2020

Impact of Kenya's Public Debt on Economic Stability

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2020

Abstract

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MBA, University of Nairobi, 2008

BSc, University of Nairobi, 1990

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Policy

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June 2020

Abstract

Kenya's public debt has grown rapidly, precipitating debate on its impact on economic performance and causing public anxiety. The purpose of this quantitative ex post facto study was to investigate the long run and causal relationship between Kenya's public debt and economic growth. Keynesian theory, Ricardian equivalence theory, and neoclassical theory provided the framework for the study. Research Questions 1 and 2 addressed the causal relationship between public debt and select covariates as independent variables and real gross domestic product (GDP) growth rate as the dependent variable. Research Question 3 addressed the relationship between primary budget balance and public debt. Archival data were analyzed using the vector error correction model and autoregressive distributed lag methods. Findings showed a positive long-run causality between public debt and real GDP growth. The relationship between primary budget balance and public debt was positive and statistically significant, demonstrating that Kenya's debt is sustainable. Findings may be used to promote adoption of fiscal policies that increase economic growth, savings, investments, job creation, and living standards of Kenyans.

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Dedication

I dedicate this work to my wife, Margaret, and my children, Andrew, Gideon, and Maryclaire, for their steadfast support and for believing that my academic enterprise was worthwhile and deserved their support.

Acknowledgments

My Walden University journey has been fulfilling and challenging in equal measures. I thank God for sustaining me throughout this scholarly journey. I am grateful to all the faculty members who facilitated the different courses in my program for their contribution in building my skills and knowledge. My family has been outstanding throughout this period, offering their support and encouragement and bearing with my long hours of seclusion as I worked on my assignments and dissertation. I would also like to acknowledge my mother, Mary Gathoni, whose life of hard work and dedication to family has been a great source of inspiration to me. Dr. Abednego Kiwia, a work colleague and an alumnus of Walden University, introduced me to the program and encouraged me to enroll. Together with Dr. Sylvester Kisonzo, another Walden alumnus and work colleague, they encouraged me along the way, and I am truly grateful to them.

Finally, I want to acknowledge and sincerely thank my committee for their invaluable assistance and guidance. My chairperson, Dr. Ernesto Escobedo, the committee member Chizoba "Dr. Zee" Madueke, and the university research reviewer, Dr. Kathleen Schulin, contributed immensely to the improvement of my dissertation and helped me to sharpen my scholarly writing skills. I am sincerely and forever grateful for their supervisory support.

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Chapter 1: Introduction to the Study

There has been ongoing debate in the media and political platforms about Kenyan's growing public debt and its impact on Kenya's economy (Ndii, 2017; Ngugi, 2018; Ochieng, 2018). Although the government has defended borrowing as beneficial and necessary in covering infrastructure gaps and spurring economic growth, the opponents of borrowing have argued that public debt trajectory is unsustainable and deleterious to economic growth (Ndii, 2017; Mwere, 2018). There is a relationship between economic development and public debt because the choice of public financing impacts incentives, resource use, and production possibilities (Owusu-Nantwi & Erickson, 2016). Hyman (2014) defined *public finance* as "the field of economics that studies government activities and the alternative means of funding government expenditures" (p. 7).

Studies on the relationship between public debt and economic growth have produced mixed results indicating that the relationship is contingent on debt dynamics that differ from one country to another. Examples of variables that drive debt dynamics include primary budget balance, interest payment, and gross domestic product (GDP) growth rate (Megersa & Cassimon, 2015). Some studies have shown a positive relationship between public debt and economic growth (Duran, 2017; Owusu-Nantwi & Erickson, 2016; Wibowo, 2017). Others such as Topal (2014) have found that the relationship between public debt and economic growth depends on a country's debt ratio. In a study that focused on 12 Eurozone economies, Topal found a positive relationship between public debt and economic growth when the debt ratio was below 71.66%, but

negative when the ratio was higher than 71.66%. The divergent results indicated that public debt dynamics differ across countries, and the relationship between public debt and macroeconomic performance for a country is a question for empirical determination rather than a priori established rule.

This study has five chapters. The first chapter includes the introduction, background, problem statement, and purpose. It also includes the research questions, hypotheses, significance of the study, and implications for social change. In Chapter 2, there is the literature review providing an examination of previous studies on the subject of public debt and economic growth and their findings, and a description of the econometric and research methods that other researchers have used. Chapter 2 also addresses common terms in public debt research and provides definitions for those terminologies. Chapter 3 presents the design of the study, sources of data, and data analysis methods. Chapter 4 presents the results of the analyses, and Chapter 5 presents the discussions, conclusions, and recommendations.

Background

Kenya's debt grew from Sh1.89 trillion in 2013 to nearly sh5.04 trillion in 2018 (Munda, 2018). The increase in debt has seen Kenya commit more than half of its tax revenue to pay loans, leaving minimal funds for paying for developmental needs (Munda, 2018). Kodongo (2018) suggested that Kenya would spend sh870.5 billion on debt repayment in 2018 against the projected revenues of sh1.76 trillion. Kenya's debt as a percent of GDP rose from 42.8% in 2008 to 57.1% in 2017 (Central Bank of Kenya [CBK], 2018). The 2017 debt-to-GDP ratio of 57.1% is was higher than the International

Monetary Fund (IMF) recommended threshold of 40% (Kodongo, 2018). Munda asserted that increased government spending is not matched by economic growth, thereby raising the prospects for debt rising to unsustainable levels. As Figure 1 demonstrates, Kenya's debt has grown rapidly since 2012, and it is still increasing.

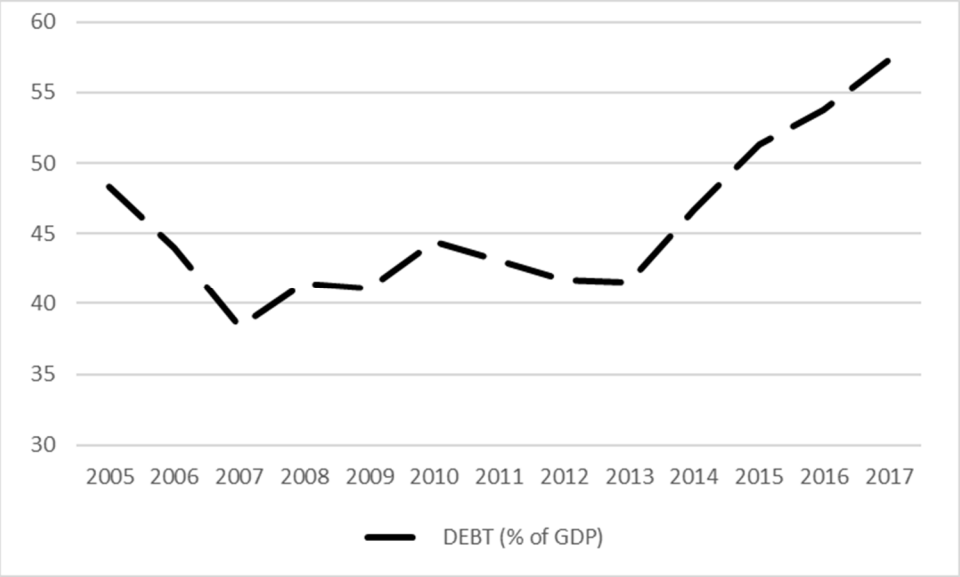

Figure 1. Trend of Kenya's debt burden, 2008-2017.

Although Kenya's public debt has grown rapidly in recent years, its impact on macroeconomic stability has not been empirically established. In the literature, there is no consensus among economists regarding whether public debt has positive or negative impacts on macroeconomic stability (Rahman, Ismail, & Ridzuan, 2019; Renjith & Shanmugam, 2018). Three main theoretical frameworks for trying to understand the relationship between borrowing and economic growth are the Ricardian equivalence theorem, the Keynesian theorem, and the neoclassical theorem (Lwanga & Mawejje, 2014; Renjith & Shanmugam, 2018). The Ricardian equivalence theorem predicts a neutral relationship and posits that debt's only purpose is to smoothen expenditure or

revenue shocks. The Keynesian theorem asserts that public debt can enhance aggregate demand and drive economic growth. The central tenet of the Keynesian view is that an increase in autonomous government spending made possible through borrowing will drive economic growth through the multiplier process (Renjith & Shanmugam). Neoclassical theory predicts a negative relationship between debt and economic growth because debt results in a reduction in government saving or an increase in government dissaving, which distorts the natural rate of growth (Renjith & Shanmugam).

The relationship between public debt and economic growth has been studied in many countries with different econometric models. Duran (2017) examined the case for the Philippines and established a positive long-run relationship between external debt and economic growth. A similar study in Tanzania did not indicate a long-run relationship between external debt and GDP growth (Kasidi & Said, 2013). Eze and Ogiji (2016) established a significant and positive relationship between external debt and GDP growth while Renjith and Shanmugam's (2018) study that focused on 20 Indian states produced mixed results. My study focused on the situation in Kenya, and I examined the impact of Kenya's growing debt on economic performance. A positive and significant relationship will justify the borrowing while the opposite will justify a shift in public finance policy (Duran, 2017). Hyman (2014) defined public finance as "the field of economics that studies government activities and the alternative means of funding government expenditures" (p. 7). Public finance decisions are important because they affect incentives, resource use, production, and economic performance.

Problem Statement

Kenya's public debt has grown rapidly, raising questions regarding its sustainability and impact on the country's macroeconomic stability. The debt increased from sh1.89 trillion in 2013 to sh5.04 trillion in 2018 (Munda, 2018). The CBK (2018) recorded that Kenya's debt as a percentage of GDP rose from 42.8% in 2008 to 57.1% in 2017. Kodongo (2018) argued that the debt-to-GDP ratio of 57.1% is higher than the IMF recommended threshold of 40% for countries such as Kenya. The debt situation has triggered a heated and continuous debate for and against the continued accumulation of debt. Opponents of continued acquisition of public debt have argued that debt has grown faster than economic growth (Munda, 2018; Ndii, 2017; Ochieng, 2018). They have argued that the situation is unsustainable and harmful to Kenya's economy. Sunday (2018) asserted that public debt accumulation raises concerns about the sustainability of Kenya's public finance. The government has defended debt procurement as necessary to drive economic development. The president has argued that the government needs debt for development, adding that the country has a significant deficit of critical infrastructure needed to drive economic growth (Mwere, 2018). The national treasury has defended additional borrowing by saying that the government requires the funds to drive the big four policy agenda (Wafula & Owino, 2019). The government's big four policy agenda includes expansion of the manufacturing sector, provision of affordable housing and health care, and strengthening food security.

Amid the continuous debate for and against government borrowing, the relationship between debt and economic growth for Kenya has not been examined.

Owusu-Nantwi and Erickson (2018) posited that there is a relationship between economic growth and public debt because government's public finance policy affects incentives, resource use, and production possibilities. The problem that this study addressed is the lack of current information on the relationship between public debt and economic performance. I analyzed the long-term causal relationship between public debt and economic growth in Kenya.

Purpose of the Study

The purpose of this quantitative study was to investigate the long-run and causal relationship between Kenya's public debt and economic growth to understand the impact of borrowing on economic performance. I used an ex post facto design based on archival data and time series data for the period 1971 to 2018. To investigate the long-run and causal relationship between the variables, I applied the Augmented Dickey Fuller (ADF) unit root test, Johansen cointegration test, vector error correction model (VECM), and Granger causality technique. The variables in this study were real GDP growth rate (RGDP), public debt to GDP ratio (GOVD), government consumption expenditure to GDP ratio (GOVE), inflation (INFL), investment spending to GDP ratio (INV), economic openness measured as the sum of export and exports expressed as a ratio of GDP (OPEN), and population growth (POPG). The economic growth rate was the dependent variable while government debt, together with the other variables, were the independent variables. The sources of archival data were the World Bank, the IMF, the CBK, and the Kenya National Bureau of Statistics (KNBS). One additional Internet-based resource, TheGlobaleconomy, was useful for some of the data in the analysis.

Research Questions and Hypotheses

I framed my research questions using the criteria set by Burkholder, Cox, and Crawford (2016) who argued that research questions are interrogative statements that show the focus of the study and indicate what data are required. Burkholder et al. also argued that a quantitative research question must be stated clearly, refer to a relationship between two or more variables, and be researchable. I investigated the relationship between public debt and economic growth. My purpose was to examine whether budget deficits and public debt procured by the Kenyan government have a positive or negative impact on the economy. I included the following three research questions (RQs) and associated hypotheses in my study:

RQ1: What is the relationship between GDP growth and public debt in Kenya?

H_o1: There is no significant relationship between GDP growth and public debt in Kenya.

H_a1: There is a significant relationship between GDP growth and public debt in Kenya

The second research question was a subquestion of the first research question. My model had control variables on the right side in addition to the public debt variable. My second research question addressed the significance of the control variables in the model:

RQ2: What is the relationship between GDP growth and the control variables in the model?

H_o2: There is no significant relationship between GDP growth and the control variables.

H_a2: There is a significant relationship between GDP growth and the control variables.

To test my first and second hypotheses, I used a time-series regression model that accounted for autocorrelation, which is a common characteristic of time-series data. The regression analysis involved standard steps that included the ADF test, Johansen cointegration test, and the VECM-Granger causality tests. The model had real GDP growth rate as the dependent variable and government debt as a percent of GDP as the independent variable. Control variables were government consumption expenditure as a percentage of GDP, investment expenditure as a percentage of GDP, inflation, population growth rate, and economic openness measured as the sum of export and export expressed as a percentage of GDP.

My third question addressed whether Kenya's public debt is sustainable. Karazijiene (2015) and Renjith and Shanmugam (2018) provided an explanation and measurement of debt sustainability. I used the Bohn general equilibrium stochastic model to assess debt sustainability (see Renjith & Shanmugam, 2018). Debt sustainability is a measure of the degree to which a government can pay the accumulated debt given the prevailing economic dynamics (Ncube & Brixiova, 2015; Renjith & Shanmugam, 2018). Renjith and Shanmugam cited the GDP growth rate, primary budget balance, and capital mobility as examples of economic dynamics that affect debt sustainability. My third research question was the following:

RQ3: What is the relationship between primary budget balance and public debt in Kenya?

H_o3: There is no significant relationship between primary budget balance and public debt in Kenya.

H_a3: There is a statistically significant positive relationship between primary budget balance and public debt in Kenya.

To answer the third research question, I used regression analysis with primary debt balance as the dependent variable and public debt as the explanatory variable. I expressed both variables as a proportion of the GDP.

Theoretical Framework

A theoretical framework is a lens through which a researcher views the world, and the lens should align with the domain of study (Desjardins, 2010; Grant & Osanloo, 2014). A researcher should identify a suitable theoretical framework from his or her domain of study by conducting a literature review (Desjardins, 2010). A theoretical framework is a logical representation of the concepts, variables, and relationships addressed in a study, and it provides the structure on what the researcher should explore, examine, measure, or describe (Desjardins, 2010).

Researchers have used three main theoretical frameworks to study the impact of public debt and economic growth: Keynesian theory, Ricardian equivalence theory, and neoclassical theory. The Keynesian paradigm postulates that the economy has unemployed resources and inadequate resources (Lwanga & Mawejje, 2014). Deficit financing increases government spending, which increases aggregate demand and employment of redundant resources, and therefore national output (Hussain & Haque, 2017). Renjith and Shanmugam (2018) explained the Keynesian theory and argued that

procurement of debt drives growth in output through the multiplier effect. Renjith and Shanmugam opined that borrowing is a reallocation of resources from taxpayers to bondholders. The essence of the Keynesian theory is that public debt does not produce a negative impact on economic growth, and it can reverse economic downturns in some circumstances (Eze & Ogiji, 2016).

Ricardian equivalence theory posits that public debt has a neutral relationship to economic growth (Lwanga & Mawejje, 2014). The theory postulates that public debt does not matter because it only serves to smoothen expenditure or revenue shocks (Renjith & Shanmugam, 2018). Raising present government borrowing implies higher future taxes whose present value is equivalent to the value of the debt. Ricardian equivalence theory is based on the "inter-temporal budget constraint of the government and the permanent income hypothesis" (Renjith & Shanmugam, 2018, p. 174). An essential tenet of this theory is that it does not matter whether the government expenses are covered through taxes or debt (Karazijiene, 2015). According to Karazijiene (2015), the investment will not change if, for example, the government reduces taxes by a given amount and raises borrowing by an equivalent amount. Kelikume (2016) supported the Ricardian equivalence theory that the relationship between budget deficit and macroeconomic variables such as GDP growth is neutral.

The neoclassical theory is the opposite of the Keynesian theory because the former postulates that budget deficit hurts the economy, and therefore governments should pursue a balanced budget (Lwanga & Mawejje, 2014). The neoclassical theory posits that under the condition of full employment and closed economy, the budget deficit

will raise current expenditure, which will translate to high interest rates, reduced national savings, and reduced future investments. The theory presupposes that budget deficits will cause crowding-out of investment and lead to reduced future capital formation. Under the assumption of an open economy, the theory postulates that increased borrowing and the resultant increased consumption expenditure will lead to an appreciation of the local currency and an increase in imports and reduction of exports (Lwanga & Mawejje, 2014). The result is a negative current account balance.

Nature of the Study

The three main research approaches are quantitative, qualitative, and mixed methods. Mixed methods combine both quantitative and qualitative approaches. Babbie (2017) distinguished quantitative and qualitative data in social research by noting that a quantitative approach is numerical while a qualitative approach is nonnumerical. In quantitative studies, numeric variables are used while in qualitative studies, the focus is on understanding concepts and phenomena that do not involve numbers. Burkholder et al. (2016) explained that quantitative studies are primarily deductive whereby data are collected and hypotheses are tested to assess whether the findings support the theory. In quantitative studies, researchers carry out statistical analysis on numeric data to confirm or disconfirm hypotheses. The focus in qualitative studies is providing an in-depth explanation of a phenomenon, and the data used are textual or narrative (Burkholder et al., 2016). Qualitative approaches are usually inductive, and researchers use them to develop theories.

The objective of my study was to investigate the long-term causal relationship between public debt and economic growth in Kenya. I used a quantitative approach because my study involved numeric variables and testing of hypotheses. I designed my research according to similar studies conducted by researchers on the debt-growth nexus in different countries. I used a retrospective design, which (Creswel, 2008) referred to as the ex post facto design or causal-comparative design. An ex post facto design allows the researcher to look back and attempt to determine whether the independent variables influenced the dependent variable. In a retrospective study, the researcher uses secondary data to analyze the link between present events and previous events (Creswel, 2008).

Study Variables

Impact of public debt model. I followed the steps of Owusu-Nantwi and Erickson (2016) and Duran (2017) to specify my public-debt and economic growth model. The dependent variable was the real economic growth rate, while the independent variable was public debt expressed as a proportion of the GDP. Covariates were other macroeconomic variables that economic theory predicts to have a relationship with macroeconomic performance.

Public debt sustainability model. Researchers have used different models to assess debt sustainability for a country. Renjith and Shanmugam (2018) used the Bohn model, while Karazijiene (2015) used the Domar and Blanchard model. I used the Bohn model as described in Renjith and Shanmugam's study. My dependent variable was the primary balance expressed as a ratio of GDP, while the independent variable was public debt expressed as a ratio of GDP.

Data sources. My research design was ex post facto, which means I used secondary data. I used archival data from the World Economic Outlook of the IMF, World Development Indicators of the World Bank, the CBK, and the KNBS. Other researchers who have studied the relationship between public debt and economic performance have used WB and IMF as the main data sources (Eze & Ogiji, 2016; Megersa & Cassimon, 2015; Owusu-Nantwi & Erickson, 2016). The WB and IFM sources provided most of the data that I needed for my analysis, but the CBK, KNBS, and TheGlobaleconomy were also important sources of data for my research.

Data Analysis Process

I used time-series data for my analysis. Wonnacott and Wonnacott (1990) pointed out the challenges involved in the analysis of time-series data, which include the serial correlation of the variables. Presence of serial correlation means that observations are dependent and the consequence is that successive observations give little new information (Wonnacott & Wonnacott, 1990). When serially correlated observations are used in a regression, the estimates will be less reliable because the confidence intervals are very wide. To get reliable results, various tests and data transformation are necessary (Green, 2012; Wonnacott & Wonnacott, 1990). Robust and standard econometric methods are available to deal with the problem of serial correlation, also called autocorrelation. I adopted analytical steps similar to those used by Duran (2017), Owusu-Nantwi and Erickson (2016), and Lwanga and Mawejje (2014) to investigate the effect of public debt on economic growth.

I used the ADF unit root test to determine whether the time-series variable in my model had no unit roots. The test is used to examine whether the variables are stationary at levels or first difference (Duran, 2017). The outcome of working with nonstationary variables is spurious regression results from which no meaningful inference can be made (Eze & Ogiji, 2016). The ADF test equation is $\Delta y_t = a_0 + a_2 t + \tau y_{t-1} + \sum_{i-2}^{\rho} \beta_i \Delta y_{t-1+i} + \varepsilon_t$ (Coupet, 2017). The series is said to be stationary of order one when the researcher can reject the hypothesis of unit root after first differencing. In the next step, I conducted the Johansen cointegration test to assess the number of integrating vectors in the model. Coupet (2017) argued that the presence of cointegration is an indication of the long-run relationship between the variables, which was the focus of my study. The final step in my phased analysis was the Granger causality test using either the vector autoregressive equations or the VECM equations. The vector autoregressive equations are applicable when the ADF test shows the variables to be stationary at levels, while the VECM is applicable when the ADF shows the variables to be stationary at first difference. The Granger causality test is employed to analyze cause and effect among the variables in the model, where a vector of equations is run and each of the variables in the model is used as a dependent variable. The Granger model helps to establish the direction and strength of causality, for example whether public debt is influencing economic growth or whether the opposite is indicated.

My principal statistical data analysis tool was STATA. I also used Microsoft Excel to manage data after downloading them from archival databases to carry out simple procedures such as pivot table analyses and to clean the data before exporting it to

STATA for more advanced statistical analyses. I tested my hypotheses by examining the magnitude and sign of the coefficients from the ADF, Johansen cointegration test, and Granger causality tests.

Definitions

Budget deficit: In public finance, the excess of total expenditure over total receipts, excluding borrowing from the government receipts. Governments typically cover budget deficits through borrowing, and the total public debt at a particular time is the accumulation of previous budget deficits less periodic debt repayments (Karazijiene, 2015).

GDP: The total output produced inside a country during a particular year (Samuelson & Nordhaus, 1992).

Inflation: The percentage increase in the general price level. In my study, the measure of inflation was the percentage change in consumer price index between years. Samuelson and Nordhaus (1992) defined consumer price index as the index that measures the cost of a fixed basket of consumer goods.

Primary balance: Government revenue minus noninterest spending. Primary budget balance is equivalent to fiscal balance minus interest payments on the unpaid public debt (Makin & Griffith, 2012). Fiscal balance is government revenue minus total government spending. A fiscal surplus occurs when revenue is higher than expenditure, while a fiscal deficit occurs when expenditure exceeds revenue. Romanchuk (2013) represented the relationship between these variables in the following equation: $PD = FD - IP$ where PD is the primary deficit, FD is the fiscal deficit, and IP is the interest

payment. Government's fiscal authorities can control the primary budget balance through discretionary changes to government spending and revenue (Makin & Griffith, 2012). The primary budget balance is essential in analyzing public debt because it determines the rate of debt accumulation and debt sustainability. I used this variable to analyze Kenya's debt sustainability.

Public debt: Government debt rises when a government runs an unbalanced budget, which means expenditures exceed revenue. In that situation, the government borrows to cover the budget deficit. I used the definition of public debt as the total government liabilities in the form of unpaid loans and their associated maintenance cost (Karazijiene, 2015). I did not distinguish between domestic and foreign debt, and the variable public debt was the total outstanding government debt from both internal and outside sources.

Stationarity: A stationary time series is one that has constant statistical properties such as mean, variance, and correlation over time. Greene (2012) argued that a time series is stationary if the joint probability distribution of any set of k observations in the sequence is the same regardless of the origin, t, in the time scale. Nonstationary time-series data will lead to inaccurate statistical inferences. Only stationary data can provide meaningful sample statistics such as means, variances, and cointegration with other variables. A researcher has to first rule out nonstationarity before proceeding with the analysis involving time-series data. A standard method used in correcting nonstationarity is differencing. For my analysis, I used the ADF to test for stationarity.

Unit root: Time-series data have a unit root when they are not stationary. Presence of unit root leads to problems such as spurious regression and errant behaviors of the estimated statistics, for example when the estimated *t* ratios fail to follow a *t* distribution (Greene, 2012). Unit root tests are tests for stationarity for time-series data. Available tests for unit root include ADF and the Phillips-Perron test.

Assumptions

I made three assumptions in this study. Assumptions are the conditions that researchers expect readers to accept as accurate or plausible (PhDStudent, n.d.). Simon and Goes (2013) defined assumption as the beliefs in the proposed research that are necessary to conduct a research, but they cannot be proven. My first assumption was about my data. I used time-series data, which have several statistical problems such as autocorrelation, nonstationarity, and stochastic pattern that renders standard statistical methods such as ordinary least squares (OLS) ineffective. Procedures for correcting the anomalies are available, such as differencing (Greene, 2012; Wonnacott & Wonnacott, 1990) and detrending (Greene, 2012). I assumed that the available procedures for correcting anomalies in the timeseries data would solve the problem.

My second assumption was that the relationship between public debt and economic growth would be linear across the whole range of variables. Although most studies of the relationship between public debt end economic growth included a linear model of one form or another, a few researchers such as Coupet (2017) and Aero and Ogundipe (2016) used nonlinear models. Coupet assumed a concave relationship with public debt eliciting a positive relationship with economic growth at lower levels but a

negative relationship at higher levels. Aero and Ogundipe assumed the existence of a threshold point beyond which the relationship becomes negative. Aero and Ogundipe used the threshold autoregressive model to search for the threshold.

My third assumption was also about the research data. I used archival data from the World Bank, IMF, and CBK. The assumption was that the data would be accurate, unbiased, and adequate to analyze the relationship between Kenya's debt and economic growth.

Scope and Delimitations

My analytical model was based on the neoclassical growth theory, which posits that economic growth is a function of labor, capital, and the state of technology (Duran, 2017). The mathematical function representing this theory is $Y = (L, K, A)$ where Y is the aggregate output, L is the quantity of labor, K is the total capital stock, and A is variable that stands for the current state of the technology (Duran, 2017). The model predicts that economic growth is related to labor and capital inputs and productivity level, which in turn depends on technological innovation. The connection between public debt and economic growth comes from the assumption that borrowed funds are used to improve the quality of labor, capital, and technology. The neoclassical growth theory constrained my choice of variables. Megersa and Cassimon (2015) identified factors such as the quality of public sector management and corruption as significant in explaining the relationship between debt and macroeconomic performance. The inclusion of these variables is appropriate when comparing countries; therefore, I did not include them in my study.

Limitations

I used data from the World Bank, IMF, CBK, and KNBS. I did not have control over the reliability and quality of the data. I relied on the institutions' credibility and long-term experience in data collection, cleaning, and archival for the integrity of my data.

My analysis included only domestic variables, principally public debt, and its relationship to economic growth. However, globalization implies that events happening beyond a country's borders have the potential to affect its economy. Bryson (2011) argued that the world is becoming flatter because of globalization. An excellent example of how globalization can unleash impacts beyond national boundaries is the financial crisis of 2008. The financial crisis affected all developed economies even though the epicenter was the United States. Though my study had one variable that captured Kenya's trade with the rest of the world, it fell short of capturing the entirety of potential impacts of globalization on Kenya's economy.

My third limitation was about data analysis and statistical conclusion validity. Greene (2012) argued that analysis of time-series data poses serious problems because of high autocorrelation in the residuals. It is possible to conclude that a relationship between two variables exists even when it does not.

Significance

This research provided an understanding of how deficit financing influences the macroeconomic performance of Kenya. Answering the question of how public debt is affecting economic growth and other macroeconomic variables such as employment and

investments is essential for Kenya because of the claim that the country is over borrowing. Government actions, such as public financing decisions, influence a country's economic performance (Van & Sudhipongpracha, 2015). I sought to provide evidence regarding the impact of Kenya's public debt on economic performance. The findings from my study may inform policy debates and decisions about public debt procurement and spending. The findings also have the potential to produce outcomes that change the management of public financing in Kenya for the better.

When government spends more than the revenue it collects from its citizens, there is a budget deficit and therefore the need for debt. Debt has implications on level of savings, investments, economic growth, and by extension on employment and standard of living (Hyman, 2014). Owusu-Nantwi and Erickson (2016) argued that public financing decisions such as running deficits and procuring public debt have impacts on incentives, resource use, and production possibilities. Sound fiscal policies and prudent debt management policies will maximize social benefits such as increased savings, investments, job creation, stable interest rates, and the living standard of the citizens (Hyman, 2014). I sought to quantify the impact of government fiscal policies, particularly the use of public debt to finance infrastructure development, on the real GDP growth.

The impact of debt on economic growth differs from one country to another because each country has unique debt dynamics (Megersa & Cassimon, 2015). Duran (2017) observed that research on the relationship between public debt and economic growth has produced different results in different studies, with researchers reporting both positive and negative relationships. My research contribution was providing a

quantitative assessment of the influence of Kenya's public debt on real GDP growth. The findings from my study may assist government policymakers in designing fiscal policies that catalyze economic growth, investments, job creation, and prudent debt management. Duran noted that causality studies on debt and economic growth are important because they help to shape policies that improve public debt management and economic growth.

My findings may produce positive social change in Kenya in many ways. My research may contribute to improvement in public debt management. Hyman (2014) argued that when government uses debt prudently to finance capital expenditures that create future streams of benefits, taxpayers are not burdened by the debt. Debt burden occurs when there is a decrease in the well-being of citizens because of heavy taxation to pay off interest and principal of debts. The contribution to positive social change from my study may be at the society level because government's fiscal decisions affect the entire population. Moreover, my research has the potential to improve the allocation of public funds for development purposes and to curtail the misuse of public funds. Finally, other developing countries similar to Kenya may use the findings to reform their public financing policies.

Summary

The purpose of this quantitative study was to investigate the long run and causal relationship between Kenya's public debt and economic growth to understand the impact of borrowing on economic performance. In the face of growing public debt in Kenya and the debates about the impact of borrowing on the economy, this study may provide evidence to inform ongoing public debates. In this first chapter, I provided the

background, problem statement, and purpose of the study. I also presented the research questions, hypotheses, and analytical models used in my data analysis. In addition, I explained the assumptions, delimitations, and limitations of my study. Finally, I described the social significance of the study.

In Chapter 2, I review the literature on my research topic. I explain the theoretical framework for my study, explore how other researchers analyzed the relationship between government borrowing and economic growth, describe the variables that other researchers incorporated in their models, and synthesize the results of their studies. In addition, I define the key concepts in my study, including debt sustainability, primary balance, budget deficit, and public finance.

Chapter 2: Literature Review

The Kenyan government has grown its public debt portfolio over the last decade, causing public debate on the impact of the debt on the economy and the sustainability of the debt. Ndii (2017) argued that Kenya is spending 20% of its revenues on interest payments for the accumulated debt, and concluded that the fiscal path that Kenya has taken is reckless and will soon precipitate macroeconomic disaster. Public debt stood at Ksh 4.573 trillion in December 2017 compared to the ordinary revenue of Ksh 1.68 trillion projected for the financial year 2018/2019 (Ochieng, 2018). Kenya is spending 40% of its ordinary revenue to service its debt (Ochieng, 2018). The Institute of Certified Public Accountants of Kenya has warned that Kenya is accumulating debt at a higher rate than it is growing its economy (Ochieng, 2018). Ngugi (2018) also warned that the growth rate of Kenya's debt is higher than the growth rate of government revenue, putting into question the sustainability of the debt. In 2018, Kenya's public debt stood at 47 billion U.S. dollars, which is approximately 60% of the national GDP, a level that is likely to hurt economic growth (Sunday, 2018). Sunday (2018) asserted that the pace of public debt accumulation raises concerns about the sustainability of Kenya's public finances. Public debt has the potential for affecting social development and economic prospects (Karazijiene, 2015). Critics of Kenya's public finance, especially those outside the government, have opposed continued debt accumulation and have argued that borrowing is causing a negative economic impact.

In contrast, the government has defended debt procurement as necessary to drive development. The president has argued that the government needs debt for development,

adding that the country has a significant deficit of critical projects needed to drive economic growth (Mwere, 2018). The government has defended debt by noting that it is using debt to address the infrastructure gap, not for consumption (Mwere, 2018). The government treasury has defended additional borrowing by saying it requires the funds to drive the government's big four agenda that includes expansion of manufacture sector, provision of affordable housing and health care, and strengthening food security (Wafula & Owino, 2019). Nord and Anos-Casero (2016) argued that Kenya's debt that stands at 54% of the GDP is still within the acceptable threshold because it is below the IMF's recommended threshold of 74% for developing countries. Adam (2015) also supported the notion that debt can be beneficial if the government invests borrowed funds in capital goods such as infrastructure that will support economic growth and generate future streams of revenue that could be used to repay the debt.

The purpose of this quantitative study was to investigate the long run and causal relationship between Kenya's public debt and economic growth to understand the impact of borrowing on economic performance. I did this by examining the relationship between public debt and economic growth using an ex post facto design with archival data from the World Bank, the IMF, and the CBK. I applied time-series econometric models to examine retrospectively the relationship between public debt and economic growth for Kenya. In this chapter, I discuss the main theories that have been used to contextualize the relationship between public debt and macroeconomic variables. I also present the literature review and the model specifications that have been used to analyze the relationship between public debt and macroeconomic variables.

Literature Search Strategy

I designed my literature review to elicit information about the previous specification of the problem, methods of data analysis, and definitions of key concepts in public debt dynamics. My main resources for the literature review were the Walden University library and Google Scholar. In the Walden University library, I relied on the Political Science Complete, ProQuest, Business Source Complete, and to some extent Thoreau. I set up both Google and Mendeley alerts for published articles on public debt and deficit financing. I also used textbooks and the Internet. I also searched Kenya government's websites and other websites hosting professional organizations and research organizations. Political Science Complete, ProQuest Central, Google Scholar, and Mendeley provided useful articles for my review.

Scope of the Literature Review

Peer-reviewed literature. Peer-reviewed articles were my primary sources for the literature review, which is in line with Walden University's guidelines that require the use of peer-reviewed literature. When searching for articles, I selected the option that excluded non-peer-reviewed articles. In my research, government websites, institutional websites such as the universities and the central bank, and newspapers were also important sources. Articles and information from these other sources are not categorized as peer reviewed or not, but they were necessary for my study. Whenever possible, I used the verify peer review tool in the Walden library to determine whether the article I had extracted had been peer reviewed.

Years I reviewed. The guideline provided by Walden University is that most articles cited in the dissertation should not be older than 5 years. My 5-year range included 2014 to 2018. I tried to observe the limit of 5 years or less for all my articles and sources. I made an exception for seminal sources that addressed original ideas and thoughts on the subject. I also made an exception for government sources, professional organizations, and research organizations to take advantage of unique and useful data and information related to my research topic.

Strategy for Reviewing the Literature

Framework for the review. I developed my literature review using the plan depicted in Figure 2. The goal of my literature review was to obtain a thorough understanding of the work that other researchers had done, how concepts had been defined and measured, and what methods had been used.

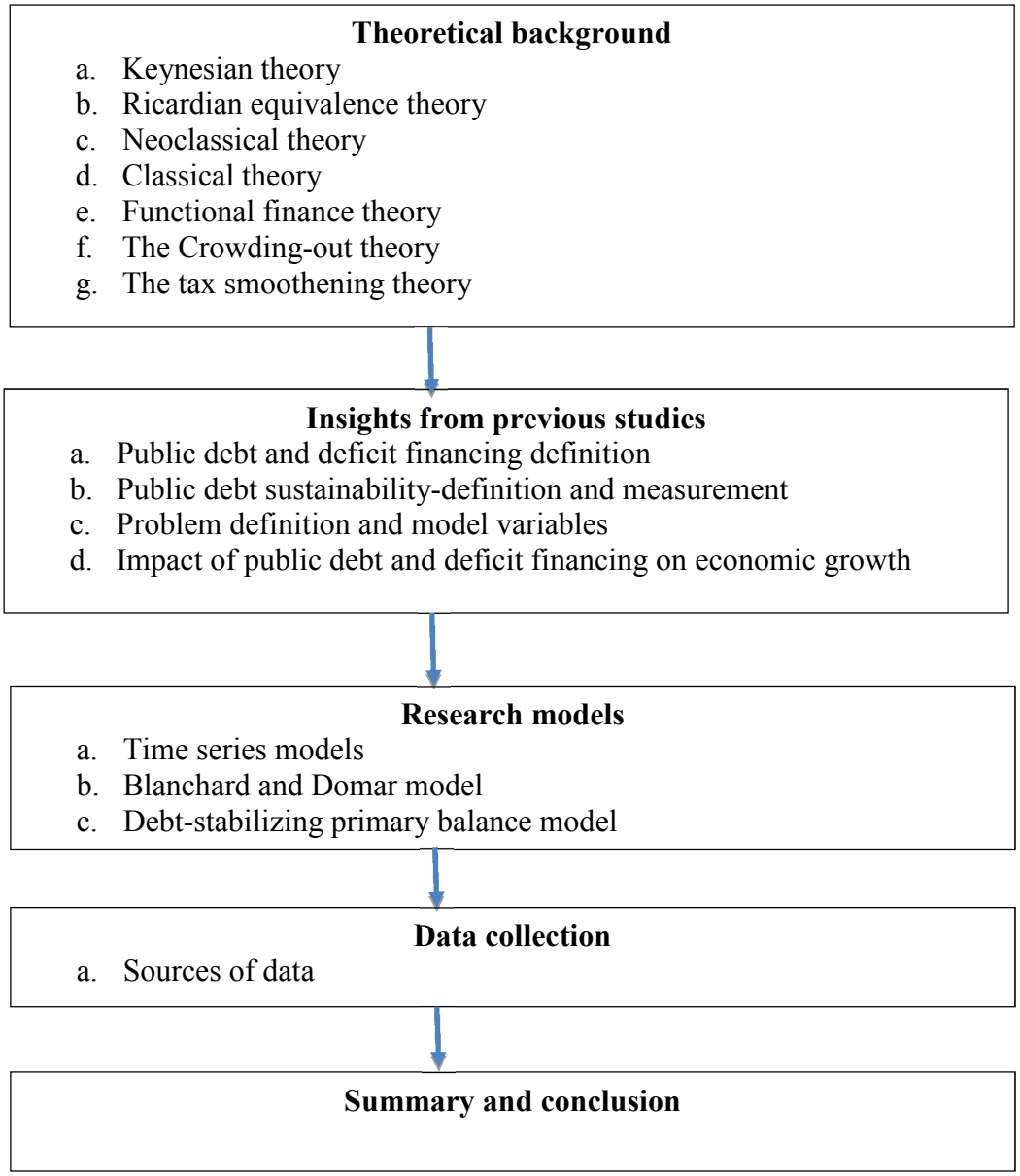

Figure 2. Literature review plan

Keyword search. I used key search words to identify articles and resources that were relevant to my topic. Keywords that stood out in my research were *public debt* and *deficit financing*, and these terms were important keywords in my search of articles and other sources. Important concepts in the assessment of impacts of public debt procured

are debt sustainability and debt dynamics. Debt dynamics are defined by the level of economic growth, borrowing interest rate, and primary budget balance, among other factors. Therefore, *debt sustainability* was another critical search term. The subject of public debt is covered under public finance, and includes topics such as budget theory and debt crisis. Other search words related to the subject of public debt that I used for the literature search included *budget theory*, *financial theory*, *debt crisis*, *crisis of debt*, *fiscal policy*, and *budget incremental model*.

Theoretical Foundation

The main theories that have been used in the literature to contextualize the impact of public debt on the economy are the Keynesian theory, Ricardian equivalence theory, and neoclassical theory (Aero & Ogundipe, 2016; Duran, 2017; Eze & Ogiji, 2016; Renjith & Shanmugam, 2018). Apart from these three main theories for analyzing the relationship between debt and economic performance, other theories include functional finance theory, classical theory, and tax smoothening theory (Karazijiene, 2015). This section includes a discussion of the theories and the relationship between public debt and macroeconomic variables. The theories represent the different propositions of the impact of public debt on the economy.

Keynesian Theory

The Keynesian theory postulates the existence of unemployed resources and inadequate credit in the economy (Lwanga & Mawejje, 2014). It further postulates that budget deficit and the increase in government spending leads to an increase in aggregate demand, which in turn leads to the employment of redundant resources, and an increase

in national output. Renjith and Shanmugam (2018) argued that public debt would boost aggregate demand and stimulate economic growth. Increase in government's autonomous expenditure through procurement of debt drives growth in output through the multiplier process, and borrowing is simply a reallocation of resources from taxpayers to bondholders (Renjith & Shanmugam, 2018). The Keynesian theory postulates that governments could reverse economic downturns by borrowing from the private sector and then returning the funds to the private sector through spending (Eze & Ogiji, 2016). Total spending in the economy influence economic growth and stability and therefore public debt to finance this spending is not harmful to the economy (Bal & Rath, 2016).

Ricardian Equivalence Theory

The Ricardian theory postulates a neutral debt-growth relationship (Lwanga & Mawejje, 2014). The theory asserts that the fiscal deficit does not matter because it only serves to smoothen expenditure or revenue shocks (Renjith & Shanmugam, 2018). The basis of this postulation is that increasing government debt implies raising future taxes whose present value is equal to the value of the debt. Renjith and Shanmugam (2018) explained that fiscal deficit today requires higher taxes in the future, assuming the government does not reduce present or future public spending. Households anticipate the requirements of higher taxes in the future, reduce their consumption, and increase savings to meet their high future tax burden (Renjith & Shanmugam, 2018). It does not matter whether the government expenses are covered through taxes or debt (Karazijiene, 2015). The investment will not change if the government reduced taxes by a given amount and

raised borrowing by an equivalent amount (Karazijiene, 2015). The theory is not a standard approach to the assessment of the economic impact of debt (Karazijiene, 2015).

Neoclassical Theory

The neoclassical theory postulates that budget deficit will hurt the economy and countries should pursue balanced budget (Lwanga & Mawejje, 2014). The theory predicts that budget deficit under the condition of full employment and closed economy would result in the rise of current expenditure that would in turn translate to high-interest rates, reduced national savings, and reduced future investment. That is, budget deficit precipitates crowding out of investment and leads to reduced future capital formation. Under the assumption of an open economy, the theory predicts that increased borrowing to sustain increased consumption expenditure would lead to an appreciation of the local currency and consequently an increase in imports and reduction in exports, hurting the current account balance (Lwanga & Mawejje, 2014). The theory also postulates that fiscal deficit would adversely affect growth because it precipitates reduction in government savings or increases dissaving. When an increase in private saving does not offset a reduction in government saving, the overall saving rate declines to put pressure on the interest rate and in the process adversely affecting growth (Renjith & Shanmugam, 2018).

Classical Theory

The theory postulates that when government contracts a loan, it creates a debt burden for the future generation. Debt procurement amounts to destroying state capital because government has to spend money in future to repay the debt and interest. The

theory finally posits that unless the government uses borrowed funds to produce public goods and investments, debt is injurious to the future generation (Karazijiene, 2015).

Functional Finance Theory

The theory posits that future burdens and benefits from public debt are equal. The reason is that citizens pay tax but also receive interest (Karazijiene, 2015). Functional finance theory is equivalent to the Ricardian Equivalence theory under the assumption of a closed economy.

Crowding-Out Theory

Government borrowing raises interests in the credit market, pushing out the private sector from the credit market and therefore negatively influencing future investments (Karazijiene, 2015). Increase in public debt has the potential of reducing investment and economic growth by raising real interest rates and crowding out the private sector (Coupet, 2017). The crowding-out theory is subsumed within the broader neoclassical theory discussed in Lwanga and Mawejje (2014), which postulates that deficit financing precipitates crowding-out of investment, which triggers reduced capital formation. Hyman (2014) argued that when budget deficit persists, it absorbs fund from the credit market and contributes to decline in national saving. Decline in national saving may increase real interest rate, reduce investments, and economic growth.

Tax Smoothening Theory

The theory posits that deficit financing allows taxes to remain the same over time. The government continues to maintain a constant tax rate and thus increases the wealth of its citizens by reducing the distortionary effect of taxes. Renjith and Shanmugam (2018)

explained the theory whose central tenet is that there is a positive response of primary surplus to government debt. It means that when the government borrows, the primary surplus relative to GDP increases and in the process makes the debt ratio to decline.

Insights from Previous Similar Studies

I presented the main body of the literature review for my research under this section. I looked at the concepts of public debt and budget deficit, defining them and anchoring them in the economic and public finance theories. Then I reviewed how different researchers have framed their research problem in analyzing impact of debt on economic stability. My focus was to review the problem specification and the types of variables and econometric models that other researchers have used to study debt-economic growth relationship. I also provided a literature review of debt sustainability, its definitions and measurements. Finally, I reviewed previous studies on the subject and their findings and provided a link to my study.

Public Debt and Deficit Financing

Governments can finance their expenditure through tax receipt or debt. When government expenditure exceeds tax revenue, a budget deficit emerges (Coupet, 2017). The public debt arises when the government's expenditure exceeds government's revenue (Karazijiene, 2015). Fiscal deficit or deficit financing arises when there is an excess of government spending over its revenue (Aero & Ogundipe, 2016; Eze & Ogiji, 2016; Hyman, 2014). Governments finance fiscal deficit through domestic and external debt (Aero & Ogundipe, 2016). Governments finance their deficit through domestic and external borrowing, printing money by the apex bank, a phenomenon that Eze and Ogiji

called ways and means of deficit financing, and through grants from donor countries and agencies (Lwanga & Mawejje, 2014). Public debt is second only to tax as a source of government revenue and it is the main instrument the government uses to cover the budget deficit (Karazijiene, 2015). Karazijiene identifies two approaches to defining public debt. Using the budget deficit approach, public debt is the total of uncovered annual budget deficits overtime (Karazijiene, 2015). Using the liabilities approach, the definition of public debt is "the sum of government's non-refundable loans and unpaid interests for them and other financial liabilities that the state undertakes to its creditors" (Karazijiene, 2015, p.196).

There are three types of deficits related to public debt (Makin & Arora, 2012; Renjith & Shanmugam, 2018). Revenue deficit is the equivalent of revenue receipt minus revenue expenditures. The fiscal deficit is the equivalent of total government receipt from revenues and non-debt capital revenues minus total expenditures, including both revenue and capital expenditures. Makin and Arora (2012) defined gross fiscal deficit as the government's aggregate disbursements before debt repayment, minus revenue receipts, non-debt capital receipts, and repaid loans and advances. Renjith and Shanmugam defined primary deficit as the equivalent of fiscal deficit minus interest payments. The two primary sources of fiscal deficit financing are borrowings and ways and means (Eze & Ogiji, 2016). Governments could borrow internally from the public, commercial banks, domestic capital market, or externally from foreign governments and international organizations. Ways and means procedure for deficit financing is the printing of new currency by the central banks of a country. Makin and Arora (2012) call the printing of

money by central banks to cover budget deficit seigniorage. Eze and Ogiji cautioned that following the procedure of ways and means to cover budget deficit could trigger inflationary trend in the economy because of the increase of money supply.

Public Debt Sustainability: Definition and Measurement

Kasidi and Said (2013) described debt sustainability as the difficulty and strain arising from the debt. They argued that debt sustainability is affected by the proportion of current resources available to service the debt. Further, they argued that existing debt stock and associated debt service, the prospective path of the deficit, the financing mix of the debt and the evolution of repayment capacity regarding foreign currency value of GDP, exports and government revenue, affect debt sustainability. Renjith and Shanmugam (2018) defined debt sustainability as the situation where debt accumulation is commensurate to the government's capacity to repay that debt. Makin and Arora (2012) have defined debt sustainability as the capacity of a government to meet its debt obligations. Government's ability to meet its debt servicing obligations depends on the size of the debt relative to GDP, economic growth rate relative to interest rate payable on outstanding debt, and primary budget balance (Makin & Arora, 2012).

Makin and Arora (2012) argued that the primary budget balance is the variable that should be used to measure debt sustainability. The researchers provided mathematical models for calculating the level of primary budget balance needed to sustain the debt ratio at a specified desired level. Makin and Arora also provided a formula for calculating the amount of primary budget balance whose discounted value over a target period of time would bring down the public debt to a targeted desired level.

The mathematical models described by Makin and Arora are very similar to Blanchard and Domar models described in Karazijiene (2015) and Ncube and Brixiova (2015). The Blanchard and Domar models estimate the "optimal" primary budget balance that a country should aim for given the country's prevailing GDP growth rate and interest rate payable on the stock of public debt. Using these models, researchers can calculate the level of primary budget balance that governments must aim to achieve debt sustainability.

Mergesa and Cassimon (2015) suggested that the three factors that drive debt sustainability are primary budget balance, interest payment, and GDP growth. The primary budget balance is the government fiscal balance, excluding interest payment (Mergesa & Cassimon, 2015; Romanchuk, 2013). Saungweme and Odhiambo (2018) cited economic diversification, interest rates, terms of trade, and economic growth dynamics as factors that determine public debt sustainability. It means that other factors other than the stock of debt affect sustainability of public debt. Ncube and Brixiova (2015) assert that the factors that drive debt dynamics are growth contribution, primary balance, and interest contribution. Sound fiscal policy in debt management should emphasize economic growth and directing loans towards growth enhancing outlays (Ncube & Brixiova, 2015).

Ncube and Brixiova (2015) suggested the following model for computing the debt stabilizing primary balance, which they defined as the primary balance required to keep public debt at a targeted desired level. When the computed debt stabilizing primary balance is higher or equal to actual primary balance, the public debt is said to be sustainable. The basic model to calculate the debt stabilizing primary balance is:

$$P_t^* = \frac{r_t - g_t}{1 + g_t} d_{t-1}^*$$

Where $P_t^*$is the stabilizing primary balance, dt* is the stable debt-to-GDP ratio, r_t is the real interest rate, and $g_t$is the real GDP growth rate in percentage. The difference between the actual primary balance and stabilizing primary balance is the primary-balance gap (Ncube & Brixiova, 2015). When debt stabilizing primary balance is higher than the actual primary balance, the debt-to-GDP ratio will rise over time unless there is fiscal intervention. If the real interest is above the GDP growth rate, the debt-to-GDP ratio will rise unless the primary balance counteracts it. Makin and Arora (2012) argue that, when the interest rate exceeds the growth rate, a primary surplus is necessary for debt stabilization. On the hand, if the growth rate exceeds the interest rate, a primary deficit is possible (Makin & Griffith, 2012).

The major approaches for testing debt sustainability are (a) unit root (b) cointegration and (c) Bohn's model (Renjith & Shanmugam, 2018). Karazijiene (2015) describes Domar and Blanchard econometric model that predicts the acceptable amount of public debt relative to the prevailing country's macroeconomic conditions such as GDP growth rate, borrowing interest rate, and the country's debt stock measured as public debt to GDP ratio. Blanchard model:

$$b_t = \frac{1 + i}{1 + y} b_{t-1} + pd_t + sf_t$$

Where $b_t$is the public debt to GDP ratio in time t, y is the nominal GDP growth rate, i is the country borrowing rate, pd_t is country's initial budget balance to GDP ratio, andsf_t is the adjusted ratio of income to GDP in time t (Karazijiene, 2015).

The Bohn general equilibrium stochastic model for assessing debt sustainability described in Renjith and Shanmugam (2018) is:

$$S_t = \propto + \varphi d_t + \varepsilon_t$$

Where S_t is the ratio of primary balance to GDP, d_t is the ratio of public debt to GDP while $\propto and\ \varphi$ are the parameters to be estimated in the model. Renjith and Shanmugam (2018) claimed that for debt sustainability to hold, S_t should be positive and be a linearly rising factor of the ratio of public debt to GDP, and φ be greater than zero and statistically significant. Debt sustainability is also assessed by comparing actual debt to thresholds that WB and IMF have established (Kodongo, 2018; Saungweme & Odhiambo, 2018). For emerging economies, the debt-to-GDP threshold is 40% and the public debt service to government revenue is 18%. Countries can improve their debt sustainability by taking measures such as improving primary balance through resource mobilization, accelerating growth, and reducing real interest rates (Ncube & Brixiova, 2015).

Problem Specification for Impact of Public Debt on the Economy

Many completed studies in the literature examine the relationship between public debt and the economy. Similarities, as well as differences, abound in the way researchers on this subject have specified the problem. There are differences in both the number and specific variables used, and in the way, the researchers have specified the analytical models. Conclusions on the impact of public debt on a country economy differ from study to study and from country to country (Rahman, Ismail, & Ridzuan, 2019; Saungweme & Odhiambo, 2018). Examples of studies that gave a positive relationship

between public debt and economic growth include Duran (2017) and Owusu-Nantwi and Erickson (2016). Saungweme and Odhiambo discussed debt overhang hypothesis that posits a negative linkage between public debt and economic growth. The hypothesis predicts that debt is damaging to the economy because it crowds out the private sector, drains financial resources through debt and interest payments to debtors, and creates uncertainty about future economic situation.

It follows that the impact of public debt will differ from one country to another depending on the economic dynamics of that country. Zambia experienced debt servicing problems because of highly volatile commodity prices and undiversified economy that largely depended on copper exports (Saungweme & Odhiambo, 2018). Saungweme and Odhiambo's study highlighted the key variables that are important to modeling the relationship between debt and economic growth. The variables include the stock of debt, government revenue, gross domestic product, and the country's terms of trade or economic openness. Ncube and Brixiova (2015) cited primary balance, interest rate, and economic growth as important variables in analyzing debt and economic growth relationship.

Kasidi and Said (2013) examined the impact of external debt on economic growth for Tanzania. They limited their focus on only two macroeconomic variables, the external debt, and gross domestic product, the latter being the dependent variable. Using only two variables limits policy options because it gives decision makers few choices although in reality, more variables are involved in economic stability. Eze and Ogiji (2016), on the other hand, specified their problem as the assessment of the impact of deficit financing on

economic stability. They defined economic stability as the achievement of price stability, maintaining full employment, and achieving sustained economic growth. Unlike Kasidi and Said (2013), Eze and Ogiji use eight different variables in their model, and that is important because results are more amenable to policy actions. Kurecic and Kokotovic (2016) sought to understand how the public debt-to-GDP ratio correlates with other significant macroeconomic indicators. Like Kasidi and Said (2014), their model has only two variables, public debt to GDP ratio as the explanatory variable and unemployment rate as the dependent variables. Lwanga and Mawejje (2014) specified their problem as the assessment of the relationship between budget deficits and selected macroeconomic variables.

Mergesa and Cassimon (2015) examined the relationship between public debt and economic growth using a panel data for 57 countries in Africa. The unique feature of their study was the focus on the nexus between public sector management (PSM) and the debt-growth relationship. Mergesa and Cassimon postulated that the quality of public sector management has a bearing on the relationship between public debt and economic growth. They used the World Bank's Country Policy and Institutional Assessment (CPIA) index as the measure of the quality of public sector management. Their study makes a comparison between countries assessed to be high on quality of PSM and those assessed to be low. Unlike Mergesa and Cassimon who use PSM index, Cooray, Dzhumashev, and Schneider (2017) used corruption index as one of the variables in assessing countries' level of public debt. Cooray et al. postulated that corruption and shadow economy have a relationship with the levels of public debt. They tested the

hypothesis that a higher level of corruption results in a higher public debt to GDP ratio. They also tested the hypothesis that the shadow economy results in a higher public debt to GDP ratio. Cooray et al. concluded that a higher level of corruption and a high incidence of the shadow economy have a positive and statistically significant effect on the public debt to GDP ratio (Cooray, Dzhumashev, & Schneider, 2017).

My study was not a cross-country comparison as in the studies by Mergesa and Cassimon (2015) and Cooray et al. (2017). I did not include variables to measure public sector management nor corruption because I focused one country. In the 2019 CPIA Africa report, Kenya's score was 3.7 against a Sub-Saharan Africa average score of 3.1 (World Bank, 2019). Similar to the study by Mergesa and Cassimon (2015), my study used economic growth as the dependent variable with public debt and interest rate appearing as independent variables. By focusing on economic growth in my analysis, my approach was consistent with Mergesa and Cassimon who have asserted that for developing countries such as Kenya, economic growth is the more relevant variable when examining debt sustainability compared to primary budget balance that other studies have used.

Karazijiene (2015) presented the Blanchard and Domar models used to estimate the acceptable debt level relative to prevailing GDP growth rate and the country's borrowing rate. Ncube and Brixiova (2015) discussed the model for computing the debt-stabilizing primary balance. The difference between the debt stabilizing balance and the actual primary balance is the primary balance gap. A positive gap would be indicative of worsening debt burden. The approaches described in Ncube and Brixiova (2015) and

Karazijiene (2015) are important in assessing debt sustainability, and they provide simple and yet limited data requirements to compute. However, my focus was on analyzing the relationship between public debt and economic growth, and therefore, I used time series models.

Lwanga and Mawejje (2014) addressed the question of the link between budget deficit and key macroeconomic variables such as interest rate and the current account balance. Lwanga and Mawejje's study has similarity to my study because both studies focused on the analysis of the relationship between public debt and economic performance. However, Lwanga and Mawejje frame their model differently, with budget deficit coming in as the dependent variable and gross domestic product, lending interest rates, current account balance coming in as the independent variables. Eze and Ogiji (2016) study focused on the assessment of the impact of deficit financing on economic stability. They defined economic stability as a situation that prevails when the economy experiences constant growth, low inflation, and full employment. The framing of my research problem corresponds to the approach that Eze and Ogiji's used to frame theirs because in both case, the focus was on impact of debt on economic performance.

Van and Sudhipongpracha (2015) used economic growth as the dependent variable, while budget deficit, real interest rate and foreign direct investment were the independent variables in their study of the relationship between budget deficit and economic growth in Vietnam. Kasidi and Said (2014) used very few variables and their only independent variable was external debt. My research focused on total public debt, and because I want my findings to provide a range of policy options, therefore I included

many of the variables that used in early studies on relationship between debt and economic growth (see Eze & Ogiji, 2016; Owusu-Nantwi & Erickson, 2016).

Aspromourgos (2014) examined how a country could achieve the twin objectives of full employment demand-led growth and a sustainable public debt trajectory. Aspromourgos defined sustainable public debt as the stabilization of the ratio of public-debt to aggregate income at some desired level. It is achieving full employment while at the same time keeping public debt at the desired level. The article by Aspromourgos is useful in putting into context the Keynesian theory on public debt and full employment, but its focus on models and its simplification of the real world situation limits its application. Lew (2017) discussed the merit of removing debt limit, giving specific reference to the case of the United States. The article is relevant because many countries, including Kenya, have legislation that cap the debt limit. Lew argued that it is difficult to justify the existence of the debt limit. Further, Lew argued that increasing the debt limit is different from authorizing an increase in spending. Most countries have abandoned the concept of the debt limit, and adopted budgetary practices that link spending and revenue to the amount of debt (Lew, 2017). Lew's essay was relevant for my study because it provided useful contextual public finance policy perspectives relevant for my studies.

Carcanholo (2017) and Forges Davanzati and Patalano (2017) presented thoughts on the political economy of public debt anchoring their reflections on the Marx theories. Carcanholo focused on the political economy of public debt, about who pays for public debt and who benefits from it. Carcanholo (2017) asserted that the capitalist class is not responsible for most public debt repayment because taxation is regressive. Further, the

increase of public debt means more revenue to the debtors in the form of interest payments. Another important assertion from Carcanholo was that public debt is a form of fictitious capital, the latter being capital that does not participate in the productive process. Forges et al. (2017) argued that Marx's theory does not offer a conclusive insight into whether public debt has a positive or negative impact on the economy. The negative side of the theory postulates that the expansion of public debt raises money income and redistributes income to the benefit of lenders.

Forges et al. (2017) asserted that the increase in public debt increases taxation on wages, which Marx called 'fiscal expropriation.' Fiscal expropriation reduces reals wages and leads to lower labor productivity. On the positive side, Marx theory postulates that an increase in public debt leads to expansion of the public sector resulting to an increase in wages and welfare services, which in turn results in increased labor productivity. I did not apply Marx theory in my study, but the studies by Carcanholo (2017), Forges Davanzati and Patalano (2017) provided critical classical postulations and arguments for and against public debt.

Data Analysis Methods

The literature showed great diversity in variables selection for public debt-economic growth modeling. Similarly, there is great diversity in the model specification itself, ranging from ordinary least square (OLS) to advanced time series econometric models. While some researchers have used standard variables in the model's others have used the log of the values. Mergesa and Cassimon (2015) analyzed the relationship between public debt and economic growth in developing countries using panel data for

57 countries. Mergesa and Cassimon argued that the three components that drive debt dynamics are primary budget balance, interest payment, and GDP growth. They further argued that GDP growth should be the preferable variable for modeling debt sustainability in developing countries, the category where Kenya falls. Economic growth is relevant for assessing debt sustainability because high growth reduces the relative size of debt (as a percentage of the GDP) even if the nominal amount of debt is increasing (Mergesa and Cassimon, 2015).

Owusu-Nantwi and Erickson (2016) derived a model of public debt and GDP growth, which showed that the impact of debt on GDP growth depends on the relative strength of the increase in production arising from public investment funded by the debt versus the crowding out of private investment. The significance of their conclusion was that whether public debt enhances or hinders GDP growth that is a matter of empirical question because both outcomes are possible. Owusu-Nantwi and Erickson (2016) model had seven variables with real GDP growth rate introduced as the dependent variable. Independent variables were public debt, government consumption expenditure, inflation, investment spending, economic openness, and population growth. Below is the model specification that Owusu-Nantwi and Erickson used:

$$GDP_t = \propto + \beta_1 GOVD_t + \beta_2 GOVE_t + \beta_3 INFL_t + \beta_4 INV_t + \beta_5 OPEN_t + \beta_6 POPG_t + e_{1t}$$

Where GDP_t is GDP growth rate in year t, $GOVD_t$ is a measure of public debt, $GOVE_t$ is government consumption expenditure, INFL is inflation, INV is investment spending, $OPEN_t$ is economic openness which is measured by summing imports and exports in a particular year, and $POPG_t$is population growth. Where reliable data on employment rate

is available, it could be use instead of population growth rate (Owusu-Nantwi & Erickson, 2016). I closely aligned choice of variables and analytical models for my study to Owusu-Nantwi and Erickson study.

Eze and Ogiji (2016) used a model that had GDP as the dependent variable, which was the case in the Owusu-Nantwi and Erickson's (2016) model. However, Eze and Ogiji used different independent variables that represented the different sources of deficit financing. The independent variables were the different sources of deficit financing that include external sources, ways and means sources, banking systems sources, and non-banking sources. Eze and Ogiji also used control variables, which were interest rate, and exchange rate. Duran (2017) studied the impact of debt on the real gross domestic product for the Philippines. Duran's independent variables were only two, domestic and external debt, and the focus was on analyzing these two variables affected real GDP, which was the dependent variable. The approach adopted by Eze and Ogiji (2016), Duran (2017) and Owusu-Nantwi and Erickson (2016 guided selection of my study variables and econometric models for data analysis

Time Series Models

My study used time series analyses methods to examine the relationship between public debt and economic growth. I used an ex post facto research design, which involves the use of past time series data to analyze the relationship between variables. Eze and Ogiji (2016) described ex-post-facto design as a research method that uses events that have already taken place. Data exists, and all that the researcher does is to analyze the relationship between the variables or the implication of one variable over another. In my

study, I looked at what has been the implication of public debt on macroeconomic variables, especially economic growth.

Many econometric models are available for analyzing time-series data. Common models include vector autoregressive (VAR) and vector error correction model (VECM) (See Duran, 2017; Coupet. 2017; Eze & Ogiji; Lwanga and Mawejje (2014; Owusu-Nantwi & Erickson, 2016). There are four main steps in VAR and VEC analysis. The steps are the Augmented Dick-Fuller (ADF) test, Johansen cointegration test, Vector Error Correction Model (VECM) or Vector Auto Regression (VAR), and finally Granger causality technique. A researcher will need to carry out all these tests to arrive at conclusive results. The ADF test is carried out to assess whether the data is stationary, that is, if the data has no unit root. Owusu-Nantwi and Erickson (2016) tested for stationarity using both the ADF test and Phillips-Perron (PP) unit root tests. A stationary time series variable has a constant mean and a constant variance over time Duran (2017). Test for stationarity is crucial because it helps to rule out spurious regression from which no meaningful inference can be made. Eze and Ogiji (2016) argued time series variables are characterized by a stochastic trend, and that is the reason for first testing for non-stationarity before proceeding with the next steps.

The next step after the ADF test is to determine the optimal lag length. The lag length indicates the number of periods the analysts should lag the variables in the subsequent VAR or VECM analysis. Duran (2017) suggested that VAR is the appropriate model when the ADF test shows that the variables are integrated of order zero or I (0). When the ADF test shows that the variables are integrated of order one or I (1) and there

is a cointegration relationship between the variables, the Granger causality test is carried out using the VECM. After the ADF test and once the optimal number of lags is determined, the next step is the Johansen cointegration test (Duran, 2017; Owusu-Nantwi and Erickson, 2016; Coupet, 2016). When variables are cointegrated, that is an indication of existence of a long-run relationship between the variables. The final step in the analysis once cointegration has been established is the Granger causality test. Granger causality test using VECM assesses both short-run and the long-run causality between the variables (Duran, 2017). The VECM short-run causality is tested using the Wald test, and the long-run causality is tested by examining the statistical significance of the error correction term (Duran, 2017).

Coupet (2017) used a three-step analytical procedure to examine the relationship between government debt and economic growth. The first step involved ADF and PP tests to test for stationarity. Coupet second step after confirming that each series is integrated was to estimate the long-run equilibrium relationship using the Ordinary Least Square Regression (OLS). The variables used in the OLS analysis were in logarithmic form. The final step in the Coupet analysis was VECM analysis. The procedure that Coupet used is amenable to multi-country analysis, but my study focused on one country only. While Coupet runs OLS after the unit root test, in my research, I used VECM.

Mergesa and Cassimon (2017) used the system-generalized method of moments (SYS-GMM) to model the impact of public debt on economic growth. They used a multi-country dataset, and like Coupet (2017), they assumed a non-linear relationship between debt and economic growth. An essential modification in Mergesa and Cassimon model

specification is that they introduced public sector management (PSM) variables into the right-hand side. They hypothesized that the quality of public sector management affects the relationship between public debt and economic growth. Mergesa and Cassimon argued that GMM is superior to conventional techniques such as the OLS because it can tackle endogeneity problems among the explanatory variables. Despite the benefits of GMM, I used VECM because it is more prevalent in the debt-economic growth literature.

Lwanga and Mawejje (2014) carried out three tests to examine the long-run relationship between budget deficit and macroeconomic performance for Uganda. Their study was motivated by the growing budget deficit and the corresponding worsening macroeconomic variables such as the widening current account deficit, rising interest rate, and inflation in Uganda.. Lwanga and Mawejje used VECM to examine whether there was a long-run relationship between budget deficits and macroeconomic variables. They carried out ADF and PP methods to test for stationarity. Next steps after confirming that the variables were non-stationary and were integrated of order (1) was the Johansen cointegration test and lag length test using the final prediction error (FPE) criteria and Akaike information criteria (AIC). The final step in the phases of Lwanga and Mawejje econometric model was the VECM analysis. They also carried variance decomposition tests to examine the interactions between the variables.

Domar and Blanchard Models

The models provides methods for assessing debt sustainability based on the current or assumed primary balance and the real interest-growth differential (Ncube & Brixiova, 2013). The method calculates the primary balance needed to achieve the

desired debt-path under assumed levels of real interest rate and economic growth. The basic formula for estimating the debt-stabilizing primary balance is

$$P_t^* = \frac{r_t - g_t}{1 + g_t} d_{t-1}^*$$

Where P_t^* is the stabilizing primary balance, d_t^* is the stable debt-to-GDP ratio, r_t is the real interest rate, and g_t is the real GDP growth rate in percentage. The difference between estimated debt stabilizing primary balance and the actual primary balance is the 'primary balance gap.' When the gap is negative, it means the debt situation is likely to worsen unless the government implements fiscal interventions. I based my study on time series econometric analysis, and the assessment of the debt stabilizing primary balance was a secondary.

Debt Stabilizing Primary-Balance Approach

The mathematical models by Domar and Blanchard provide a reliable method of estimating a reasonable level of public debt that a country should hold given the countries prevailing macroeconomic conditions (Karazijiene, 2015). The variables that determine amount of debt that countries can support are interest rates, economic growth rate, budget balance, and other macroeconomic indicators (Karazijiene, 2015). Blanchard model is:

$$b_t = \frac{1 + i}{1 + y} b_{t-1} + pd_t + sf_t$$

Where $b_t$is the public debt to GDP ratio in time t, y is the nominal GDP growth rate, i is the country borrowing rate, pd is country's initial budget balance to GDP ratio, and sf_t is the adjusted the ratio of income and cost difference to GDP in time t (Karazijiene, 2015). Domar model is:

$$b_t - b_{t-1} = -\frac{y}{1+y} b_{t-1} + \frac{d}{1+y}$$

Where b_t is the ratio of public debt and GDP in time t, and y is the nominal rate of GDP growth and finally, d is the ratio of the budget deficit and the nominal GDP. All the ratios are expressed in percentage. Again, my focus was on the long-term relationship between public debt and economic growth, and time series econometric models will be the mainstay of my analysis. I did not compute Domar and Blanchard models, choosing instead to compute the Bohn model to assess Kenya's debt sustainability

Source of Data

My study used ex post facto design. Eze and Ogiji (2016) described the ex post facto design as a research design that uses existing data with no attempt to manipulate explanatory variables. I used existing archival data for the period 1971-2018 in my study to analyze the relationship between public debt and economic growth in Kenya. Mergesa and Cassimon (2015) and Owusu-Nantwi and Erickson (2016) used an ex post facto design with secondary data from the World Economic Outlook of IMF and the World Development Indicators (WDI) of the WB. Indeed, all the studies to analyze the relationship between debt and economic growth have used secondary data, with IMF and WB being the main sources of the data. My study used secondary data from IMF, WB, CBK, and TheGlobaleconomy, an online data resource.

Conclusions

The literature on the relationship between public debt and economic growth is broad, covering both developed countries and developing countries. The distinction between countries is essential because as Mergesa and Cassimon (2015) posited, debt

dynamics are different across countries. Debt dynamics are factors such as GDP growth rate, primary budget balance, capital mobility, and interest payments, and they affect the relationship between debt and economic growth. An important conclusion is that while some studies have produced a positive relationship between debt and economic growth, others have produced a negative relationship (Rahman, Ismail, & Ridzuan, 2019). The researcher has to assess the relationship empirically on a case-by-case situation.

The econometric methods for modeling the relationship between debt and economic growth are diverse. Many models found in the literature assume a linear relationship between debt and economic growth. Other models assume a non-linear relationship and predict a range of debt beyond which the relationship reverses from positive to negative. Some models focus on a search for the debt threshold points (Aero & Ogundipe, 2016; Topal, 2014). The linear model using the three-stage analysis that involves Augmented Dick-Fuller (ADF), Johansen cointegration test, and the Granger causality test (Duran, 2018; Owusu-Nantwi & Erickson, 2016; and others) is the most prevalent. My dissertation used these steps for data analysis.

Summary

The main theoretical framework in the literature that researchers have used to analyze the relationship between public debt and economic growth are the Keynesian theory, the Ricardian equivalence theory, and the neoclassical theory (Eze & Ogiji, 2016; Renjith & Shanmugam, 2018). Keynesian theory posits a positive relationship between debt and economic growth, Ricardian equivalence theory posits a neutral relationship, while the neoclassical theory posits a negative relationship. The choice of theoretical

framework reflects the viewpoint of classical economists, and it is useful in framing the analytical model and contextualizing the findings.

Debt sustainability and debt burden are concepts that researchers use to describe the difficulty and strain that a government experiences from holding debt (Kasidi & Said, 2013). Several factors beyond the size of a debt that a government owes affect debt sustainability. The factors include the size of the debt relative to GDP, economic growth rate, and the primary budget balance (Makin & Arora, 2012; Mergesa and Cassimon, 2015). These factors are key in modeling the impact of debt on economic growth.

The literature shows considerable diversity in the model's specifications for analyzing the relationship between public debt and economic growth. The most common specifications are the VAR or VECM models, which involve three main steps. The steps step are ADF test, Johansen cointegration test, and Granger causality test (see Duran, 2017; Eze & Ogiji, 2016; Owusu-Nantwi & Erickson, 2016)). The three-step analysis solves the problem associated with time-series data, including autocorrelation, tests for the presence of cointegrating vectors between the variables in the models, and finally, tests for statistical significance and direction of causality.

In the next chapter, I have discussed my research method and data analysis techniques. I have also discussed my research design, sources of data, and my choice of analytical techniques.

Chapter 3: Research Method

The purpose of this quantitative study was to investigate the long run and causal relationship between Kenya's public debt and economic growth to understand the impact of borrowing on economic performance. I did this by examining the relationship between real GDP growth rate and debt to GDP ratio, using the latter variable as the proxy for public debt. I used time-series econometric techniques to analyze the relationship between the size of public debt, both domestic and foreign, on GDP growth. The findings may provide insights into the impact of the debt procured by the government on the macroeconomic performance and sustainability of the debt situation in the country.

In this chapter, I discuss the research methodology and rationale behind the chosen methodology. I also discuss my research philosophy, theoretical basis, and analytical approach and justification. I identify the research variables and the econometric models that I used to analyze the study. I also discuss sources of data and the length of series used in my analysis. I further discuss my data analysis plan, including the econometric tools and statistical tests I used to examine the strength and statistical significance of the relationships between the variables. I conclude with a summary and a transition to the next chapter.

Research Design and Rationale

I tested three research hypotheses related to the nexus between debt and economic performance. I used real GDP growth rate as the proxy for macroeconomic stability. The first hypothesis that I tested was that there is no causal relationship between public debt and economic growth in Kenya. The second hypothesis I tested was there is no

relationship between real GDP growth and covariates in my model. Public debt was my primary independent variable, but I also wanted to identify other covariates that have a relationship with real GDP growth. The third and final hypothesis that I tested was Kenya's public debt is not sustainable.

Total government debt was the explanatory variable in my model, but I also included covariate variables that the neoclassical growth theory postulates to affect economic growth. The dependent variable in my study was the real GDP growth rate. The independent variables were total public debt as the primary explanatory variable, while government consumption expenditure, inflation rate, investment spending, economic openness, and population growth rate were the covariates.

I used a quantitative ex post facto design for my study. Ex post facto models predict outcomes retrospectively because events took place in the past, and the analysis only indicates whether there are statistically significant relationships between the variables (Druckman, 2004). Balogun, Awoeyo, and Dawodu (2014) argued that time-series models are used "to obtain an understanding of the underlying forces and structure that produced the observed data and to fit a model and proceed to forecast, monitoring or even feedback and feedforward control" (pp. 1046-1047). My main sources of data were the World Economic Outlook of the IMF and World Development Indicators (WDI) of the WB and the CBK. Others were TheGlobaleconomy and the KNBS.

Research Philosophy and Theoretical Base

I grounded my research on the positivist philosophy. Burkholder et al. (2016) defined *philosophy* as the branch of study associated with understanding the fundamental

nature of existence and reality. The significance of positioning to a particular philosophical orientation is that it helps to create the bridge between the aims of the study and the methods required to achieve those aims (Burkholder et al. 2016). Comte (as cited by Burkholder et al., 2016) posited that the term *positive knowledge* stands for scientific knowledge, which is different from fictional knowledge because it is generated from facts.

Positivist philosophy proposes that there is an objective truth that can be discovered through carefully controlled scientific methods (Burkholder et al., 2016). The epistemological assumption underlying this philosophical orientation is that scientists measure and interpret in a value-free manner and that knowledge is generated through facts that are derived from the application of the scientific method (Burkholder et al., 2016). I took a positivist approach and conducted a quantitative study in which I collected data and ran analyses following established scientific methods, and arrived at my conclusions through testing of hypotheses.

I based my research on the neoclassical theory of public debt. Lwanga and Mawejje (2014) stated that under the assumption of full employment and closed economy, the neoclassical theory holds that borrowing will result in an increase in current expenditure, which translates to high interest, reduced national savings, and reduced future investment. Even under the assumption of an open economy, the theory posits that borrowing increases consumption expenditure, which leads to an appreciation of the local currency and an increase in imports and reduction in exports (Lwanga & Mawejje, 2014). The neoclassical theory also predicts adverse effects of debt through decreased savings

and increased interest rates, which affect investment and growth (Renjith & Shanmugam, 2018). The choice of the neoclassical theory of public debt was appropriate for my study because it gave me a framework for developing the hypotheses for my research.

Choice of Analytic Method

I used time-series data analysis techniques consistent with similar studies that had addressed the relationship between public debt and macroeconomic performance. Duran (2017), Owusu-Nantwi and Erickson (2016), Lwanga and Mawejje (2014), and Coupet (2017) used analytic methods that were appropriate for my study. An alternative econometric model for time-series analysis is the system-generated methods of moments (SYS-GMM) (Megersa & Cassimon, 2017). Megersa and Cassimon (2017) argued that GMM is a superior technique compared to the ordinary least squares (OLS) because it can eliminate endogeneity among the explanatory variables. Even though SYS-GMM provided a useful analytic alternative, I used the three-step analytical procedure described by Duran (2017) and Owusu-Nantwi and Erickson (2016).

A good analytical technique for time-series data to examine the causal relationship between variables is to eliminate autocorrelation and measure the strength of the relationships between the variables. My empirical analysis included three econometric tests consistent with the approach used by Duran (2017), Owusu-Nantwi and Erickson (2016), Lwanga and Mawejje (2014), and Eze and Ogiji (2016). The tests were the ADF, the Johansen cointegration test, and the VECM. The tests comprise a suite of time-series data techniques that an analyst implements consecutively to test the level of integration of the variables, the presence and number of cointegration vectors, and the

direction and strength of causality. I examined the long-term causal relationship between public debt and economic growth to confirm or disconfirm the hypothesis that Kenya's continued accumulation of debt is harmful to the country's macroeconomic performance. Real GDP growth rate was the dependent variable, and total debt and other covariates were the independent variables.

Methodology

In this section, I describe the research methodology that I used to answer the research questions. My methodology derived from and aligned with the research problem, research questions, and hypotheses tested in my study. Babbie (2017) argued that the two major tasks in research design are to specify as clearly as possible what the researcher wants to find out. Second, after the researcher has defined the problem statement, purpose, and research questions, they must determine the best methodology to answer the research question. Burkholder et al. (2016) underscored the significance of ensuring that the elements in research are logically linked because that helps to answer the research questions as unambiguously as possible.

Population

I used archival data and I did not need to generate new data for my research. The time series data that I used for my study covered the period 1971-2018. The statistical models that I used for data analysis work better with longer time series especially when many variables are involved, as was the case in my study. A long time series ensures that there are sufficient degrees of freedom for the statistical tests. I used a retrospective study design, also referred to as causal-comparative study design, or the ex post facto design.

Sampling and Sampling Procedures

I used existing data and therefore I did not need to develop a sampling plan. All that I needed to do was to select the variables and the length of the time series. Selection of the country was purposive, and I selected Kenya. In the next step, I selected 1971-2018 as the length of the time series that my study was to analyze. My choice of the length of time series was guided by need to have a long period but one where information was available for all the seven variables in my model. The statistical models that I used in my analysis required long time series to produce robust results.

Archival Data

I used existing data consistent with my ex post facto research design. My main data sources were the World Economic Outlook of the IMF and the World Development Indicators (WDI) of the WB. The IMF and the WB sources have been the primary sources of data for similar studies (see Duran, 2017; Eze & Ogiji, 2016; Mergesa & Cassimon, 2015; Nantwi-Owusu & Erickson, 2016)). I also used data from the Central Bank of Kenya (CBK), Kenya National Bureau of Statistics (KNBS), and TheGlobaleconomy.

Definition and operationalization of research variables. The variables in my study were similar to variables used by Owusu-Nantwi and Erickson (2017). The dependent variable in my study was real GDP growth, which was the proxy for macroeconomic stability. The explanatory variable at the center of my research is total public debt in a particular year. I also used covariates in the analysis as control or

moderating variables. Below are the operational variables that my study used and analyzed:

The growth rate of GDP in time. The variable is the real GDP growth rate in period t. The variable measures economic growth. The source of data was the World Bank.

Gross government debt as a percentage of GDP (GOVD). I used this variable as the measure of public debt. I operationalized the variable using the liabilities approach, which define public debt as the outstanding loans and unpaid interests for the loan, and other financial liabilities held or guaranteed by the government (Karazijiene, 2015). The variable represent gross government debt as a percentage of GDP and it is the proxy for public debt. The variable was measured as government debt as a percentage of GDP. The source of data for this variable was International Monetary Fund (IMF).

Government consumption expenditure (GOVE). The variable measured government consumption expenditure as a percentage of GDP. The source of data was the World Bank. The rationale for introducing this variable into the model derives from the neo-classical theory, which holds that economic growth is a function of labor, capital, and state of technology. Therefore, high consumption expenditure would mean low investment expenditure.

Investment spending (INV). The variable represented investment spending as the percentage of the GDP, and I obtained it from the TheGlobaleconomy. From the neoclassical growth theory, investment spending would enhance labor and capital inputs and therefore have a positive impact on economic growth.

Inflation (INFL). The variable measured inflation (consumer price) in percentage. I measured inflation as the increase of the consumer price index from one period to another. The source of data was the International Monetary Fund (IMF).

Population growth (POPG). The variable measured population growth and I obtained the data from the World Bank.

Economic openness (OPEN). The variable measured the degree of economic openness. I operationalized the variable by measuring the total of exports and imports and expressing the total as a percentage of GDP. The variable measured capital mobility (Owusu-Nantwi & Erickson, 2017). The Source of data was TheGlobaleconomy. Figure 3 shows trends in three of the variables in my model from 2005-2017.

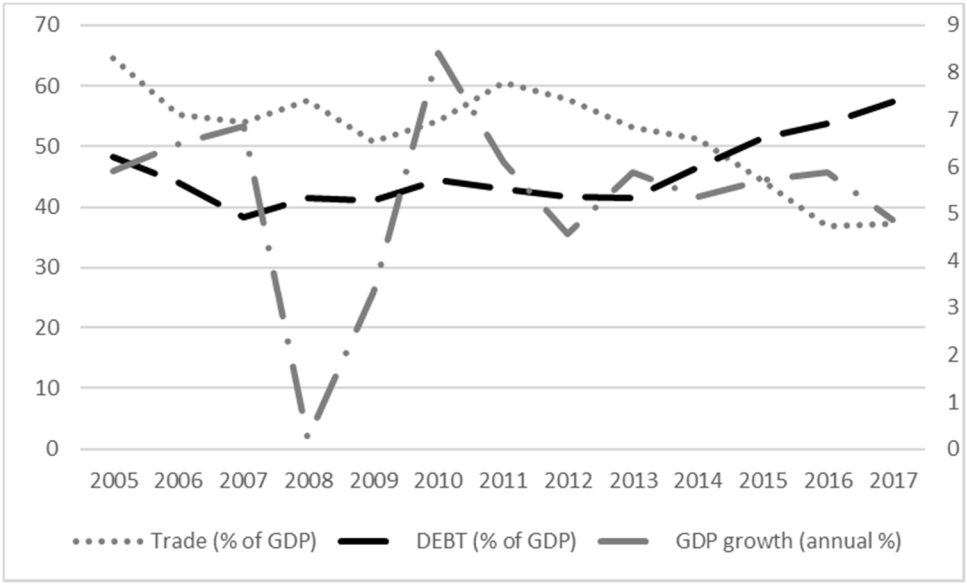

Figure 3. Trends in public and related macroeconomic variables, 2005-2017.

Data Analysis Plan

I used STATA statistical package and excel for my analysis. STATA is a comprehensive statistical package with extensive capability for analyzing time series

data. STATA also provides flexibility in importing and exporting data across other programs such as Access and excel. That flexibility was important because I initially extracted my data into excel sheets, and therefore, STATA's ability to import the data was an essential capability. STATA command can be stored and ran as batch command in subsequent sessions. That gives the researcher the opportunity to modify and improve the commands from one session to another, and a researcher can report the command they used to illustrate the procedures that they implemented. Appendix C has the STATA command that I used in my analysis.

Data Cleaning and Screening

I used archival data managed by reputable organizations, including the WB and the IMF. My data cleaning and screening was limited to ensuring that there are no missing values in my time series variables. My analysis covered forty-eight years, from 1971 to 2018, and there were seven different variables. I inspected the data to ensure that I have values for the entire study period for all my research variables. Rudestam and Newton (2017) argued that secondary data is likely to be of higher quality than student's generated primary data. That is because some of the organizations responsible for collecting secondary data have sufficient budget and other resources needed to collect and maintain clean databases.

Two types of transformations are common in the form of analysis that I used in my analysis. The first transformation is to use the natural logarithm of the variables rather than the original variables. The second common transformation is to scale down the variables by expressing the variables as a percentage of the GDP. The only data

transformation I made in my analysis was to scale the variables by expressing them as percent of GDP. For the data that I downloaded from WB and IMF sources, the variables were already presented as ratios of GDP, so I did not have to perform the transformations. Examples of researchers who have used the logarithm transformation are Lwanga and Mawejje (2014) and Duran (2017).

Data Analysis Process

Descriptive statistics. Descriptive analysis was the first analysis that I conducted on my data. I also graphed the variables to have a visual perspective of the data that I was dealing with. All the variables in my analysis were continuous and measured at the ratio scale, and thus amendable to descriptive analysis. Descriptive analyses through either a graphical presentation, estimating measures of central tendency and dispersion are essential in providing an initial indication of how data looks like. That help in subsequent decision on data cleaning and the appropriate statistical models for analysis.

Test for stationarity. Time series variables have several characteristics, which a researcher should correct prior to commencing regression analysis. Wonnacott and Wonnacott (1990) identified autocorrelation as one such characteristic, and they argued that data that has this characteristic produces unreliable estimates. Another common characteristic of time series data is that the variables are non-stationary, which means the variables have a time-varying mean and time-varying variance (Duran, 2017). Eze and Ogiji (2016) argued that running regression using non-stationary data produces statistics from which no meaningful inference can be made.

I used the ADF unit root test to check if my variables were stationary. Variables could be stationary at level or first difference, designated as I(0) or I(1). That distinction was necessary because it determines the appropriate model for analysis, whether VAR or VECM. The null hypothesis is that each variable has a unit root, which is equivalent to stating that the variable is non-stationary. The alternative hypothesis is that the variable is stationary (has no unit root). When the absolute value of the computed statistic is greater than the absolute critical value at a specified confidence level (1%, 5%, 10%), the null hypothesis is disconfirmed. A stationary time series has a constant mean, variance, and autocorrelation overtime. Researchers test for stationarity by regressing a time series with its first lag and assess the coefficient of regression. The basic model for testing stationarity is:

$$y = c + \alpha y_{t-1} + \mu_t$$

The null hypothesis assumes the time series is non-stationary, which is the same as saying it has unit root and α = 1.The rule is to reject the null hypothesis when the obtained *p*-value is less that the specified significance level, usually 5%. Rejecting the null hypothesis infers that the series is stationary. The ADF model I used in my study is as follows:

$$y_t = c + \beta_t + \alpha y_{t-1} + \phi_1 \Delta Y_{t-1} + \phi_2 \Delta Y_{t-2} + \cdots \phi_p \Delta Y_{t-p} + \varrho_t$$

Where y_{t-1} is the first lag of the time series and ΔY_{t-n} is the *nth* difference of the time series. The ADF model adds more differencing terms to the original Dick Fuller model and that adds more thoroughness to the test.

Vector Error Correction Model (VECM) analysis. In the next step, after establishing the variables are stationary of order one, I(1), was to run the VECM analysis. Under this step, I estimated the optimal lag-length, ran the Johansen cointegration test, and then the Granger causality tests.

Lag length test. I used Final Prediction Error (FPE), the Akaike Information Criteria (AIC), and the Hanna Quinn Information Criterion tests to determine the optimal lag-length. The test indicated the optimal lag-length for the next Johanssen cointegration test.

Johanssen cointegration test. After the lag-length test, the next analysis that I carried out was the Johanssen cointegration test, which is the standard test for examining the long-run relationship between time series variables. Johansen cointegration test assesses the presence and number of cointegration vectors within the variables in the model. It computes the trace and maximum eigenvalue statistics. Both these two statistics are used to test the null hypotheses that the number of integrating vectors is less than or equal to 0,1,2,3,4, or 5. When the trace test statistic or the maximum Eigenvalue test statistic is above the critical value at the designated significance level, the null hypothesis of no cointegration is rejected, and the alternative hypothesis that there is cointegration is accepted. I used a 5% level of significance consistent with the study by Owusu-Nantwi and Erickson (2016). Duran (2017) tested his hypothesis at 1%, 5%, and 10% respectively. Johanssen cointegration test only indicates the number of cointegration relationship across the vector of variables involved in the model. The test does not indicate the particular variables that are cointegrated or the direction of causality.

The long run and short run relationships. After establishing the presence of cointegration within the variables, my next step was to determine causality within the variables using the VECM model. The VECM model is only constructed if the variables are cointegrated. The VECM is a restricted VAR model and it provides information on long run and short run dynamics of cointegrated series. The compact VECM model is as follows:

$$\Delta Y_t = \alpha + \sum_{t-i}^{k-1} \beta_i \Delta \mathrm{Y}_{t-i} + \sum_{J-i}^{J-1} \gamma_j \Delta \mathrm{X}_{J-i} + \ldots\ldots + \sum_{m-i}^{k-1} \delta_m \Delta \mathrm{R}_{m-i} + \lambda ECT_{t-1} + \mu_t$$

Where X to R represent the set of the explanatory variables in the VECM model, and ECT_{t-1} is the error correction term, which is the lagged value of the residuals obtained from cointegrating regression of the dependent variables on the regressors. The term ECT_{t-1} contains the long run information derived from the long run cointegrating relationship. The λ coefficient is the speed of adjustment and it takes a negative sign, and it measures the speed of convergence back to long run equilibrium after a shock or deviation arising from changes in the independent variables.

VECM results provide two pieces of information that convey information about the statistical significance of the relationship between the variables. The first piece of information is the coefficients relating to the direction and strength of two variables. The second piece of information is the statistic called the error correction term (ECT), and it contains the long run information derived from the long run cointegrating relationship (CrunchEconometrix, 2018). I assessed short run relationship through direct method and the Wald test method. The direct method involved examining the sign and statistical

significance of the VECM output. I conducted the Wald test as a post-estimation test, and it tests the statistical significance of a variable and its lags together.

Threats to Validity and Reliability

External Validity

External validity measures the extent to which results can be generalized to other times, places, treatments variations, or participants (Rudestam & Newton, 2017). Many factors can undermine the external validity of results, and they include context-dependent mediation and interactions between the causal results and the environment (McDavid, 2013). By using an ex post facto research design, which entail use of secondary data, I was able to eliminate sampling bias, which is one source of external validity threat.

For data analysis, I used statistical models that have been tested and applied extensively in different places and over a long time. The combinations of tests that I used such as ADF, Johanssen cointegration test, VECM, and the Granger causality tests are well-established standard statistical tools for analyzing time-series data (Duran, 2017; Lwanga & Mawejje, 2014; Owusu-Nantwi & Erickson, 2016). I used data from endowed and reputable organizations that are capable of maintaining good data. All these factors contributed to strengthening external validity of my research.

Internal Validity

Shadish, Cook, and Campbell (2002) argued that threat of internal validity is present when it is not possible to determine conclusively which variables caused the other. That means internal validity threat leads to an inconclusive determination of cause and effect relationship within the variables in the model. There are several sources of

internal validity threat and instrumentation or measurement of variables, and the presence of confounding factors are particularly significant for my research. Another important validity issue is statistical conclusion validity, which measures the degree to which research can conclusively establish that a relationship exists between two variables.

I used secondary data and that contributed to the elimination of instrumentation problem. Variables in WB and IMF databases have standard definition and measurements across different countries and different periods, thus ensuring there is consistency of measurement over time. I limited the threat of confounding factors through careful modelling that ensured all potential confounding factors are included in the model as covariates. Drost (2011) argued that failure to take into account confounding factors is a source of internal validity problem.

Another potential source of threat to internal validity came from the difficulty in conclusively determining the direction of causality within the variables in my model. To deal with that threat, I used standard statistical tools developed and used purposely to test for the existence and direction of causation. The Johansen cointegration test examined explicitly for the presence and number of vectors of variables that have a long-run relationship. The Granger test that followed the Johansen cointegration test established the direction of causality within the variables.

Reliability

In a research process, reliability is a measure of how free the results are from measurement errors. Reliability is essential because it affects the validity of the results. Frankfort-Nachmias (2015) describes the reliability of data as a measure of how error-

free the data is. Burkholder et al., (2016) defined reliability as the degree to which research instrument produces consistent results. Therefore, reliability means the measurement of the variable yields the same results each time. Because I only used secondary data, I did not have to develop data collection instruments to make measurement of variables. I relied on the integrity of systems that the WB and the IMF have established to collect and validate data from member countries for my claim to data reliability.

Researcher Bias

A researcher bias has the potential of obscuring the true meaning of the phenomenon that the researcher is examining and hence the validity of the results. Researcher bias is his or her positionality to the topic under investigation. Ravitch and Carl (2016) argued that a researcher should engage a process called reflexivity, which is a process of self-awareness during research that helps a researcher to guard against their biases. Ravitch and Carl (2016) defined reflexivity as the systematic assessment of the researcher's identity, positionality, and subjectivities. Reflexivity also entails a self-reflection of "biases, theoretical preferences, research settings, the selection of participants, personal experiences, relationships with participants, the data generated, and analytical interpretations" (Ravitch & Carl, 2016, p. 15). I used standard and well-established data analysis models that left little discretion for manipulating the results. To avoid researcher bias, I remained conscious of my reflexivity and positionality and followed rigorous statistical procedures that are devoid of subjectivity.

Ethical Procedures

I adhered to the rules set out by the Walden University's Institutional Review Board (IRB) to ensure that my research is fully compliant with University's ethical standards as well as any applicable international guidelines. My research did not involve human subjects, and therefore, I faced limited ethical problems. I subjected my research to IRB procedures by submitting an application form before proceeding with data collection. My Walden IRB approval number was 12-04-19-0644418.

Summary

I discussed my research methods, covering the full scope from data collection and the econometric models that I used to analyze the data. I described my research design, which is an ex-post-facto design that uses archival data instead of primary data. I also described my data analysis methodologies, which involve three main sequential analyses. My data analysis methodologies aligned with analytical steps used by Duran (2017), Owusu-Nantwi and Erickson (2016), and Lwanga and Mawejje (2014). The analytical steps start with testing for stationarity using the ADF test, the Johnsen cointegration test that examines the presence and number of cointegration vectors within the variables in the model, and finally the VECM Granger short-run and long-run causality tests to measure the strength and direction of causality. I concluded the chapter by analyzing internal and external validity threats, and explained how I dealt with these threats in my research.

Chapter 4: Results

The purpose of this quantitative study was to investigate the long run and causal relationship between Kenya's public debt and economic growth to understand the impact of borrowing on economic performance. I formulated three research questions and associated hypotheses to aid my investigation:

RQ1: What is the relationship between GDP growth and public debt in Kenya?

My null hypothesis was that there is no significant relationship between GDP growth and public debt in Kenya. I tested my hypothesis by regressing the real GDP growth rate with government debt expressed as a percentage of GDP. Apart from government debt, I also included other explanatory variables on the right-hand side of the equation to take account of control variables.

RQ2: What is the relationship between GDP growth and the control variables in the model?

My null hypothesis was that there is no significant relationship between GDP growth and the control variables in the model. I tested the second hypothesis by regressing GDP growth with the control variables that included government consumption expenditure, investment, inflation, population growth, and economic openness. Government consumption and investment were expressed as a percentage of GDP. Economic openness was operationalized by adding exports and imports and expressing the sum as a percent of GDP.

RQ3: What is the relationship between primary budget balance and public debt in Kenya?

My null hypothesis for the third question was that there is no significant relationship between primary budget balance and public debt in Kenya. I used this research question to assess Kenya's debt sustainability, and the model that I used is the Bohn general equilibrium stochastic model. I tested the third hypothesis by regressing government debt with the primary debt balance.

In this chapter, I describe the process of data collection and cleaning. I also provide a detailed presentation of data analysis and results, including the alternative econometric analytical models that I tried and the final model I used to produce the results. The chapter ends with a summary and a transition to Chapter 5.

Data Collection

My primary data sources were the World Development Indicators (WDI) of the World Bank (WB) and the World Economic Outlook of the IMF. Other sources of data were the CBK and TheGlobaleconomy, which maintains a time-series database for crucial macroeconomic variables. The limitation with the CBK database was that it had a recent time series, whereas the models I used for this study required a longer time series. I used a time series running from 1971 to 2018. The CBK data were used to complement and validate the other sources of data.

Table 1 summarizes the source of data for each of the variables that I used in this study. Most of the data were from the WB and IMF. I also used TheGlobaleconomy for two of the variables in my model.

Table 1

Source of Data and Description of Variables of Research Questions 1 and 2

Variable	Definition	Data source
RGDP	Real GDP growth rate	Central Bank of Kenya and TheGlobaleconomy
GOVD	Gross government debt as a percentage of GDP (used here as a proxy for public debt)	World Economic Outlook (IMF)
GOVE	Government consumption expenditure as a percentage of GDP	World Development Indicators (WB)
INV	Investment as a percentage of GDP	TheGlobaleconomy
INFL	Inflation (consumer price) in percentage	World Economic Outlook (IMF)
POPG	Population growth (%)	World Development Indicators (WB)
OPEN	Economic openness (sum of export and import) as a percentage of GDP as a proxy for capital mobility	TheGlobaleconomy

Data Cleaning and Screening

My first action after acquiring the data was to screen for completeness and outliers. I also checked for duplicates, missing values, and completeness of the series for the period 1971-2018. Screening yielded no duplicates. There were missing values for 1977 and 1978 for variable GOVD, and I solved that problem by taking the adjacent values. I filled the 1977 gap using the 1976 value, and I filled the 1978 value using the 1979 value. To address the limitation of incomplete data series, I searched for and used alternative databases that keep macroeconomic data. For example, because the CBK data series started from 1999 and my study needed longer time-series data, I had to complement the CBK data with other Internet resources, such as TheGlobaleconomy.

Descriptive Statistics and Test

I conducted descriptive analysis of the data, as shown in Table 2. I reported key statistics including mean, median, range, skewness, and kurtosis for each of the variables. Although preanalysis diagnostics of data for autocorrelation, skewness, and kurtosis would be essential for OLS, they are not necessary for time-series analysis because the models in use for time-series analysis, such as VECM and ARDL that I used in my data analysis, are capable of dealing with limitations such as autocorrelation. Descriptive analysis in my study served the purpose of visualizing the data.

Table 2

Descriptive Statistics

Statistics	RDGP	GOVD	GOVE	INV	INFL	POPG	OPEN
Mean	4.7865	43.1154	16.3875	20.5552	11.9563	3.1554	56.5654
Median	4.4850	44.4600	16.6118	20.3500	10.1300	3.0287	55.6700
Maximum	22.1700	82.0900	19.8034	29.7900	45.9800	3.8651	74.5700
Minimum	-0.8000	13.0800	12.7111	15.0000	1.5500	2.3059	36.1800
Std. Dev	3.9717	16.9304	1.9281	3.3429	8.0381	0.5117	8.4470
Skewness	2.2271	-0.2263	-0.1694	0.3758	1.9300	0.0914	-0.1579
Kurtosis	10.3546	2.7034	1.8817	2.7245	8.2511	1.4430	3.4129
Range	22.9700	69.0100	7.0923	14.7900	44.4300	1.5592	38.3900
Observations	48	48	48	48	48	48	48

Analyses and Results for Research Questions 1 and 2

I examined Research Questions 1 and 2 using a single model. Research Question 1 addressed the relationship between GDP growth and public debt in Kenya, while

Research Question 2 addressed the relationship between GDP growth and the control variables. In both cases, the dependent variables were the real GDP growth rate (RGDP). Research Question 1 constituted the focus of the study, and the variable of interest was the gross government debt as a percentage of the RGDP. I assumed that control variables such as government consumption expenditure (GOVE), investment spending (INV), Inflation (INFL), population growth rate (POPG), and economic openness (OPEN) would moderate the relationship between RGDP growth rate and public debt.

I used VECM for data analysis for Research Question 1 and 2. For Research Question 3 I used the autoregressive distributed lag (ARDL). VECM is most appropriate when all the variables are nonstationary at level but become stationary at first difference. Even though three of the variables in my model were stationary at level, I still used VECM for my analysis. The autoregressive distributed lag (ARDL) model is capable of handling variables that have a mix of both I(0) and I (I) level of integrations.

Unit Root Test Results for Stationarity Check

I performed the ADF unit root test to check if the variables are nonstationary or stationary. Nonstationary variables have a time-varying means or time-varying variance, and conducting regression analysis with such variables could lead to spurious regression. The ADF test is an essential preliminary step in the analyses of time series data because its results indicate the appropriate data corrections procedures and models for the subsequent steps. I presented the results of ADF test in Table 3.

Table 3

ADF Unit Root Test

	Levels		First difference		Stationarity
Variable	Constant	Constant with trend	Constant	Constant with trend	
RGDP	-.495 (0.000)	-.479 (0.000)	-.903 (0.000)	-.942 (0.000)	I(0)
GOVD	-.085 (0.447)	-.109 (0.764)	-.975 (0.000)	-.985 (0.000)	I(1)
GOVE	-.088 (0.657)	-.290 (0.222)	-.980 (0.000)	-.988 (0.000)	I(1)
INV	-.481 (0.003)	-.604 (0.003)	-1.384 (0.000)	-1.384 (0.000)	I(0)
INFL	-.516 (0.002)	-.543 (0.005)	-1.168 (0.000)	-1.172 (0.000)	I(0)
POPG	.021 (0.998)	-.084 (0.227)	-.066 -(0.321)	-.053 (0.849)	Not valid
OPEN	-.266 (0.163)	-.408 (0.090)	-1.153 (0.000)	-1.163 (0.000)	I(1)

The unit root test indicated that my variables had mixed levels of integration, with half of the variables integrated at level and the remaining three variables integrated at first difference. The remaining variable, population growth rate (POPG), had invalid test results. Sayed Hossain (2013) explained that a test is invalid when the ADF unit root test returns a positive coefficient. The test for stationarity for POPG at level was positive, and it was nonstationary at first difference. The conclusion was that the results for POPG are not valid, consistent with Sayed Hossain (2013). Duran (2017) suggested that the VECM model is suitable when variables are integrated of order one or I (1). There are exceptions, such as Owusu-Nantwi and Erickson (2016), where researchers have used

VECM model even when some of the variables were stationary at level. Taking cue from Owusu-Nantwi and Erickson, I also used VECM. The ARDL model used in Research Question 3 analysis is not contingent on the level of integration of the series (Kripfganz and Schneider, 2016).

Lag Length Test

I conducted the lag length test to assess the optimal number of lags to use in the VECM model. Time series variables have serial correlation characteristics, which means each observation is statistically dependent on the previous ones (Wonnacott &Wonnacott, 1990). A lag of four, for example, means that the researcher should include four lags of the particular variable as regressors in the model. Table 4 has the results from my lag length test. I used four tests, namely Final Prediction Error (FPE), Akaike information criterion (AIC), Hannan-Quinn information criteria (HQ), and Schwartz Bayes information criterion. All four criteria are efficient (Sayed Hossain, 2013). Three out of the four criteria suggested that the optimal lag length should be four lags.

Table 4

Lag Length Selection Test

Lags	Final prediction error (FPE)	Akaike information criterion (AIC)	Hannan-Quinn information criterion (HQ)	Schwartz Bayes information criterion (SBIC)
0	2.9e+06	34.731	34.8362	35.0148
1	283.099	25.4823	26.3244	27.7531
2	56.3722	23.6982	25.2771	27.9559
3	7.7832	21.2268	23.5426	27.4715*
4	4.42362*	19.5025*	22.5552*	27.7341

Johansen Cointegration Test

Following the results of unit root tests and lag length test, I performed the Johansen Cointegration test to determine the number of cointegration vectors. The test involved both the trace and maximum Eigenvalue tests. Both test the null hypothesis that the number of cointegration vectors is less than or equal to the specified rank, zero to six in this study. I presented the results of Johansen cointegration test in Table 5.

Table 5

Johansen Cointegration Test

Model	Null hypothesis	Trace statistics	Critical value (5%)	Maximum Eigen	Critical value (5%)
Lag length =4	r≤0	263.366	124.24	95.890	45.28
	r≤1	167.476	94.15	78.990	39.37
	r≤2	88.486	68.52	36.673	33.46
	r≤3	51.813	47.21	26.631	27.07
	r≤4	25.182*	29.68	17.423	20.97
	r≤5	7.759	15.41	5.984	14.07
	r≤6	1.774	3.76	1.774	3.76

Both the trace statistics and maximum Eigen tests showed that the number of cointegration vectors in the model are four. The results showed that the trace statistic for the null hypothesis that the number of cointegration vectors is zero was 263.366. The value is above the critical value of 124.24 at the 5% level, which indicated the rejection of the null hypothesis of no cointegration. The maximum Eigen results arrived at a similar conclusion of rejecting the null hypothesis of no cointegration and accepting the alternative hypothesis of the presence of cointegration because the computed statistic was 95.890 compared to the critical value of 45.28 at 5%. I was able to reject the null hypothesis for cointegration ranks of one, two, and three. At rank four, the trace statistics was 25.182 and critical value was 29.68 at 5%, while the maximum Eigen value was 17.423 and the critical value was 20.97. In both case, the computed statistic was less than

the critical value, and therefore I could not reject the null hypothesis that there are at most four cointegration vectors in the VECM model.

The Johansen cointegration test results indicate that there exists a cointegration relationship among the seven variables, namely RDGP, GOVD, GOVE, INV, INLF, POPG, and OPEN. That means these variables move together in the long run and they have a long run equilibrium relationship. I ran VECM to examine both short run and long run causalities and reported the results in the following section.

Vector Error Correction Model Analysis

After establishing the lag length and establishing there are four cointegration vectors in my model, I ran VECM to estimate the long run and short run relationships between my dependent variable and independent variables. I presented the results in Table 6, which summarizes the results of the long run relationship, while Table 7 summarizes results for the short run relationship.

Long-run relationship. In the long run, GOVD had a positive and statistically significant impact on the RGDP. Other variables that had a positive and significant impact on RGDP were INV, and POPG. Government consumption expenditure-to-GDP ratio and OPEN had negative and statistically significant impact on RDGP. The coefficient for GOVD was 0.502 and it was significant at 1%, suggesting that public debt contributes positively to economic growth. The error correction term (ECT) for this model was -0.937 and it was significant at 1%, confirming that there is a long run relationship running from GOVD, GOVE, INV, INFL, POPG, and OPEN to RGDP growth rate. The interpretation of the ECT coefficient, also referred as speed of

adjustment, is that following a shock, approximately 93.7% of the adjustment towards the long run equilibrium for real GDP growth rate will be completed within one year (see CrunchEconometrix, 2018).

Table 6

Long Run Relationship

	Independent variables						
Dependent variable	GOVD	GOVE	INV	INFL	POPG	OPEN	Constant
Coefficient	0.502	-5.135	1.197	-0.1731	19.360	-0.170	1.804
P-value	0.000	0.000	0.000	0.001	0.000	0.007	

The short-run causality. I presented the results of the short-run causality test in Table 7 and Table 8. Sayed Hossain (2013) suggests two methods of assessment of short-run causality in a VECM model. The first method is to assess the statistical significance of individual coefficients directly from the VECM output, while the second method is the Wald test that assesses the statistical significance of all the coefficients for the lags of a particular variable taken together. Wald test was a post estimation test after the VECM analysis. I presented the simple short-run causality results in Table 7 and the short-run Granger causality results in Table 8.

The VECM analysis output had three lags for each variable, and the results in Table 7 were for lag one through to lag three. The results established that there is a statistical significant short run causal relationship between GOVD and RGDP because the coefficients were all significant at 1%.The coefficient for first lag was -0.406, for the

second lag was -0.360, and for the third lag was -0.219, and all were statistically significant at 1%. In the short run, GOVD has a negative relationship on the RGDP. Government consumption expenditure and INFL had a positive and statistically significant relationship with the RGDP, with all the three lags demonstrating significance at 1% level. The first lag of OPEN had a coefficient of 0.156 that was significant at 5%. The first and second lags of INV were negative and statistically significant at 1% and 5% respectively.

Table 7

Short Run Causality Using Individual Coefficients

	Independent variables						
Dependent variable	RGDP	GOVD	GOVE	INV	INFL	POPG	OPEN
RGDP		-0.406***	2.964***	-0.688***	0.348***	144.700**	0.156**
		-0.360***	3.801***	-0.600**	0.424***	-228.637**	0.098
		-0.219***	2.524***	-0.183	0.268***	217.167***	0.084
GOVD	-1.392*		-3.565	0.487	-0.524	-211.842	-0.299
	-0.947		-6.780***	-0.080	-0.257	35.873	-0.188
	-0.201		-1.395	-0.408	-0.181	-26.438	-0.154
GOVE	0.229**	-0.044		-0.067	0.042	41.322	0.013
	0.011	-0.022		0.060	0.003	-25.328	-0.032
	-0.022	-0.003		0.042	-0.021	10.267	-0.008
INV	1.031***	-0.329***	0.798		0.213**	-93.037	0.140
	0.815**	-0.051	1.766**		0.167	200.468	-0.017
	0.379	-0.186**	0.467		0.171**	-40.497	-0.130
INFL	-2.394***	0.989***	-7.698***	0.854		-61.121	-0.302
	-1.676**	0.445	-8.171***	0.955**		-226.882	-0.406
	-0.464	0.474**	-1.481	-0.436		-14.813	0.215
POPG	0.001	0.000	0.003	-0.001	0.000		0.000
	0.000	0.000	0.002	0.000	0.000		0.000
	0.000	0.000**	0.002	0.000	0.000		0.000
OPEN	0.570	0.017	-1.793	-0.244	0.152	-67.619	
	-0.126	0.465	-1.676	-0.381	0.066	184.784	
	-0.225	0.165	-0.670	-0.024	0.038	-172.847	

Table 8 has the short run Granger causality test results, estimated using the Wald test. The null hypothesis was there is no Granger causality between the RGDP, GOVD, GOVE, INLF, INV, POPG, and OPEN in Kenya from 1971 to 2018. The alternate hypothesis was there is Granger causality among the variables over the period 1971 to 2018.

The results showed that there was a statistically significant linear causal relationship between GOVD and RDGP. That means in the short run GOVD Granger causes RDGP. The rest of the variables, GOVE, INFL, POPG, and OPEN, all displayed statistically significant short run Granger causality with RGDP. With the GOVD as the dependent variable, the Chi-square value for RGDP was 4.65, but it was not statistically significant. The interpretation is that there is no short run Granger causality running from RGPD to GOVD. The causal relationship between GOVD and RGDP was unidirectional, running from GOVD to RGDP but not the other way round. The result also indicated a statistically significant short run Granger causal relationship running from RGDP to INV and INFL, respectively. That indicates that variation in RDGP would cause changes in INV and INFL, respectively. There is a bidirectional short run causation between RGDP with INV and INFL respectively.

Table 8

Short Run Granger Causality Using Wald Test

	Independent variables – Chi-square value (Wald test)							
Dependent variable	RGDP	GOVD	GOVE	INV	INFL	POPG	OPEN	t-statistics Error Correction Term
RGDP		23.67	37.34	20.87	24.63	26.73	7.92	-0.937
		0.000***	0.000***	0.000***	0.000***	0.000***	0.048***	0.000***
GOVD	4.65		12.14	1.70	3.23	5.75	2.08	1.438
	0.199		0.007***	0.637	0.358	0.124	0.556	0.044
GOVE	5.88	0.79		1.94	3.25	4.57	1.63	-0.157
	0.118	0.852		0.586	0.355	0.206	0.653	0.178
INV	23.82	12.92	7.06		4.97	9.39	7.35	-0.369
	0.000***	0.005	0.070		0.174	0.025**	0.062	0.123
INFL	18.51	12.67	32.16	10.09		14.58	9.04	2.228
	0.000***	0.005***	0.000***	0.018**		0.002***	0.029**	0.000
POPG	3.34	5.29	2.47	1.00	0.30		2.97	-0.001
	0.342	0.152	0.480	0.800	0.961		0.396	0.313
OPEN	1.52	3.56	1.04	0.77	0.36	1.16		0.418
	0.677	0.313	0.791	0.856	0.948	0.762		0.524

The results confirmed that there is a short run Granger causal link running from GOVD, GOVE, INV, INFL, POPG, and OPEN to real GDP growth rate. Based on results that I presented in Table 8, I could not sustain the null hypothesis that coefficients for GOVD, GOVE, INV, INFL, POPG, and OPEN are zero, instead I accepted the alternate hypothesis that the coefficients are different from zero. More relevant for my study, the

results demonstrated that there is a linear short run causal relationship between RGDP and GOVD.

Findings for Research Question 1

My Research Question 1 examined the relationship between RGDP and GOVD in Kenya. I used GOVD as the proxy for public debt, consistent with Owusu-Nantwi and Erickson (2016). My null hypothesis was that there is no significant causal relationship between RGDP and GOVD. The results established that there is a long run relationship between GOVD and RGDP. The coefficient for the GOVD was 0.502 and it was significant at 1%. The adjustment term -0.937 was significant at 1% suggesting that deviations from the long run equilibrium are corrected within one year at a convergence speed of 93.7%. Both the simple and Granger short run causality tests between GOVD and RGDP were statistically significant at 1%.

The conclusion from the research is that there is a linear causal relationship between RGDP and GOVD. Therefore, I rejected the null hypothesis and adopted the alternate hypothesis that there is a significant relationship between GOVD and RGDP in Kenya.

Findings for Research Question 2

For Research Question 2, I wanted to establish the relationship between RGDP and the covariates variables. The central focus of my study was the relationship between GOVD and RGDP. I posited that other variables moderated the relationship between GOVD and RGDP, and therefore I added GOVE, INV, INFL, POPG, and OPEN in the

model. The null hypothesis that I tested was that there is no significant relationship between the RGDP and the control variables.

The results established that there is both long run and short run linear causal relationships between running from GOVE, INV, INFL, POPG, and OPEN to RDGP. The long results showed that INV and OPEN had a positive and statistically significant linear causal relationship with RGDP. The remaining covariates, GOVE, INFL, and OPEN had a negative long run causal relationship. Results from the short run Granger causality test established that all the covariates had statistically relationship with RDGP, with INV and INFL showing a bidirectional relationship. Overall, the study established that other macroeconomic variables other than GOVD influenced RGDP. The data disconfirmed the null hypothesis of no statistically significant relationship, and I accepted the alternate hypothesis of a statistically significant relationship between RGDP and the covariates. The interpretation is that other macroeconomic variables other than GOVD influence RDGP.

Diagnostic Checking of the Model

Following from the VECM test, I performed tests for residual autocorrelation, normality of the residuals, and model stability. These tests were to ascertain that the results met the criteria of best linear unbiased estimates (BLUE) and can explain the relationship between the dependent variables and the independent variables in the model.

Residual autocorrelation. I used the Lagrange-multiplier test to check for autocorrelation of the residuals. The null hypothesis that I tested was that there was no autocorrelation at the lag order. I presented the results of residual autocorrelation in Table

9. At lag order one, two, and four, I could not reject the null hypothesis of no autocorrelation at 5%. Therefore, I accepted that the residuals were not auto correlated, which is a good sign that the model is specified correctly. However, the data could not support the null hypothesis of no autocorrelation at lag order number three because the *p* value was 0.036, which means the test revealed presence of autocorrelation at lag order three.

Table 9

Lagrange-Multiplier Test for Autocorrelation

Lag	Chi2	df	Prob > chi2
1	61.416	49	0.110
2	53.500	49	0.306
3	68.245	49	0.036
4	48.100	49	0.510

Normality test of residuals. I used the Jarque-Bera method to assess whether the residuals from the VECM model were normally distributed. The null hypothesis is that the residuals are normally distributed, which is the desired results to confirm that the results from VECM were BLUE. The result presented in Table 10 showed that overall, the *Chi2* was 15.121 and the *p*-value was 0.370, and therefore I could not reject the null hypothesis. Overall, the VECM model was robust, and the residuals were normally distributed. Only D_RGDP equation with *Chi2* of 6.761 and a *p*-value of 0.034 was the condition for normality of residuals not fulfilled. However, based on the results for the

entire model, and the majority of the equations, I concluded that the residuals were normally distributed. Hence, the results from VECM were BLUE.

Table 10

Jarque-Bera Test for Normality of the Residuals

Equation	Chi2	df	Prob > chi2
D_RGDP	6.761	2	0.034
D_GOVE	2.124	2	0.346
D_GOVD	0.115	2	0.944
D_INV	0.425	2	0.809
D_INFL	1.662	2	0.436
D_POPG	2.369	2	0.306
D_OPEN	1.665	2	0.435
ALL	15.121	14	0.370

Test of model stability. To confirm that the model correctly specified the number of cointegration equations, I generated the roots of the companion matrix diagram after the estimation of the VECM model. I presented my findings in Figure 4. The graph of Eigenvalue showed that none of the Eigenvalue fell outside the unit circle. The stability check confirmed that the model is specified correctly.

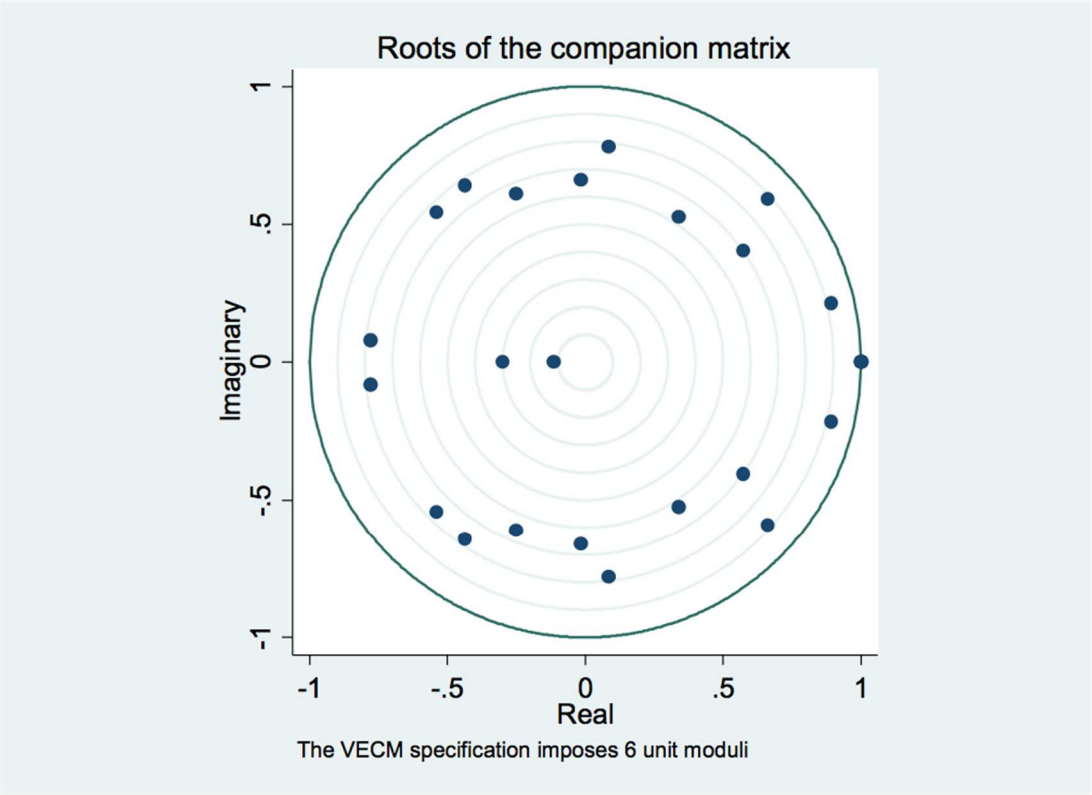

Figure 4. Roots of the companion matrix.

Analyses and Results for Research Question 3

In Research Question 3, I addressed the question of Kenya's debt sustainability. I analyzed the relationship between primary budget balance and public debt using the Bohn general equilibrium model. The null hypothesis that I tested was there was no significant relationship between primary budget balance and public debt in Kenya. Underlying that hypothesis is the understanding that public debt is sustainable if growth in public debt has a positive relationship with primary budget balance.

Source of Data

I used data series running from 1982 to 2018 for my analysis of Research Question 3. My dependent variable was the primary budget balance to GDP ratio

(PB_RATIO). The independent variable was the public debt as a percent of GDP (GOVD). I needed data for the period 1982-2018 but IMF data covered the period 1982-2011. Therefore, I supplemented IMF data with the Kenya National Statistical Bureau (KNBS) data to complete my series. The KNBS produces an annual publication, the Economic Survey, which has detailed data on different aspects of economic activities. The section of the publication that was relevant to my research was the public finance chapter. The two tables in that chapter that I reviewed to get my data are 'national government gross receipts on recurrent account' and 'central government economic analysis of expenditure.' I calculated the primary budget balance, which is government revenue minus non-interest spending. I then computed my primary budget to GDP ratio by dividing the estimated primary budget with the GDP.

Descriptive Statistics and Test

I conducted descriptive statistics of the data, which I have reported in Table 11. I reported mean, maximum, minimum, range, standard deviation, skewness, and kurtosis of each variable. Both variables demonstrated a high level of standard deviation, 4.519 for PB_RATIO, and 10.870 for the GOVD. The variable PB_RATIO was moderately skewed to the left with a skewness value of -0.762, while variable GOVD was moderately skewed to the right with skewness value of 0.880. Examination of kurtosis results indicated that that the variable PB_RATIO was approximately normally distributed, but the variable GOVD was leptokurtic, and hence not normally distributed. I also ran the correlation analysis between the two variables and obtained a correlation

value of 0.1450. The results indicated a weak correlation between PB_RATIO and GOVD.

Table 11

Descriptive Statistics of Research Question 2 Variables

Stats	PB_RATIO	GOVD
Mean	-1.398	50.475
Maximum	5.602	82.090
Minimum	-11.982	34.070
Range	17.584	48.020
Standard Deviation	4.519	10.870
Skewness	-0.762	0.880
Kurtosis	2.926	3.802
N	37	37

Specifying the Question 3 Regression Model

I used ARDL model specification to run my Bohn framework for estimating debt sustainability. The original Bohn model was linear, and it was estimated using OLS method (Renjith & Shanmugam, 2018). Renjith and Shanmugam noted that over time there has been an adaptation of the Bohn framework to accommodate non-linear specifications, panel data, and other forms of linear specification such as ARDL. Shastri and Sahrawat (2015) used the ARLD model to assess fiscal sustainability in India. The ARLD model that I estimated is:

$$y_t = c + \emptyset y_{t-i} + \beta x$$

Where y is the primary budget to debt ratio, and it was the dependent variable in my ARDL model. At the same time, x is the public debt to GDP ratio, and it was the independent variable. The ARDL is a linear model, and it fits a linear regression model of the dependent variable and independent variables, but also add lagged dependent and independent variables as additional regressors. The variables that I used are similar to variables in the original Bohn framework model, but I also used the first lag (y_{t-1}) of the dependent variable as an independent variable. Introducing the lagged value as an explanatory variable was consistent with the theory that most time series variables are serially correlated, which means y is a linear combination of its previous values (Wonnacott & Wonnacott, 1990).

Findings for Research Question 3

I reported the results of my debt sustainability analysis in Table 12. The *R*-squared was 0.836, while the adjusted *R*-squared was 0.825, thus demonstrating that the model fitted the data well and that is was specified correctly. The *p*-value for L1, the first lag of PB_RATIO, was 12.06, and it was statistically significant at 1%. That result demonstrated that there is autocorrelation between PB_RATIO and its previous values.

Table 12

Coefficients Estimated From ARDL Model

					Number of observation	33
					F(2,30)	76.52
					Prob > F	0.000
					R-squared	0.836
					Adj R-squared	0.825
	Coefficients	Std. error	t	p>|t|	95% confidence interval	
PB_RATIO						
	0.955	0.079	12.06	0.000	0.793	1.117
GOVD	0.087	0.035	2.49	0.018	0.058	0.158
_CONS	-4.921	1.863	-2.64	0.013	-8.726	-1.116

To answer Research Question 3, I look at the sign and statistical significance of the relationship between PB_RATIO and GOVD. The estimated coefficient for GODV was 0.087, and it was statistically significant at 5%. That result disconfirmed my null hypothesis that there is no statistically significant relationship between primary budget balance and public debt in Kenya. I accepted the alternate hypothesis that PB_RATIO and GOVD have a positive and statistically significant relationship. I concluded that Kenya's public debt is sustainable based on Renjith and Shanmugam (2016) guideline that if the relationship between primary budget balance and the debt is positive and statistically significant, then the debt is sustainable.

Summary

Chapter 4 presented the results of my analyses. In my research, I investigated three research questions, and I used archival data from the WB, the IMF, and the CBK, the KNBS, and TheGlobaleconomy. For Research Questions 1 and 2, I used the same data and same model, which VECM and my time series variables covered the period 1971-2018, a total of 48 years. For my Research Question 3, I used a shorter time series that covered the period 1982-2018, and I used ARDL model to analyze debt sustainability for Kenya.

The VECM results indicated that there was both a short run and long run cointegration between RGDP and GOVD in Kenya. The result showed that RGDP has a positive and statistically significant long run relationship with GOVD. The relationship was unidirectional from GOVD to RGDP, but not the other way round. The Granger short run analysis results indicated that RGDP has a relationship with GOVE, INFL, POPG, and OPEN, confirming the alternate hypothesis for Research Question 2 that other macroeconomic variables moderate the relationship between RGDP and GOVD. The results for debt sustainability that I analyzed using ARDL model indicated that there is a positive and statistically significant relationship between primary budget balance and public debt for Kenya. That finding disconfirmed the null hypothesis for Research Question 3 that there is no significant relationship between PB_RATIO and GOVD Kenya. I accepted the alternate hypothesis that there is a statistically significant positive relationship between PBRATIO and GOVD in Kenya. The interpretation is that Kenya's debt is sustainable.

The next chapter is the last for the dissertation. In that chapter, I discussed the findings of my analyses, main conclusions from my research, recommendations for further research, and the implications for positive social change. Finally, I provided some suggestions on how future researchers could improve this study.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this quantitative study was to investigate the long run and causal relationship between Kenya's public debt and economic growth to understand the impact of borrowing on economic performance. The study was motivated by the unremitting debate in the media and political platforms about the impact of Kenya's growing debt on economic performance, with debt expressed as a percentage of GDP increasing from 42.8% in 2008 to 57.1% in 2017 (Central Bank of Kenya [CBK], 2018). The government has continued to defend growing public debt arguing that it needs to procure debt to cover infrastructural gaps and catalyze economic growth.

On the other hand, opponents of borrowing have argued that public debt's trajectory is unsustainable and deleterious to economic growth. I conducted the study to answer the question about the impact of public debt on real GDP growth, which I used as a proxy for economic performance. Debt sustainability was the focus of the other research question, which was answered by analyzing the relationship between primary budget balance and public debt. I also wanted to synthesize policy recommendations revealed by the study findings.

I worked with three conceptual frameworks that explain the relationship between public debt and economic growth. The Keynesian theory postulates that debt will increase government spending and employment of redundant resources, which will lead to an increase in national output (Eze & Ogiji, 2016; Lwanga & Mawejje, 2014). The Ricardian theory postulates a neutral debt-growth relationship on the ground that debt incurred today is equivalent to the present value of future taxes (Renjith & Shanmugam).

The third conceptual framework was the neoclassical theory, which holds that debt will hurt the economy through the crowding-out of the private sector and the resultant reduced future capital formation (Lwanga & Mawejje, 2014).

My results indicated that there is a long-run relationship running from GOVD, GOVE, INV, INFL, POPG, and OPEN to RGDP. Further, the short-run Granger causality using the Wald test showed that there is a statistically significant relationship between debt and real GDP growth. This result disconfirmed the null hypothesis of no relationship between debt and economic growth. The relationship between primary budget balance and public debt was positive and statistically significant at 5%, indicating that Kenya's public debt is sustainable. The findings from my study are consistent with the Keynesian theory that holds that debt increases national output.

Interpretation of the Findings

The topic of the relationship between public debt and GDP growth has been studied across many developed and developing countries. The empirical literature reflected divergent conclusions on the relationship between public debt and economic growth (Duran, 2017; Rahman et al., 2019)). Some studies provided evidence of a negative long-run relationship between public debt and economic growth, other studies indicated a positive relationship, and others did not demonstrate statistical significance between economic growth and debt (Duran, 2017).

The VECM and ARDL models that I used in my analyses both address the linear relationship between public debt and economic growth. However, other studies have established a non-linear, inverted u shaped relationship between public debt and

economic growth (Aero & Ogundipe (2016), Duran (2017), Reinhart, Reinhart, & Rogoff, 2012; Reinhart, Reinhart, & Rogoff, 2015). Turning points of 85% were estimated in a study of Organization for Economic Cooperation and Development (Reinhart & Rogoff, 2012), while a lower turning point of 59% was established for a larger sample of 155 countries (Afonso & Jalles, 2013). The import of these findings is that the relationship between public debt and economic growth is positive for a specific range but becomes negative beyond a certain threshold.

Debt is likely to continue to be an essential public finance tool in the near future, as the government of Kenya continues its drive to cover the deficit of critical infrastructure needed to drive economic growth (Mwere, 2018). Owusu-Nantwi and Erickson (2016) supported the argument that developing countries such as Kenya will continue to borrow because tax revenue is not sufficient to fund the enormous expenditure needed to pay for investment in infrastructure, education, social welfare, health care, and other sectors of the economy. There is a need for continuous assessment of the impact of the debt on economic performance to provide policy decision-makers with reliable information for public finance planning.

The first research question addressed the relationship between public debt in Kenya and economic growth. I tested the null hypothesis that there is no statistically significant relationship between public debt and economic growth. My second research question addressed the relationship between economic growth and the covariates in the model. I tested the null hypothesis that there is no statistically significant relationship between RGDP growth and the control variables. My estimation model had government

consumption expenditure as a percentage of GDP, investment as a percentage of GDP, inflation, population growth, and economic openness as control variables. In introducing these variables, I was acknowledging that other variables moderated the relationship between public debt and economic growth. The third question that I answered in my study addressed the relationship between primary budget balance and public debt in Kenya. I tested the null hypothesis that there is no statistically significant relationship between primary budget balance and public debt in Kenya.

Finding of Research Question 1

The findings demonstrated that there is both long run and short run Granger causality between GOVD and RGDP. The long run coefficient for public debt was 0.502 and it was significant at 1%, signaling the existence of statistically significant relationship between GOVD and RGDP growth. That finding is consistent with the findings of Putunoi and Mutuku (2013) who established that domestic debt growth in Kenya had a positive and significant effect on economic growth. However, Putunoi and Mutuku only considered domestic debt, while my study considered total public debt (domestic and external). Owusu-Nantwi and Erickson (2016) also established a positive and statistically significant long-run relationship between public debt and economic growth in Ghana.

The short-run Granger causality test established a unidirectional linear causal relationship running from GOVD to RGDP. The simple short-run causality test using coefficients for individual lagged variables established a statistically significant negative relationship between GOVD and RGDP. However, the error correction term of -0.937,

which was statistically significant at 1%, meant that 93.7% of deviations from the long-run equilibrium are corrected within 1 year.

Finding of Research Question 2

The short run Granger test established that there was a linear relationship between GOVE, INV, INFL, POPG, OPEN, and RGDP. All the covariates were significant in explaining the variation in RGDP in the short run. The finding of a positive relationship between GOVD is consistent with conclusions reached by Owusu-Nantwi and Erickson (2016) for Ghana. However, my finding of a positive relationship between OPEN and RGDP is contrary to their finding of a negative relationship.

Finding of Research Question 3

I found that the relationship between public debt and primary budget balance was positive and statistically significant. That means Kenya's public debt is sustainable. Primary budget balance is government revenue minus noninterest expenditure, and primary budget balance is equivalent to fiscal balance, minus interest payments. Because the primary budget balance determines the rate of debt accumulation, it is a critical variable in assessing debt sustainability. Figure 5 shows a scattergram of the primary budget to GDP ratio and public debt to GDP ratio. From the data analysis, I was able to establish that there is a positive and statistically significant relationship between the two variables, with a coefficient of 0.087 and a *p* value of 0.018. Findings from my study are consistent with findings by Ng'ang'a, Chevallier, and Ndiritu (2019) who established that GDP growth had a positive impact on primary balance.

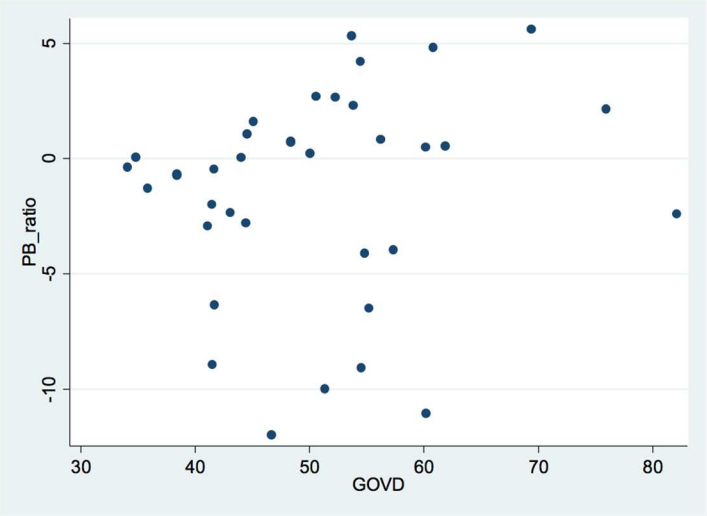

Figure 5. Scattergram showing the relationship between primary balance to GDP ratio and public debt to GDP ratio.

Limitations of the Study

I used linear estimation models and assumed that the relationship between public debt and economic growth is linear over the entire universe of debt. However, other studies (Aero & Ogundipe, 2017; Afonso & Jalles, 2013; Coupet, 2016; Reinhart, Reinhart, & Rogoff, 2012; Topal, 2014) have established a concave relationship where GDP growth rate rises with increasing debt up to a threshold point beyond which growing debt starts to hurt economic growth. I chose to go with the linear models such as VECM and ARDL model because they are the most commonly used models in the literature for analyzing the relationship between public debt and economic growth.

Archival data from the WB, IMF, CBK, and TheGlobaleconomy were my sources of data. The accuracy of the data was beyond my control. However, these are reputable organizations with credible and reliable systems for collecting, cleaning, archiving, and disseminating large multi country data.

Recommendations

The findings from my study established a positive and statistically significant long run relationship between RGDP growth and GOVD. That relationship was negative in the short run, indicating short run shocks that stabilize in the long run. Another important finding from study was the positive and statistically significant relationship between PB_RATIO and GOVD, consistent with findings by Ng'ang'a et al. (2019). That finding implies that in the case of Kenya, primary budget balance reacts to shocks in a way that mitigates explosive debt position.

Public debt plays an important role in macroeconomic development in Kenya. However, given the fact that Kenya's debt to GDP ratio has reached the 60%, the government must reduce its appetite for debt, targeting to bring the ratio down to 50%. A high debt ratio leads to debt overhang, characterized by drains to the financial resources through the outflow of principal and interest payments to debtors and the uncertainty about the future economic situation (Saungweme & Odhiambo, 2018). For the 2018/2019 government fiscal year, the proportion of expenditure towards debt redemption and interest payments to local and external debtors was 28.36% of the total government expenditure (KNBS, 2019). That represents a significant outflow of financial resources and signifies the need to reduce the total debt burden and the rate of acquisition of new debt.

Implications

I analyzed the relationship between public debt and real GDP growth in Kenya in my study. The study was prompted by the increasing Kenya's debt portfolio, which has

generated continuous debate and caused public anxiety. Hyman (2014) observed that debt could cause either positive or negative impact on economic performance depending on country's fiscal policy. Debt may lead to low savings, which cause low investments and by implication, low job creation and standard of living for the citizen of the country. However, debt may cause positive impact on economic growth if government allocates more spending to infrastructure and other capital goods that yield a stream of benefits in future (Hyman, 2014). Duran (2017) noted that debt-economic growth causality studies such as this one are important because they help shape more appropriate policies to promote better public debt management and economic growth. Lwanga and Mawejje (2014) asserted that causal studies are important for informing both fiscal and monetary policy. Therefore, the positive social change implication for my study is the potential for fiscal reforms in Kenya government to improve debt management, catalyze economic growth, investments, job creation and living standards of Kenyans.

Conclusion

The purpose of this quantitative research was to investigate the long run and causal relationship between Kenya's public debt and economic growth to understand the impact of borrowing on economic performance. I used the VECM to estimate both the long run and the short run Granger causality between public debt, macroeconomic covariate variables and real GDP growth rate. The findings of my research indicated that there is a positive long run relationship between public debt and real GDP growth rate, but the short run relationship was negative. I also investigated debt sustainability by analyzing the relationship between the primary budget balance and GDP growth using

ARDL model. Findings from debt sustainability analysis indicated that there was a positive and statistically significant relationship between primary budget balance and debt, thus fulfilling the condition for debt sustainability.

My research did not take into account the postulation advanced in other studies of the existence of a concave relationship between economic growth and debt (see Afonso & Jalles, 2013; Aero & Ogundipe, 2016; Coupet, 2017; Reinhart et al., 2012). Neither did my study investigate the nexus between the quality of public sector management (PSM) and the debt-growth relationship even though Mergesa and Cassimon (2015) postulated that such a relationship exists. Future studies should address these gaps.

Summary

Findings from my study indicated that there is a long run and short run causality between public debt and the real GDP growth. The covariates that returned a positive and statistically significant long run relationship with the real GDP growth rate were investment and population growth. The link between investment spending and economic growth is consistent with Hyman (2014) who argued prudent spending of debt on public investments that create future stream of benefits might improve welfare.

An importation limitation from my research was the assumption that the relationship between public debt and economic growth is linear over the whole universe of debt. Other studies such as Aero and Ogundipe (2017) and Topal (2014) have demonstrated that the relationship is concave. The other limitation is that my research did not incorporate the influence of corruption and the shadow economy (Cooray et al., 2016) on government debt. The quality of public sector management (PSM) has an impact on

the performance of public debt (Mergesa & Cassimon, 2015), but my research did not incorporate a variable for this component.

Public debt will continue to be essential to the Kenya's macroeconomic development. However, with Kenya's debt to GDP ratio hitting the 60% mark in 2020, it is imperative that government reduces its appetite for debt and bring the ratio down. A persistent high debt ratio is likely to precipitate a debt overhang, characterized by drains of financial resources through outflows to pay principal and interests to debtors, and the economic uncertainty about the future economic situation. In the fiscal year 2018/2019, Kenya's debt redemption in interests and principals stood at 28.36% of the total government expenditure (KNBS, 2019).

Chapter 5 concludes this dissertation. Appendices A and B have the data that I used in the analyses. In Appendix C is the STATA command protocol used to carry out the statistical analyses and the tests reported in this dissertation.

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Appendix A: Data Set for Research Questions 1 and 2

YEAD	RGDP	GOVE	GOVD	INV	INFL	POPG	OPEN
1971	22.17	17.98029	13.29	23.92	3.78	3.577735315	63.83
1972	17.08	17.63221	13.49	22.32	5.83	3.630206192	55.31
1973	5.9	16.45224	14.07	25.81	9.28	3.675456991	56.06
1974	4.07	17.03592	13.08	25.76	17.81	3.712097198	74.57
1975	0.88	18.3254	13.09	18.14	19.12	3.741563968	64.34
1976	2.15	17.4601	13.77	20.24	11.45	3.761304921	64.21
1977	9.45	17.20523	13.77	23.72	14.82	3.777195919	66.55
1978	6.91	19.51477	25.39	29.79	16.93	3.796723201	67.62
1979	7.62	19.19578	25.39	18.13	7.98	3.822025263	57.36
1980	5.59	19.80338	25.96	24.51	13.86	3.846021237	65.42
1981	3.77	18.58875	30.67	22.91	11.60	3.863433139	64.28
1982	1.51	18.43303	35.83	21.86	20.67	3.865113846	58.22
1983	1.31	18.42165	34.78	20.93	11.40	3.846046501	54.16
1984	1.76	17.38183	34.07	19.81	10.28	3.803939055	58.8
1985	4.3	17.46029	38.38	25.32	13.01	3.745275168	55.45
1986	7.18	18.31957	41.65	21.77	2.53	3.681816211	55.74
1987	5.94	18.56876	48.35	24.29	8.64	3.616906244	47.7
1988	6.2	18.40579	45.10	25.45	12.26	3.544875746	49.97
1989	4.69	18.05661	44.52	24.86	13.79	3.466469729	53.16
1990	4.19	18.64243	50.03	24.16	17.78	3.384345997	57.02
1991	1.44	16.77135	57.31	20.97	20.08	3.304696282	55.6
1992	-0.8	15.68227	54.81	16.92	27.33	3.22760537	52.93
1993	0.35	14.47997	82.09	17.61	45.98	3.148732286	72.86
1994	2.63	15.15493	75.92	19.29	28.81	3.06803937	71.27

1995	4.41	14.84292	69.36	21.82	1.55	2.989260583	71.75
1996	4.15	15.18057	60.79	15	8.86	2.914286538	57.31
1997	0.47	15.53615	50.55	15.14	11.36	2.848934797	54.06
1998	3.29	16.24996	54.43	16.69	6.72	2.798516498	48.9
1999	2.31	15.7533	53.67	15.52	5.74	2.765553396	48.19
2000	0.6	15.05429	52.23	17.41	9.98	2.745984467	53.31
2001	3.78	15.97291	56.22	18.79	5.74	2.728033491	55.95
2002	0.55	17.078	61.84	15.14	1.96	2.712391179	55.17
2003	2.93	18.13132	60.13	16.48	9.82	2.709600176	54.13
2004	5.1	17.86007	53.80	16.96	11.62	2.720796213	59.48
2005	5.91	17.38021	48.34	17.65	10.31	2.739229463	64.48
2006	6.47	14.347	43.98	18.63	14.45	2.757906955	55.24
2007	6.85	14.62961	38.37	20.46	9.76	2.768559996	53.89
2008	0.23	15.67398	41.47	19.61	26.24	2.767253963	57.58
2009	3.31	15.21447	41.09	19.33	9.23	2.750846669	50.86
2010	8.41	14.16903	44.40	20.84	3.96	2.722585637	54.23
2011	6.11	14.01163	43.05	21.7	14.02	2.693732572	60.45
2012	4.56	13.85793	41.69	21.48	9.38	2.66270486	57.77
2013	5.88	14.13958	41.49	20.11	5.72	2.618524437	53.13
2014	5.36	13.89041	46.67	22.43	6.88	2.55944065	51.3
2015	5.72	14.08763	51.33	21.47	6.58	2.491936871	44.21
2016	5.88	12.93897	54.50	18.26	6.30	2.421143197	37.65
2017	4.86	12.7111	55.18	18.8	8.01	2.356812573	37.49
2018	6.32	12.91398	60.15	18.44	4.69	2.305948675	36.18

Appendix B: Data Set for Research Question 3

YEAR	PB_RATIO	GOVD
1982	-1.282124	35.83
1983	0.0660093	34.78
1984	-0.359012	34.07
1985	-0.662821	38.38
1986	-0.452	41.65
1987	0.7144928	48.35
1988	1.6118819	45.10
1989	1.0613596	44.52
1990	0.2338544	50.03
1991	-3.949099	57.31
1992	-4.105876	54.81
1993	-2.395068	82.09
1994	2.1441702	75.92
1995	5.6015721	69.36
1996	4.8291326	60.79
1997	2.7029343	50.55
1998	4.1994007	54.43
1999	5.32749	53.67
2000	2.6551121	52.23
2001	0.8264139	56.22
2002	0.5530163	61.84
2003	0.4952335	60.13
2004	2.2989148	53.80
2005	0.7605544	48.34

2006	0.0399772	43.98
2007	-0.721233	38.37
2008	-1.990215	41.47
2009	-2.931182	41.09
2010	-2.788917	44.40
2011	-2.356236	43.05
2012	-6.345669	41.69
2013	-8.930683	41.49
2014	-11.98218	46.67
2015	-9.977567	51.33
2016	-9.071916	54.50
2017	-6.487799	55.18
2018	-11.0441	60.15

Appendix C: STATA Command Protocol Used in Data Analysis

```
/*VECTOR ERROR CORRECTION MODEL */
/* setting the time variables */
tsset year, yearly
/* Summary statistics for the variables in the model */
tabstat rgdp gove govd inv infl popg open, statistics( mean median max min sd skewness kurtosis range count )
/*Testing for the augmented unit root*/
dfuller rgdp, regress lags(0)
dfuller rgdp, trend regress lags(0)
dfuller d.rgdp, regress lags(0)
dfuller d.rgdp, trend regress lags(0)
dfuller gove, regress lags(0)
dfuller gove, trend regress lags(0)
dfuller d.gove, regress lags(0)
dfuller d.gove, trend regress lags(0)
dfuller govd, regress lags(0)
dfuller govd, trend regress lags(0)
dfuller d.govd, regress lags(0)
dfuller d.govd, trend regress lags(0)
dfuller inv, regress lags(0)
dfuller inv, trend regress lags(0)
dfuller d.inv, regress lags(0)
dfuller d.inv, trend regress lags(0)
dfuller infl, regress lags(0)
dfuller infl, trend regress lags(0)
dfuller d.infl, regress lags(0)
dfuller d.infl, trend regress lags(0)
dfuller popg, regress lags(0)
dfuller popg, trend regress lags(0)
dfuller d.popg, regress lags(0)
dfuller d.popg, trend regress lags(0)
dfuller open, regress lags(0)
dfuller open, trend regress lags(0)
dfuller d.open, regress lags(0)
dfuller d.open, trend regress lags(0)
/*Correlation analysis*/
cor rgdp gove govd inv infl popg open
/*lag length selection test */
varsoc rgdp gove govd inv infl popg open
/*The Johansen cointegration test */
vecrank rgdp gove govd inv infl popg open, trend(constant) lags(4) max
/*Vector error correction model - VECM*/
vec rgdp gove govd inv infl popg open, trend(constant) rank(4) lags(4)
/* postestimation tests */
/* short-run Granger causality test*/
test ([D_rgdp]: LD.gove L2D.gove L3D.gove)
test ([D_rgdp]: LD.govd L2D.govd L3D.govd)
test ([D_rgdp]: LD.inv L2D.inv L3D.inv)
test ([D_rgdp]: LD.infl L2D.infl L3D.infl)
test ([D_rgdp]: LD.popg L2D.popg L3D.popg)
test ([D_rgdp]: LD.open L2D.open L3D.open)
/* Test for autocorrelation of the residuals */
veclmar, mlag(4)
/*Check of normality of the residuals */
vecnorm, jbera
/* END OF VECM MODEL*/

/* AUTOREGRESSIVE DISTRIBUTED LAG MODEL */
ardl  rgdp gove govd inv infl popg open, lags(2) ec
/*ardl postestimation tests */
```