4 Pooled Ordinary Least Squares Regression Test

Dependent variable: GDPP			
	Coefficient	p-value	S.E
PDEBT	-0.0175***	0.004	0.0061
GCF	0.0814**	0.024	0.0360
POP	0.2803	0.402	0.3346
TOP	0.0064	0.458	0.0087
Institutions	0.1564	0.264	0.1401
R-squared	11.57		
PDEBT - Public debt		Institutions – Score of components	
GCF - Capital formation			
POP - Population growth			
TOP - Trade openness			

Asterisks *, **, *** represent significance at 10%, 5% and 1% respectively.

Table 1.4 shows the regression output with per capita growth as the dependent variable. The variable of interest, public debt, has a weak adverse relationship with GDP and it is statistically significant at 1% significance level. This implies that as public debt rises, per capita growth declines and this corresponds with the conclusion found by Ahmed (2017). Population growth is positively associated to GDPP although it is not significant. In addition, gross capital formation which represents investment has a positive relationship with per capita growth, with significance level being at 5%. Trade openness also reflects a positive correlation with per capita growth, but it is not significant. Similarly, the governance

indicators presented using a score of components have a positive relationship with GDP per capita although not significant. The R squared has a low value of 11.57.

The main regression output for analyzing the relationship between public debt and economic growth is provided in table 1.5. As mentioned earlier, the governance indicators are highly correlated therefore we ran the models with each indicator separate. Out of the six indicators, only three have significant results and they are presented in table 1.5 below. The indicators include political stability, regulatory quality and voice and accountability. Columns (1)-(6) represent the model where the governance indicator used is political stability, columns (7)-(12) include regulatory quality and columns (13)-(18) include voice and accountability. We utilized three techniques which include the pooled OLS (POLS), two-stage least squares (2SLS) and SGMM. The coefficients are presented together with the corresponding standard errors.

Political stability – columns (1) to (6)

The POLS model reveals a negative relation between public debt and economic growth. This implies that when public debt increases by 1%, GDP per capita will fall by approximately 1.3%. In our preferred model, SGMM shows an adverse relationship between debt and growth whereby economic growth falls by 1.4% when debt rises by 1%. On the contrary, 2SLS reveals a positive relationship between debt and economic growth and carries an R-squared of 34.3. Political stability has a positive relationship with GDP in all the models and is statistically significant at 10% in POLS and 2SLS models.

Regulatory quality – columns (7) to (12)

From the pooled OLS model, public debt is weakly and negatively related to economic growth, although not significant. On the other hand, although insignificant, 2SLS and SGMM reveal a positive relationship between debt and growth. Regulatory quality is positively related to GDP per capita and significant in all three models.

Voice and accountability – columns (13) to (18)

The pooled OLS and our preferred model, SGMM show that public debt and economic growth have an adverse relationship although the results are not significant. SGMM shows that a 1% increase in public debt will result in a fall in GDP by approximately 3%. 2SLS

reveals a positive relationship between debt and growth and carries an R-squared value of 33.5.

Overall, in all the models used, the relationship between public debt and economic growth yields insignificant results. Our preferred model SGMM shows a negative relationship between debt and growth when utilizing political stability and, voice and accountability. The different models that have been used yield different results (changing signs) due to some missing variables and the instrumental variables used. The rest of the indicators (corruption, government effectiveness and rule of law) are presented in the appendices although they are insignificant (see table A4).

Our results correspond with those found by Bonga, et al. (2015) in Zimbabwe using OLS model for the period 1980-2013. They established that public debt negatively affects economic growth in Zimbabwe. Our study is closely related to a study done by Makate, et al. (2018) using 40 SSA countries. The authors made use of fixed effects; two stage least squares and GMM models. Their findings revealed a negative relationship between external debt and growth. From our analysis, we can conclude by saying that public debt has minimal or no effect on economic growth in the SADC region.

Table 1:5 Public debt and economic growth regression for the period 1996-2015

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
VARIABLES	POLS	se	IV/2SLS	Se	System GMM	Se	POLS	se	IV/2SLS	se	System GMM	se	POLS	se	IV/2SLS	se	System GMM	se
GDPP = L,	0.2077	(0.143)	0.2102	(0.133)	0.1906*	(0.113)	0.2029*	(0.120)	0.2110*	(0.122)	0.2000	(0.126)	0.2113	(0.136)	0.2114	(0.133)	0.2218*	(0.133)
PDEBT	-0.0126	(0.019)	0.0336	(0.057)	-0.0143	(0.048)	-0.0013	(0.018)	0.0496	(0.047)	0.0037	(0.060)	-0.0082	(0.019)	0.0504	(0.049)	-0.0340	(0.073)
GCF	0.0709	(0.045)	0.0690	(0.057)	0.1284	(0.096)	0.0367	(0.046)	0.0567	(0.055)	0.1110	(0.099)	0.0593	(0.049)	0.0666	(0.060)	0.1625	(0.108)
POP	0.2022	(1.070)	-0.0845	(0.774)	-0.9652	(0.769)	0.5171	(1.233)	0.1678	(0.884)	-0.7583	(0.931)	0.2244	(1.078)	0.0287	(0.822)	-0.8348	(0.853)
TOP	-0.0127	(0.025)	-0.0058	(0.016)	-0.0220	(0.065)	-0.0228	(0.030)	-0.0029	(0.019)	-0.0377	(0.076)	-0.0267	(0.024)	-0.0021	(0.018)	-0.0565	(0.070)
POL	2.8646*	(1.629)	2.2977*	(1.180)	3.8514	(2.907)												
REG							3.4248***	(1.082)	2.4503**	(1.080)	5.6644**	(2.886)						
VA													3.7930**	(1.876)	2.6422*	(1.357)	9.1998***	(2.319)
Constant	1.2184	(4.396)	-1.7173	(3.435)	0.0000	(0.000)			-2.0186	(3.929)	0.0000	(0.000)			-2.1082	(3.484)	0.0000	(0.000)
Observations	197		193		197		197		193		197		197		193		197	
Number of ID	11				11		11				11		11				11	
j					60						60						60	
arlp					.						.						.	
ar2p					0.715						0.703						0.895	
hansep					.						.						.	
R-squared			0.343						0.336						0.335			

Note: Asterisks *, **, *** denote significance at 10%, 5% and 1% respectively. Reported are regression coefficient estimates and standard errors in parentheses. The standard errors are robust and adjusted for finite sample bias including clustering by country. All the regressions include year and country fixed effects.

We continue by testing for cross sectional dependence. The concept of intra-borrowing serves as the main reason behind this test and it also raises much interest as it may lead to complexities in the debt situation the region. The Intra-SADC debt is mostly triggered by the global economic downturn and this is a way of them assisting each other financially in times of need (AFRODAD, 2014). The SADC countries have a history of borrowing from each other and evidence shows that many of them borrow from South Africa (AFRODAD, 2014). The Development Bank of Southern Africa (henceforth DBSA) has been providing loans to the SADC regions and South Africa is the only shareholder in the bank. Countries such as Congo, Lesotho, Mozambique and Zambia have received loans from the DBSA in pursuit of their developmental projects. In 2007, the Reserve Bank of Malawi gave Zimbabwe a loan worth US\$100 million for Zimbabwe to buy maize. Zimbabwe managed to pay back 76 million and the rest was repaid in the form of fuel (AFRODAD, 2014). Botswana also extended a loan to Malawi in 2013 to boost their health and agricultural sector. If cross-sectional dependence is found to be present, Driscoll and Kraay standard errors should be used. For the purpose of our study, we used the Pesaran test for cross sectional dependence test and the assumption is that there is no correlation among residuals.

Table 1.6 Cross-Sectional Dependence

A: Pesaran abs test			
Pesaran's test for cross sectional independence = 4.863, Pr = 0.0000			
Average absolute value of the off-diagonal elements = 0.258			
B: Driscoll-Kraay standard errors			
GDPP	Coefficient	S.E	P-value
PDEBT	-0.027	0.007	0.001
GCF	0.050	0.045	0.280
POP	0.355	0.516	0.500
TOP	-0.005	0.016	0.766
Institutions	1.068	0.661	0.123
Observations	268		
Within R-squared	8.80		

From the Pesaran test, we found that cross sectional dependence exists between the SADC countries given that the Pr value is less than 0.05 and significant at 1%. We continued by using the Driscoll-Kraay standard errors test as suggested by Torres-Reyna (2007). We found that public debt (% of GDP) has an adverse relationship with GDP per capita growth, and it is significant at 1% significance level. Trade openness also has a harmful relation with growth although it is not significant. Gross capital formation, population growth and institutions are positively associated with per capita growth however, we did not find any significant relationship between the variables. Maximum lag of 2 was used.

Public Debt Threshold and Analysis

One of the primary objectives of this study was to enumerate a threshold at which public debt (% of GDP) begins to have detrimental effects on growth. Following Reinhart and Rogoff (2010), we categorized the public debt variable into four groups. We look at public debt as a share of GDP “below 30%”, “30-59%”, “60-89%” and “90% and above”. It is noteworthy that these thresholds may not hold in developing countries in the SADC region. The use of the categories is entirely for the interest of how these thresholds may affect economic growth. To determine the threshold equation, we expand equation (4) from chapter three:

$$\frac{\partial GDPP}{\partial (PDEBT)_{it}} = \frac{\partial (\mu + GDPPC_{it-1} + \varphi(PDEBT)_{it} + \partial PDEBT_{it}^2 + \beta_1 \sum_{i=1}^n \vartheta_{it} + \beta_2 \sum_{i=1}^n \Omega_{it} + U_{it} + \varepsilon_{it})}{\partial ((PDEBT)_{it})} \quad ..(7)$$

$$0 = \varphi + 2\partial(PDEBT)_{it} \varphi \leftrightarrow PDEBT_{it} = \frac{-\varphi}{2\partial} \quad \dots\dots\dots (8)$$

Equation (8) gives us the public debt threshold. Table 1.9 presents the public debt threshold by means of the random effects GLS estimates and the outcomes investigating the potential non-linear association are shown in table 1.9.

Table 1.7 Public Debt Threshold

Dependent Variable: GDP per capita										
	(1) GDPP		(2) GDPP		(3) GDPP		(4) GDPP		(5) GDPP	
L.GDPP	0.340*	(0.117)	0.334*	(0.127)	0.337*	(0.113)	0.333*	(0.117)	0.329*	(0.109)
PDEBT	0.009	(0.010)	0.012	(0.011)	0.006	(0.011)	0.009	(0.010)	0.008	(0.010)
pdebt_sq	-0.000*	(0.000)	-0.000*	(0.000)	-0.000	(0.000)	-0.000	(0.000)	-0.000	(0.000)
TOP			0.026	(0.030)						
top_sq			-0.000	(0.000)						
POP					-0.490	(0.566)				
POP_sq					0.178	(0.127)				
GE							0.214	(0.476)		
GE_sq							-0.081	(0.332)		
CORR									0.031	(0.360)
CORR_sq									-0.433	(0.265)
PDEBT threshold	63.56		71.68		48.79		64.53		63.3	
Obs	267		256		267		267		267	
Number of countries	15			15			15		15	
R-squared	0.211		0.210		0.214		0.210		0.212	

The aim is to determine a possible range of the public debt threshold using a sample of 15 countries. In detail, column (1) presents estimates in which we only control for the initial GDP per capita growth, public debt, public debt squared, and year fixed effects. The results reveal that public debt (% of GDP) begins to hinder growth at a threshold of 63.56% and statistically significant at the 10%. Furthermore, in column (2) we included trade openness and the square of the trade openness variable along with the variables controlled in column (1) and the results shows that the threshold changes to nearly 71.68%. Similarly, we add annual population growth and its square variable in column (3) and find that the threshold falls to nearly 48.79%. following a similar pattern, we add government effectiveness and its square value in column (4) and corruption and its square value in column (5). We find that the threshold moves to nearly 64.63% and 63.3% respectively. Initial per capita growth appears to be significant in all the columns. We conclude by stating that our threshold at which public debt deteriorates economic growth ranges from 48.79 to 71.68 percent. Our conclusion in terms of the threshold should be viewed as a guide to countries in the SADC region included in this analysis and not as country specific turning points. The value of the public debt threshold seems to be dependent on the model specification. Our threshold results depend on the mixture of countries that are used in the sample and hence our threshold ranges between 48.79 to 71.68% while the set threshold for SADC countries is 60%. This may also explain why some countries are still doing well regardless of their public debt ratio being above 60%.

The main idea behind our study was to explore the public debt and economic growth nexus, considering the role of institutions. We wanted to investigate whether institutional quality influences the relationship. To achieve this, we evaluate an interaction term. For the purpose of our study, we only conduct and present the interaction concerning two variables that are of interest, that is public debt (PDEBT) and institutional quality (Institutions).

Table 1.8: Public debt and institutions interaction

GDPP	Coefficient	Standard error	P value
PDEBT	-0.0150	0.0067	0.024
GCF	0.0770	0.0364	0.034
POP	0.2747	0.3422	0.422
TOP	0.0037	0.0091	0.671
Institutions	0.0037	0.1890	0.984
c.PDEBT#c.Institutions	0.0029	0.0021	0.172
R-sq	0.12		
Number of observations	268		

Public debt maintains a negative association with economic growth, and it is significant at 5% level given the two-tailed p-value of 0.024. If public debt increase by 1% then economic growth will decline by approximately 1.5%. Our institutions (from score of components) have a positive association with growth although it is not significant. When we interact institutions and public debt, we get a positive value of 0.0029, and this implies that institutions influence public debt positively.

All the governance indicators have a positive impact when interacted with public debt although not significant (see Tables A5-A9). However, regulatory quality has higher impact on the use and effectiveness of public debt. Table 1.9 presents the regulatory quality and debt interaction, and it reveals a positive value of 0.0122 that is significant at 10%. This entails that when the government formulates and executes sound policies, they can reap the benefits of borrowing and boost economic growth. According to Jalilian, et al. (2006), regulatory quality matters for economic growth from using two perspectives, the standard of regulation and regulation efficiency. Regulatory quality and economic performance have a robust connection.

Table 1.9 Regulatory quality and debt interaction

GDPP	Coefficient	Standard error	P value
PDEBT	-00061	0.0088	0.486
GCF	0.0775	0.0355	0.029
POP	0.2589	0.3267	0.428
TOP	0.0065	0.0089	0.466
REG	-0.1234	0.5720	0.829
c.PDEBT#c.REG	0.0122	0.0072	0.088
R-sq	0.1277		
Number of observations	268		

Mechanisms through which public debt impacts economic growth

One of the objectives of our analysis is to determine the probable routes through which public debt might affect economic growth. For the purpose of this study, we consider three channels which include (i) private investment (proxied by gross capital formation), (ii) private sector credit, (iii) domestic savings. We focus on only two governance indicators which were used by authors such as Ahmed (2017). In the second model, we found that there is a negative relationship between private sector credit and public debt. We also found a negative link between population growth and private sector credit, but it is not significant. Similarly, we found an adverse relation amongst public debt and private investment, and public debt and gross domestic savings in the second and third models. The all dependent variables have an inverse relationship with public debt. In the second model, trade openness maintains a positive relationship with private investment. All the channels tested were insignificant.

Table 1.10 Mechanisms through which public debt might influences economic growth

	Private sector credit		Investment		Domestic savings	
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Public Debt	-0.0007	(0.0361)	-0.0173	(0.0174)	-0.0173	(0.0121)
Population growth	-1.6740	(1.8989)	0.9044	(0.6135)	0.7956***	(0.4150)
Trade openness	0.0021	(0.0137)	0.0506*	(0.0293)	-0.0047	(0.0145)
Corruption	1.4322	(2.4480)	1.8096	(2.2485)	1.9472	(2.5761)
Government effectiveness	2.1040	(3.8262)	2.4325	(3.2924)	2.3107	(3.4548)
Observations	208		215		212	
R-squared	0.9695		0.7991		0.9098	
Number of groups	12		12		12	

Note: *, **, *** represent significance at 10%, 5% and 1% respectively. Reported in table 1.12 are the regression coefficient estimates and standard errors in parentheses. The dependent variables are presented as column headers.

We were unable to find any statistically significant relation concerning public debt and the chosen channels and therefore recommend that further examination should be undertaken to uncover other potential ways that public debt might follow and impede economic growth. The SADC zone should consider designing policies that will focus on yielding great investment returns in the future for them to enjoy the benefits of borrowing. Debt service costs may affect the future generation and countries should design policies that will lower borrowing so that the money that would have been used to pay interest can be shifted to fruitful projects and improve service delivery.

4.3 Conclusion

We made use of the pooled OLS, 2SLS and SGMM models and tested the governance indicators individually due to high correlation. We found that political stability, regulatory quality and voice and accountability have a positive relationship with GDP per capita and are statistically significant. Pooled OLS reveals an adverse relation between public debt and

economic growth in all the three models although not significant. SGMM also revealed an adverse relationship between debt and growth when utilizing political stability and voice and accountability. Our models yield conflicting results, and this may be due to missing variables and the instrumental variables used. Our findings show that public debt has minimal or no consequence on public debt in the SADC region. Individual sets of institutions including corruption, government effectiveness and rule of law should be improved to eliminate the negative effects that public debt has on economic growth and improve the rate of growth. Quality institutions are highly associated with an increase in economic growth and lower public debt accumulation. Our findings revealed an adverse relation between public debt and economic growth which brings the risk of debt overhang and crowding out effects to the fore. This is in line with the chosen theoretical framework, neoclassical growth theory which argues that the accumulation of national debt generates crowding out effects in the shorter term as the future generations bear the tax burden.

One of the main objectives of this study is to determine whether institutional quality plays a role in the debt-growth relationship. When we interact our institutions with public debt, we get a positive value of 0.0029 although it is not statistically significant. We also established that cross sectional dependence exists between the SADC countries and the result was significant at 1% significance level. The SADC region should have stringent policies aimed at reducing factors that might bring about additional negative effects on economic growth and improve their institutions.

CHAPTER FIVE

CONCLUSION AND POLICY RECOMMENDATIONS

5.1 Conclusion and policy recommendations

The goal of this study was to examine the relationship between public debt (% of GDP) and economic growth (proxied by GDP per capita growth) considering the role of quality institutions. This study was conducted using 15 SADC countries for the period 1996-2015 and this was influenced and restricted by the lack of reliable public debt data and missing observations in most countries. Our preferred regression model was the SGMM model. The POLS regression model was found to be more favourable relative to the random effects model. Both the SGMM and 2SLS models revealed an adverse relationship between public debt and economic growth although the public debt estimates are statistically insignificant. GDP per capita was found to be significant at 10% level in SGMM and not significant in 2SLS. Our focus was to ascertain if institutional quality matters in the debt and growth relation. To achieve this, we used an interaction term and found that good quality institutions impact positively on growth. We made use of the PCA to construct an index for institutional quality and found that institutions have a favourable influence on economic growth although it is insignificant. Specifically, if institutional quality improves by 1% then economic growth will rise by approximately 0.29%. Considering the governance indicators individually, we found that corruption, government effectiveness and rule of law have an influence on the undesirable influence that public debt displays on economic growth in the SADC region. To exploit the benefits of borrowing, policymakers need to make an effort in improving and maintaining institutional quality and as a result, they will have proper collection and use of public debt which will bring about long-term economic gains and boost their economies.

The second objective of our study was to enumerate a debt threshold for the region. We found that the threshold ranges from 48 to 72 percent. We also established that the countries in question depend on each other in terms of financial assistance hence the concept intra-borrowing. We know that there are countries that have exceeded their set debt threshold, but the economy continues to thrive. This is possible if there are quality institutions and lower corruption, and the countries borrow to finance projects that will yield revenue for them in the future, create jobs for citizens and also have better service delivery. The third intention of our research was to determine plausible mechanisms in which public debt impacts economic growth. We considered credit to the private sector, private investment (substituted by gross

capital formation) and gross domestic savings. The three revealed a negative association with public debt but we failed to find a significant channel. This provides eagerness for further research by considering other possible channels. We realized that countries with quality institutions manage public debt and perform better than those with poor institutions and conclude by saying that need to strengthen their institutions in order to have sustainable growth and development. Lastly, we need to improve institutions in the SADC region to ensure that we have a decline in debt accumulation and higher growth rates.

For future research, we recommend that other probable mechanisms through which debt influences growth should be examined and the long-run relationship should be examined to comprehend the link between institutions, government debt and economic growth. In addition, we need to determine the forms and uses of debt and find out who are the players involved in the use of debt. Moreover, there is need to determine significant channels that must be used in order for public debt to work efficiently.

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APPENDICES

Table A1: List of SADC countries used in the study

Angola	Madagascar	Seychelles
Botswana	Malawi	South Africa
Democratic Republic of Congo	Mauritius	Tanzania
Eswatini	Mozambique	Zambia
Lesotho	Namibia	Zimbabwe

Table A2: Normality Test

Model	Observations	Chi-squared statistic	Probability
OLS	244	29.66	0.0000
2SLS	257	34.26	0.0000
SGMM	257	34.26	0.0000

Table A3: Spearman Correlation Test

	GDPP	PDEBT	GCF	POP	TOP	CORR	GE	POL	REG	RULE	VA
GDPP	1.00										
PDEBT	-0.17***	1.00									
GCF	0.30***	-0.19***	1.00								
POP	-0.00	0.12**	0.12*	1.00							
TOP	0.16***	-0.22***	0.40***	-0.44***	1.00						
CORR	0.12**	-0.30***	0.37***	-0.50***	0.43***	1.00					
GE	0.15**	-0.13**	0.32***	-0.48***	0.25***	0.91***	1.00				
POL	0.23***	-0.18***	0.47***	-0.32***	0.49***	0.78***	0.73***	1.00			
REG	0.17***	-0.31***	0.32***	-0.34***	0.16***	0.83***	0.87***	0.67***	1.00		
RULE	0.14**	-0.16*	0.35***	-0.42***	0.31***	0.88***	0.92***	0.81***	0.84***	1.00	
VA	0.16**	-0.10	0.36***	-0.32***	0.22*	0.83***	0.91***	0.76***	0.84***	0.91***	1.00
GDPP – GDP per capita PDEBT- Public debt GCF – Capital formation POP – Population growth TOP – Trade openness CORR – Corruption GE – Government effectiveness POL – Political stability REG – Regulatory quality RULE – Rule of law VA – Voice and accountability											

Asterisks *, **, *** denote rejection at the 10%, 5% and 1% significance level respectively

Table A4: Public debt and economic growth regressions 1996-2015

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
VARIABLES	POLS	se	IV/2SLS	se	SGMM	se	POLS	se	IV/2SLS	se	SGMM	se	POLS	se	IV/2SLS	se	SGMM	se
GDPP	0.2346*	(0.132)	0.2222*	(0.132)	0.2059*	(0.124)	0.2273	(0.140)	0.2273*	(0.136)	0.2009**	(0.091)	0.2112	(0.140)	0.2161	(0.140)	0.2079*	(0.116)
PDEBT	-0.0103	(0.019)	0.0506	(0.049)	-0.0081	(0.054)	-	(0.017)	0.0462	(0.046)	-0.0008	(0.033)	-0.0068	(0.018)	0.0519	(0.052)	-0.0292	(0.063)
							0.0080											
GCF	0.0740	(0.060)	0.0756	(0.067)	0.1168	(0.102)	0.0647	(0.060)	0.0704	(0.066)	0.1185	(0.109)	0.0603	(0.049)	0.0680	(0.062)	0.0860	(0.140)
POP	0.4789	(1.286)	0.1461	(0.878)	-0.8853	(0.892)	0.4542	(1.304)	0.1381	(0.893)	-0.7857	(0.725)	0.3655	(1.230)	0.0932	(0.892)	-0.8651	(0.812)
TOP	-0.0163	(0.028)	-0.0026	(0.019)	-0.0263	(0.069)	-	(0.027)	-0.0028	(0.020)	-0.0291	(0.052)	-0.0169	(0.027)	0.0003	(0.022)	-0.0351	(0.066)
							0.0188											
CORR	-0.4702	(1.763)	-1.5114	(1.400)	5.1310	(4.316)												
GE							1.0243	(2.187)	-1.4720	(2.094)	3.4191	(5.431)						
RULE													2.8506	(1.920)	1.0228	(2.062)	6.4177	(6.054)
Constant			0.9202	(3.103)	0.0000	(0.000)			0.5355	(2.774)	0.0000	(0.000)	2.7655	(4.679)	-1.4948	(3.096)	0.0000	(0.000)
Obs	197		193		197		197		193		197		197		193		197	
Number of ID	11				11		11				11		11				11	
j					60						60						60	
arlp					.						.						.	
ar2p					0.693						0.736						0.666	

hansep					.						.						.	
R-squared			0.328						0.328						0.328			

Asterisks *, **, *** denote rejection at the 10%, 5% and 1% significance level respectively

Table A5: Corruption and public debt interaction

GDPP	Coefficient	Standard error	P value
PDEBT	-0.0140	0.0073	0.053
GCF	0.0901	0.0357	0.012
POP	0.1614	0.3411	0.636
TOP	0.0031	0.0089	0.728
CORR	-0.3176	0.5900	0.590
c.PDEBT#c.CORR	0.0087	0.0074	0.245
R-sq	0.1169		
Number of observations	268		

Table A6: Government effectiveness and debt interaction

GDPP	Coefficient	Standard error	P value
PDEBT	-0.0108	0.0081	0.180
GCF	0.0827	0.0361	0.022
POP	0.2280	0.3565	0.522
TOP	0.0032	0.0092	0.731
GE	-0.2995	0.6400	0.640
c.PDEBT#c.GE	0.0115	0.0076	0.131
R-sq	0.1261		
Number of observations	268		

Table A7: Rule of law and debt interaction

GDPP	Coefficient	Standard error	P value
PDEBT	-0.0137	0.0076	0.073
GCF	0.0815	0.0359	0.023
POP	0.2476	0.3409	0.468
TOP	0.0041	0.0091	0.655
RULE	0.0201	0.5879	0.973
c.PDEBT#c.RULE	0.0072	0.0067	0.283
R-sq	0.1198		
Number of observations	268		

Table A8: Voice and accountability and debt interaction

GDPP	Coefficient	Standard error	P value
PDEBT	-0.0127	0.0077	0.100
GCF	0.0763	0.0365	0.036
POP	0.2689	0.3313	0.417
TOP	0.0046	0.0093	0.624
VA	0.0218	0.5625	0.969
c.PDEBT#c.VA	0.0103	0.0075	0.170
R-sq	0.1248		
Number of observations	268		

Table A9: Political stability and debt interaction

GDPP	Coefficient	Standard error	P value
PDEBT	-0.0153	0.0066	0.021
GCF	0.0710	0.0356	0.046
POP	0.2825	0.3239	0.383
TOP	0.0021	0.0090	0.821
POL	0.3740	0.5014	0.456
c.PDEBT#c.POL	0.0047	0.0044	0.293
R-sq	0.1261		
Number of observations	268		

Table A10: Missing Variables Summary

Variable	Obs=.	Obs>.	Obs<.	Unique Values	Min	Max
PDEBT	3		297	297	6.440054	262.843
GCF	29		271	270	1.525177	55.36271
TOP	15		285	285	23.98087	225.0231

