The Determinants of Public Debt in the Gambia : An Autoregressive Redistributed Lag (ARDL) bound Cointegration Technique

By

JARJU, Saikouna E

THESIS

Submitted to

KDI School of Public Policy and Management

In Partial Fulfillment of the Requirements

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Committee in charge:

Professor Cho, Dongchul, Supervisor

Professor Liu, Cheol

Professor Kim, Taejong

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Abstract

With rising public debt levels in developing and middle income countries and the debt crises that has strucked most of the advanced economies, there has been a lot of scholarly and policy debates about the factors that determines the public debt level of a country. This paper examines the impact of selected macroeconomic variables as well as a governance indicator (government effectiveness variable) in determining the public debt level of The Gambia. An Autoregressive Distributed Lag (ARDL) method was employed to establish the short-run and long-run impact of the selected variables on public debt. The study reveals that trade openness and gross fixed capital formation have an increasing impact on public debt in the long-run. GDP growth, official exchange rate, and the government effectiveness variables on the other hand have a decreasing effect on public debt levels in the long-run. However, none of the variables show a significant relationship with public debt of levels of The Gambia in the short-run.

Keywords: Public Debt, Debt Sustainability, Auto Regressive Distributive Lag (ARDL), GDP Growth

Dedication

Dedicated to my beloved late parents

Acknowledgment

I thank and praise the Almighty Allah for granting me good health and wisdom to carry out this research, and for all the favors He has bestowed on me. I wish to express my heartfelt gratitude to my thesis supervising committee, Professor Cho Dongchul and Professor Lui Cheol. Without their extensive supervision and encouragement this research would have been difficult to be completed on time.

I equally wish to extend my sincere appreciation to the KDI School of Public Policy for granting me a fully funded scholarship. To the Government of the Gambia, I am grateful for granting me a study leave to study overseas.

I am grateful to my mentors; Sulayman Yameogo, PhD and Lusekelo George PhD for their tireless support and guidance that has better the content of this paper.

Finally, I want to thank my family and friends for their unwavering support, love, and encouragement during my studies.

List of Abbreviation and Acronyms

ADF	Augmented Dickey Fuller
AIC	Akaike Information Criterion
ARDL	Auto Regressive Distributed Lag
DSA	Debt Sustainability Analysis
GFCF	Gross Fixed Capital Formation
GDP	Gross Domestic Product
HIPC	Highly Indebted Poor Countries
MDRI	Multilateral Debt Relief Initiative
IMF	International Monetary Fund
MoFEA	Ministry of Finance and Economic Affairs
OLS	Ordinary Least Squares

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1. Introduction

1.1. Background of the study

One of the most worrying and challenging economic issues faced by the policy makers in The Gambia is the high risk of debt distress on the public debt portfolio. From the recent debt sustainability analysis conducted, the results have shown that the country has breached most of the indicative debt sustainability thresholds by substantial margin signalling major liquidity pressures (MoFEA, 2020 a).

Over the years, an enormous amount of research has focused on topics such as the sustainability and the optimality of the public debt levels, as well as the corresponding sustainable trajectory of fiscal balance (Forslund et al., 2011; IMF, 2019; Calderón & Zeufack, 2020).

Since the country received debt forgiveness through the Highly Indebted Poor Countries (HIPC) initiatives, the debt levels have been rapidly increasing; this continues to pose threatening macroeconomic implications. According to an IMF Second Staff Monitoring Program Review (2018), The Gambia's public debt risks have worsened, with the ratio of debt to GDP approximately 130 per cent at end 2017. Debt service to revenue threshold registered significant breach in the recent periods showing a liquidity challenge of the government as huge chunk of the domestically generated revenue predominantly from taxes goes into servicing debt consequently restraining government spending in other pressing sectors like agriculture, education, health etc.

This situation propelled the government to reduce the cost-risk factors embedded in the public debt portfolio over the medium to long term by pursuing various policies aimed at addressing these problems such as seeking only concessional external financing and

lengthening the maturity profile of the domestic debt to reduce roll-over risk. One of the major objectives of these policies was to reduce the government's net domestic borrowing, which would relieve yield pressure and allow for a progressive extension of the maturity profile thus, help avoid locking in excessive costs upfront by extending the maturity too quickly (MoFEA, 2020 b).

Numerous studies have probed the elements that determine the evolution of public debt in recent years (Reinhart & Rogoff, 2010; Sinha et al., 2011; Swamy, 2015; Lau & Lee (2016). Swamy (2015) revealed that economic growth, population, FDI, and inflation all had a diminishing impact on debt using the Panel Granger causality methodology. He argued that investment, government spending, and openness to trade, on the other hand, had an increasing impact on public debt. Sinha et al. (2011) used panel regression to confirm that growth in GDP, interest rate changes, inflation rate, current account, and foreign direct investment are the primary factors that influence the magnitude of public debt. However, Reinhart and Rogoff (2010) examined GDP growth and public debt nexus, concluding that if the percentage of debt-to-GDP is less than 90%, the link between them becomes weak.

Notwithstanding, no specific research has examined the drivers of Gambia's debt levels to the best of my knowledge. As a result, this research intends to add to the current body of knowledge on the relationship between specified variables and public debt levels with focus on The Gambia. The Government, particularly the Ministry of Finance and Economic Affairs will be interested in this paper's findings which can be used to make policy decisions.

To achieve this goal, this paper will be premised on the following research questions: Does the selected variables manifest a causal link on the public debt burden in The Gambia? If there is a causal relationship, what are the policy implications on the control of the selected variables?

In finding answers to the aforementioned questions, the paper uses an Autoregressive Distributive Lags Mechanism (ARDL) as proposed by Pesaran et al. (2001) to test whether the selected variables manifest a short run or long run impact on the public debt levels in The Gambia.

The remainder of this paper is laid out as follows: The next chapter reviews the literature on public debt and its determinants. Chapter III discusses primary hypotheses. Chapter IV presents the data and research method. Chapter V presents the analysis of the results. Finally, chapter VI presents the policy recommendations of the findings and conclude the paper.

1.2. Research Question

This paper will be premised on the questions below:

1) Do the selected variables manifest a causal relationship on the evolution of public debt in The Gambia?

2) If there exists a nexus, what are the policy implications on the control of the selected variables?

1.3. Hypotheses

The following hypothesis will be tested on my interest variables.

H_1: Trade openness is a key determinant that positively impacts the public debt levels in The Gambia.

H_2: Higher GDP growth has a decreasing casual impact on public debt levels in The Gambia.

H_3: Government effectiveness has a decreasing impact on the public debt dynamics in The Gambia.

1.4. Significance of the Study

The findings of this study will contribute to the existing body of knowledge on the effect of specified drivers on public debt in the Gambian economy. In addition, it will recommend ideas for future studies so that researchers might pick up and examine these topics.

The government, particularly the Ministry of Finance, can use the result of this study to make policy decisions. The overarching goal is to direct economic policies in managing public debt in The Gambia, as well as to advise the government on the impact of selected variables on public debt so that informed investment decisions can be made.

Finally, the findings of this study will enlighten investors about the causes in the flotation of government bonds and how this affects the country's economic growth. This will guide investors in making decisions about when and where they can direct their investments which can help to boost economic growth.

2. Analysis of The Gambia's Public Debt Portfolio

2.1. Public Debt Evolution in the Gambia

The graph in figure 1 illustrates the historical trend in the evolution of public and publicly guaranteed debt for the past twenty years. The Gambia's public debt levels have ever been in an increase before the receipt of the HIPC and MDRI debt reliefs mainly as a result of persistent budget deficits, fiscal slippages, and an increase in guarantees to the State Own Enterprises (SOEs). Before the receipt of the HIPC debt relief, the county's debt levels reached 140 per cent to GDP.

In 2007 the country reached the HIPC completion point and benefited from assistance worth 66.6 million USD which was meant to reduce the country's debt as a percentage of export below the 150 per cent HIPC threshold. In terms of net present value, World Bank and IMF contributions to this debt relief were US$22.3 million and US$2.3 million, respectively. As of November 2007, US$8.0 million and US$0.6 million of these total promises had already been delivered as interim assistance. In Net Present Value (NPV) terms, the total debt relief provided between 2001 and 2007 was US$17.5 million. In addition, The Gambia also benefitted from Multilateral Debt Relief Initiative (MDRI) that was initiated by the G8 countries to eliminate debts of most indebted countries with the aim to further reduce HIPCs debt and offer more resources to assist in achieving the Millennium Development Goals (IMF, 2007). This relief has helped to reduce the Debt to GDP ratio down from 140.5% to 60.9% as shown in figure 1.

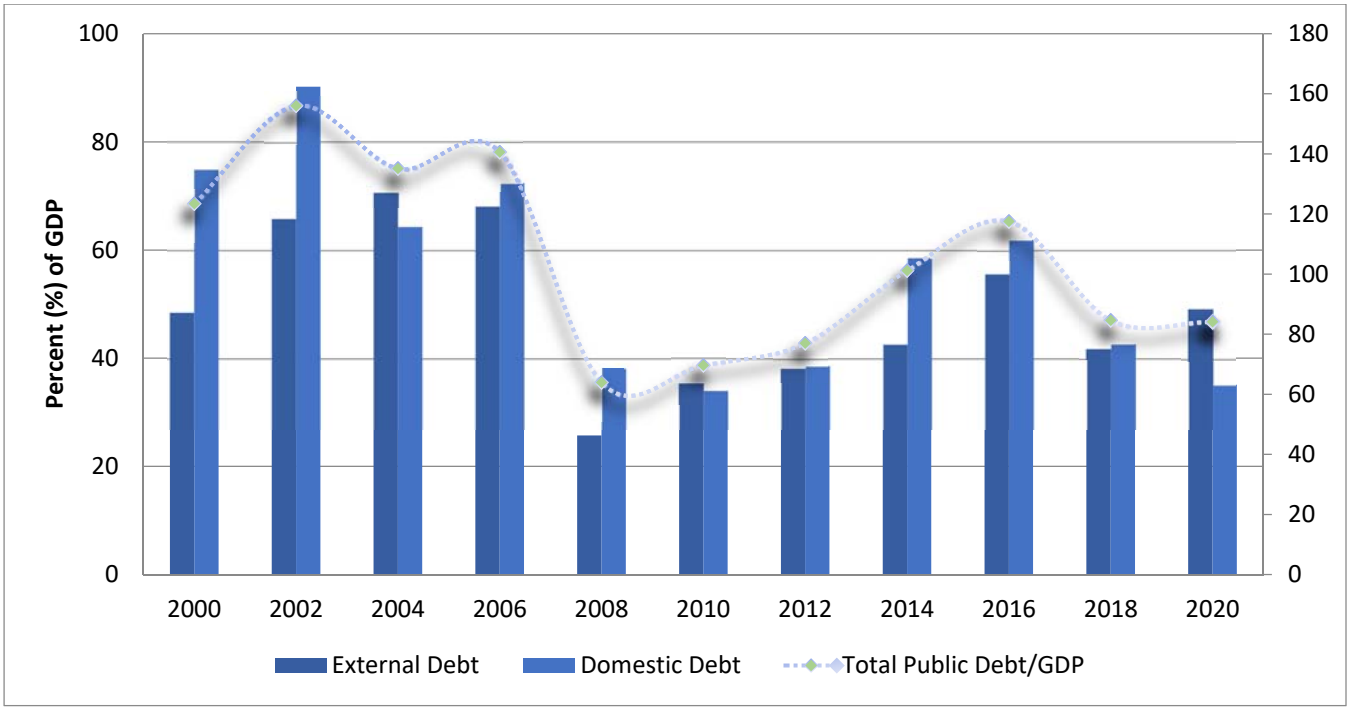
Even though the relief was on the external debt portfolio, the impact of the relief has trickled down on the domestic debt portfolio too as the relief has created a breathing space for the budget which eventually reduced the issuance of T-bills from the domestic debt market to finance the budget deficit.

Despite the receipt of these debt reliefs, the country soon started to breached most of the indicative debt thresholds in less than a decade which can be attributed to the uncontrollable

growth in the budget deficit. This has forced the government to restructure its external debt with most of the bilateral and multilateral creditors in 2020 by deferring principal payments up to 2024.

According to the Debt Sustainability Analysis (DSA) report (2020), exchange rate, economic growth, primary balance, nominal interest rates, and foreign direct investments, as well as current account balance have been the driving factors on the growth of public debt in The Gambia. Historical data have shown that the combination of current account deficit and FDI are established to have been the most significant cause of the increase in debt in The Gambia. Other inexplicable factors (residuals) could have contributed to debt accumulation in the past, some of which will be assessed in this paper.

Figure 1: Evolution of Public Debt Outstanding as a Percentage of GDP



3. Literature Review

What are the factors that determine the public debt level of a country? To answer this question, this chapter will review the literature on the main determinants of a country's public debt levels. Since the 1970s and 1980s debt crises in which majority of the developing and emerging economies where affected, a lot of empirical research has focused on the variables that influence the public debt dynamics in developing, emerging, and advance economies (IMF, 2019; Sadik-Zada & Gatto, 2019; see also McFadden et al., 1983; Sachs & Larrain, 1999; Eicher, 2008; Kourtellos et al., 2013; Atta-Mensah & Ibrahim, 2020).

Based on earlier literature that examines the causes of debt crisis and the ramifications of the crisis on least developed countries for borrowers and lenders. It has been established that deflation in product prices, interest rates, and exchange rate appreciation are the contributors to debt crisis in Least Developed Countries (LDCs). Additionally, GDP growth, ratio of debt service to export, and a high interest payment are found to be the most fundamental drivers of a country's demand for borrowing (see McFadden et al., 1983; Eichengreen & Portes, 1986; Hajivassiliou, 1987; Stambuli, 1998).

In a study conducted in 23 countries using panel and cross-sectional data to examine the factors that influence external debt, Eichengreen and Portes (1986) concluded that trade openness and export fluctuations directly influences the levels of a country's foreign debt, however, this finding was argued to be not statically significant using the cross-sectional data. Similar findings were established by Alshara et al. (1991) who examined the magnitude and structure of Jordan's public debt as well as its link with some of the macroeconomic variables such as investment, gross national product, revenue from tax, disposable income, and trade

openness. Their findings showed that external debt is positively impacted by consumption, investment, imports, and GDP growth.

Having discussed findings of earlier studies, I will now review recent studies that have mostly focused on the possibility of nonlinearities within the debt and growth nexus, particularly focusing on high public debt. Most of these studies have postulated that there is an inverse link between government debt and economic growth (see Kumar & Woo, 2010; Sinha et al., 2011; Reinhart & Rogoff, 2012; Swamy, 2015).

In his seminal work, Swamy (2015) revealed that GDP growth, public spending, FDI, inflation, and population all had a decreasing effect on public debt by using the panel granger causality methodology. He argued that gross fixed capital formation, consumer spending, and openness to trade, on the contrary, had an increasing impact on with debt (for a useful and more recent discussion on GDP growth and public debt nexus see Ndoricimpa, 2020).

Sinha et al. (2010) used panel regression to confirm that growth in GDP, interest rate changes, inflation rate, current account, and foreign direct investment are the primary factors that influence the magnitude of public debt. However, these findings were refuted by the study of Reinhart and Rogoff (2010) who examined GDP growth and public debt nexus concluding that if the percentage of debt-to-GDP is less than 90%, the link between them becomes weak. These conclusions spurred a lot of debate that led a distinct body of research to explore whether the arguments are robust enough to account for non-arbitrary debt levels (e.g. Krugman & Eggertsson, 2010; Cecchetti et al., 2011; Bittencourt, 2015)

The debate over the link between GDP growth and public debt in industrialized nations became more heated since the publishing of an opposing paper by Herndon et al. (2014) questioning arguments made by Reinhart and Rogoff (2010). Krugman and Eggertsson (2010)

claim the nexus that exists between growth in GDP and public debt is related to the assumption that slow economic growth contributes to large amounts of public debt using Japan as an example.

Bittencourt (2015) analyzed the key causes of public debt in the emerging countries in South America. He concluded that the region's debt ratios have decreased dramatically because of economic growth. He established that in order to maintain the region's debt burden under control, the region requires an economic environment that enhances productivity to boost economic growth. Similar finding on the decreasing impact of growth of an economy on public debt have been established in the East African Region (see Babu et al., 2014).

In a study that used multiple econometric methodologies, Lau and Lee (2016) explored main factors driving public debt in The Philippines and Thailand. Their findings suggest inflation and interest cost to have been the most important elements in determining Thailand's external debt. However, no proof of relationship could be established between the aforementioned variables and public debt in the case of The Philippines. This finding conforms to an early study by Rangarajan and Srivastava (2003) who established that primary deficits and the difference between interest rates and growth significantly influences the change in debt-to-GDP ratios.

A parallel strand of literature focuses on debt sustainability and a country's debt carrying capacity which is argued to be determined by numerous factors for example primary deficits, interest payments, exchange rate, inflation, and GDP growth, as well as the macroeconomic environment and debt management capacities (e.g. Mahmood et al., 2009; Greenidge et al., 2010; Wyplosz, 2011; Kiptoo, 2012).

Greenidge et al. (2010) conducted a study on the drivers of foreign debt in the Caribbean countries and the results show that there is decreasing impact export and effective exchange rate (REER) on external debt. This finding conforms with a later study by Kiptoo (2012) who looked at the factors that influence Kenya's external debt sustainability and found that the country's level of export and economic growth were both directly related to debt sustainability.

After looking at both recent and earlier studies that investigated the impact of macroeconomic variables in determining a country's public debt level, I will now finally look at other influencing elements that have been generally overlooked in the on-going discussions on public debt evolution. Only Asiedu and Lien (2011) evaluate, at least implicitly, the impact of government effectiveness on public debt. There are only a few studies that focused on studying the nexus between public debt and governance indicators like quality of institutions, political stability, government effectiveness, rule of law, etc. (but see North, 1991; Acemoglu & Robinson, 2002; Acemoglu et al., 2005; Oatley, 2010; Gunduz, 2017)

According to Gunduz (2017), institutions that control government operations in managing economic resources play a great role in designing well-formulated policies that boost economic efficiency and lower the risk of negative shocks. Governments with better and higher-quality institutions are more likely to stimulate performance and increase production, resulting in more job opportunities for their citizens. This he argues will induce consumers to spend more, thus enabling the government to mobilize more revenue through taxes and help avoiding budget deficit in the future.

In a ground-breaking study by Acemoglu and Robinson (2002), they provided outstanding arguments as to why institutions are the drivers of the divergence between countries. He

argued that the significance of quality institutions on the sustainability of a country's debt can be linked to the argument on why some countries are wealthy and others impoverished base on their culture and geographical location. South and North Korea, for example, were the same country in 1944, with the same people, cultures, history, languages, and geography. However, when they split in 1945, each adopted a different economic path. North Korea adopted a centrally planned economy with no private property rights, no free press. South Korea, on the other hand, adopted a capitalist system of economy that includes property rights, democracy, an open economy, and a reliable legal system. Their institutional differences reflect their divergent economic paths and, as a result, debt bearing capacity.

Strong institutions are believed to uphold and ensure effective ownership rights which encourage investors to spend, develop, and participate in economic activities. Expectations are important in an economy and as such, if individuals believe their property rights will be retained and safeguarded, they will become more ready to invest in the country, all of which play a role in a country's debt carrying capacity and long-term debt sustainability (Acemoglu et al., 2005).

4. Methodology and Data

4.1. Specification of the model

The goal of this paper is to look into the underlying elements that influence The Gambia's public and publicly guaranteed debt levels. As a result, DEBT (public debt to GDP ratio) is regressed on: GROWTH (GDP growth), OPEN (trade openness), GFCF (gross fixed capital formation as a percentage of GDP), RIR (real interest rate), and EX_RATE (official exchange rate). In addition to the above macroeconomic factors, I included the government effectiveness variable (GOV_EFF) to assess whether the degree to which a government efficiently operates have an impact on the debt levels in The Gambia as posited by many literatures (Jalles, 2011; Megersa & Cassimon, 2015; Cooray et al., 2017; Benfratello et al., 2018).

In order to assess the link between debt and the selected variables, I will first run a simple regression with the OLS model specified below.

$$DEBT_t = \beta_0 + \beta_1 GROWTH_t + \beta_2 OPEN_t + \beta_4 GFCF_t + \beta_5 IR_t + \beta_6 EXC_t + \beta_7 GOV\_EFF_t + \varepsilon_t \quad \text{....equation (1)}$$

I will additionally use the ARDL estimation mechanism recommended by Pesaran et al. (2001) as a robustness check and to establish interaction between the variables both in the short-run and in the long-run.

The ARDL model therefore is presented below as follows:

$$\Delta DEBT_t = \beta_0 \sum_{j=1}^{p} \Psi_j \Delta DEBT_{t-j} + \sum_{j=0}^{p} \Omega_j \Delta GROWTH_{t-j} + \sum_{j=0}^{p} \Pi_j \Delta OPEN_{t-j} + \sum_{j=0}^{p} \theta_j \Delta GFCF_{t-j} + \sum_{j=0}^{p} \omega_j \Delta RIR_{t-j} + \sum_{j=0}^{p} \alpha_j \Delta EX\_RATE_{t-j} + \sum_{j=0}^{p} \varphi_j \Delta GOV\_EFF_{t-j} + \delta_1 DEBT_{j-1} + \delta_2 GROWTH_{j-1} + \delta_3 OPEN_{j-1} + \delta_5 GFCF_{j-1} + \delta_6 RIR_{j-1} + \delta_7 EX\_RATE_{j-1} + \delta_8 GOV\_EFF_{j-1} + \nu_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots . equation\ (2)$$

From the above equation, the β_o represents the drift whereas the elements Ψ, Ω, Π, π, θ, ω, α, φ represent the coefficients. The white noise in the model is represented by ν. The optimal lag and the number of lags are represented by "p" and "j" respectively. Maximum number of lags for annual time series data is limited to 2 years, according to the Pesaran model (1997). The long-term relationship is defined by the component of the equation that begins with δ. As a result, the null hypotheses (H_0) alternative hypotheses (H_1) are respresented as follows so as to establish the long-term relationship:

$$H_0: \delta_1 = \delta_2 = \ldots\ldots\ldots\ldots \delta_8 = 0$$

$$H_1: \delta_1 \neq \delta_2 \neq \ldots\ldots\ldots\ldots \delta_8 \neq 0$$

Below is a specification of the unrestricted error correction model (ECM):

$$\Delta DEBT_t = \alpha_0 \sum_{j=1}^{p} \Psi_j \Delta DEBT_{t-j} + \sum_{j=0}^{p} \Omega_j \Delta GROWTH_{t-j} + \sum_{j=0}^{p} \Pi_j \Delta OPEN_{t-j} + \sum_{j=0}^{p} \theta_j \Delta GFCF_{t-j} + \sum_{j=0}^{p} \omega_j \Delta RIR_{t-j} + \sum_{j=0}^{p} \alpha_j \Delta EX\_RATE_{t-j} + \sum_{j=0}^{p} \varphi_j \Delta GOV\_EFF_{t-j} + \tau\ ECM_{t-1} + \vartheta_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots . equation\ (3)$$

4.2. Data

This study uses a time series data on DEBT (public debt to GDP ratio), GROWTH (GDP growth), OPEN (trade openness), GFCF (gross fixed capital formation as a percentage of GDP), RIR (real interest rate), EX_RATE (official exchange rate), and GOV_EFF (Government Effectiveness) all extending over the period from 2000 to 2019. The data was extracted from the World Development Indicators (WDI) database, and from the Central Bank of the Gambia (CBG) data warehouse.

To determine the influence of economic growth on public debt, the model includes GDP growth (GROWTH) over the period of the study. Higher economic growth raises domestically generated revenue, which reduces the need for debt. Hence, the expected sign of the GROWTH coefficient in this paper is negative.

Trade Openness in this paper measures the degree to which a country is engaged in trade with the rest of the world. It is determined as the summation of exports plus imports in a year divided by Gross Domestic Product (GDP). Despite the fact that openness of an economy does manifest a direct link with public debt, they are widely established to have manifested an inverse relationship. Least developed economies are typically characterized by restrictions on trade. According to Auboin (2003), the elimination of trade barriers can lead to greater growth in an economy and an increase in export, thus, reducing dependence on external debt. The expected sign of openness in this paper is negative, implying that the more the open an economy is, the lower its public debt levels.

Exchange rate fluctuations have been widely argued in most of the literatures to have impacted the debt levels in many least developed countries. When the value of a country's currency appreciates its debt level reduces, vice versa. The study expects to manifest a positive relationship between EX_RATE (official exchange rate and public) and DEBT (public debt as percentage of GDP). A control variable, Gross Fixed Capital Formation

(GFCF) is expected to have a positive coefficient as the more investments are undertaken by the Government, the more they borrow more from the external sources to finance these investment projects thus increasing public debt levels.

Another potential influencing element on public debt levels which has been generally overlooked is government efficacy. Only Asiedu and Lien (2011) evaluate, at least implicitly, the impact of government effectiveness on public debt. Taking example on FDI inflow, findings have established too much of unnecessary levels of bureaucracy in a government obstruct such flows.

We may infer this finding to the postulated causal relationship that link governance indicators to the government debt levels. Government effectiveness has both restricting and enabling impact on both public and private players.

Firstly, effective governments have viable, cogent, and result-oriented policies that allow them to better and prudently allocate its meagre funds. This helps in reducing the dependence on the issuance of new debt to support the government's budget.

Secondly, because an effective government delivers a steady and relatively beneficial economic environment, the quality of public services helps increase the amount of revenue generated in an economy. As a result, higher tax revenues are generated, reducing budget deficit to necessitate borrowing.

Government effectiveness variable in this paper is part of the World Governance Indicators from the World Bank database that are calculated from 31 diverse sources which are based on hundreds of different factors (Kaufmann et al., 2010). The data exclusively focuses on perception data reported by commercial information providers, public sector organizations worldwide, survey respondents, and NGOs. The aggregate indicator of a country's score is expressed in standard normal distribution units (-2.5 to 2.5).

Figure 2: GDP Growth
GDP

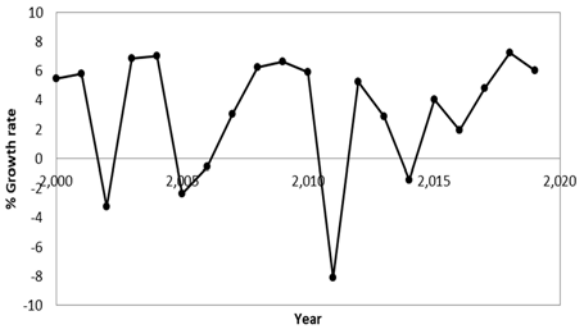


Figure 3: Gross Fixed Capital Formation %

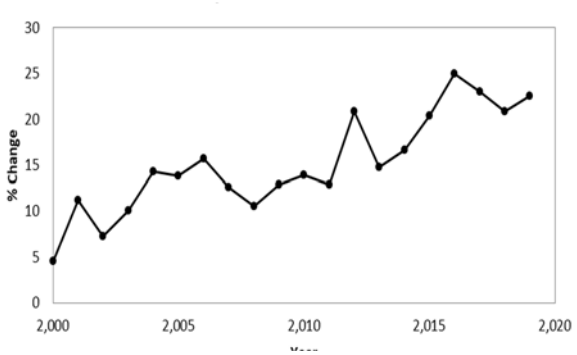


Figure 4: Trade Openness

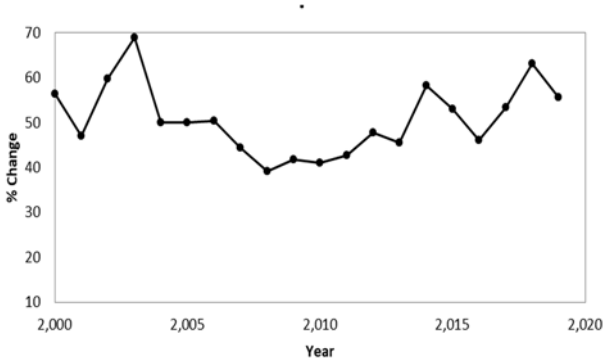


Figure 5: Official Exchange Rate

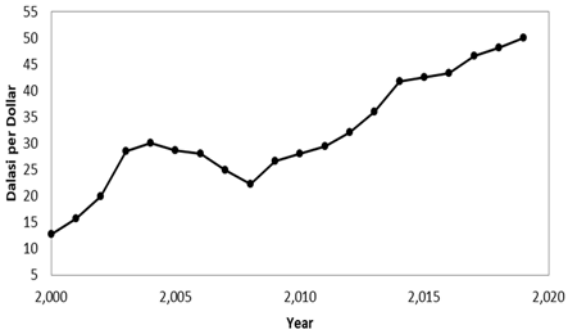


Figure 6: Real Interest Rate

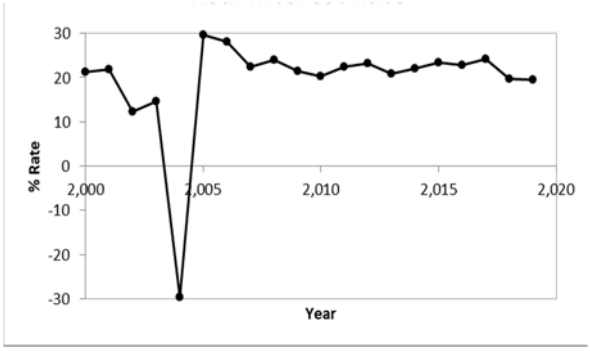
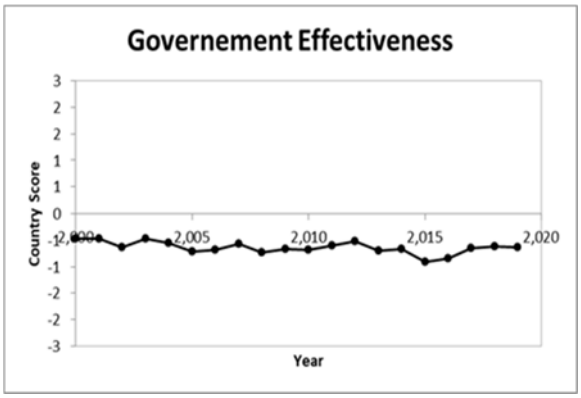


Figure 7: Government Effectiveness



4.3. Descriptive Statistics

Table 1: Descriptive Statistics

Variable	N	Mean	Std. Dev.	Min	Max
DEBT	20	101.22	31.48	60.91	156.01
GROWTH	20	3.18	4.22	-8.13	7.23
OPEN	20	0.51	0.08	0.39	0.69
GFCF	20	15.18	5.45	4.56	24.92
RIR	20	19.21	12.12	-29.71	29.59
EX_RATE	20	31.76	10.69	12.79	50.06
GOV'T_EFF	20	-0.64	0.11	-0.90	-0.47

Table 2: Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) DEBT	1.000							
(2) GROWTH	-0.215	0.080	0.123	-0.255	1.000			
	(0.363)	(0.737)	(0.605)	(0.278)				
(3) OPEN	0.564	1.000						
	(0.010)							
(4) GFCF	-0.306	0.005	1.000					
	(0.189)	(0.984)						
(5) RIR	-0.297	-0.129	0.128	1.000				
	(0.203)	(0.587)	(0.592)					
(6) EXC	-0.279	0.252	0.295	0.062	0.075	-0.264	-0.283	1.000
	(0.234)	(0.285)	(0.000)	(0.795)	(0.754)	(0.053)	(0.031)	
(7) GOV_EFF	0.205	0.270	-0.275	-0.279	0.223	-0.147	1.000	
	(0.385)	(0.250)	(0.034)	(0.234)	(0.344)	(0.560)		

The correlation matrix for the dependent and independent parameters in the model was computed in Table 4. The correlation is calculated to see if there was any multicollinearity between the model's exogenous variables. When the correlation coefficients between the independent variable are less than 0.30, it means the multilinear regression model is free from multilinearity limitations (Dabholkar et al., 2000)

The correlation matrix above demonstrates that all of the variables, with the exception of trade openness and government effectiveness have a decreasing effect on the country's public debt levels.

5. Analysis of Results and Discussion:

This part of the paper will present and discuss the regression result of the OLS regression and ARDL model specified in section 3 (data and methodology).

5.1. OLS Regression Result

Table 3**: Linear regression**

DEBT	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
GROWTH	-2.320	.954	-2.43	.030	-4.381	.259	**
OPEN	4.17	.641	6.51	0.00	2.790	5.560	***
GFCF	5.832	1.836	3.18	0.007	1.865	9.79925	**
RIR	-0.997	.329	-3.03	.010	-1.709	-.284	**
EX_RATE	-4.218	1.029	-4.10	.001	-6.913	-2.464	***
GOV_EFF	-1.503	2.101	-0.72	.028	-3.515	-2.247	**
Constant	-94.591	44.903	-2.11	.055	-191.597	2.416	**

Mean dependent var	100.853	SD dependent var	32.960
R-squared	0.821	Number of obs	20.000
F-test	9.97	Prob > F	0.001
Akaike crit. (AIC)	155.747	Bayesian crit. (BIC)	162.870

*** $p<.01$, ** $p<.05$, * $p<.1$

The above regression output reflects that all the independent variables have a significant impact on public debt in The Gambia. The results shows that trade openness and gross fixed capital formation are both debt creating flows (manifest a positive relationship), and they are both significant at 1% and 5% significant level respectively. On the other hand, real interest rate, economic growth, foreign direct investment, official exchange rate, and government effectiveness are both shown from the regression result to have inverse relationships with public debt in The Gambia.

Notwithstanding, the paper used a time series data with 20 year period which means the number of observation is fairly small. This implies that the above model will be subject to a small degree of freedom and some variables might not be stationary.

To avoid potential biasness using the OLS regression method alone, this paper additionally used an ARDL approach which is proposed by Pesaran et al. (2001) as a robustness check for

the relationship between public debt and the selected variables. The ARDL model provides both the short run and long impact of the selected variables on the dependent variable. This element of the model is essential as it will help policy makers to be able to design policies base on the short run and long run results.

5.2. Dickey-Fuller Unit-Root-Test

Unlike most of the other co-integration techniques, the ARDL has important properties that make it appropriate for this study. For example, it does not impose a limiting condition that all variables for the research must be integrated using the same order. Furthermore, the ARDL methodology produces precise estimates even if the sample size is small, but other co-integration methods are sensitive to sample size, so doing bounds testing will indeed be consistent with this study. Read Srinvasan et al. (2012) for additional information on the ARDL approach.

Pesaran, Shin, and Smith (2001) suggested the ARDL technique that is premised upon its estimation of an Unrestricted Error Correction Model (UECM), which has significant advantages over traditional cointegration methods.

Moreover, all the variables in this paper are time-series data, which means they could be non-stationary having unit roots. A simple regression model using non-stationary variables might generate erroneous results.

ARDL model is deemed ineffective when series are integrated to order 1(2) or above. As a result I first run a unit root test on the time-series variables. The test results are shown in Table 4.1, which indicates that variables are integrated to a series of 1(1) or 1(0), indicating that the ARDL model is suitable to use.

Table 4**:** Unit root test

Dickey-Fuller Unit-Root-Test (DFURT) using AIC			
Variables	**P-value at Level**	**P-value at 1st Difference**	**Judgment**
DEBT	-1.624	-4.782***	1(1)
GROWTH	-4.680***	-	1(0)
OPEN	-2.536	-5.194***	1(1)
GFCF	-1.988	-6.566***	1(1)
RIR	-4.179***	-	1(0)
EXC	-0.700	-2.784*	1(1)
GOV_EFF	-2.955**	-	1(0)

Note:, **, and *** represent 10%, 5%, and 1% significance levels, respectively*

5.3. Lags selection using AIC

I use the Unrestricted ECM in order to check the long-run co-integration of the variables in the model. To be able to do that, the number of lags must be established first before executing UECM which I did using the Akaike Info Criteria (AIC).

Table 5: AIC lag lengths

LAG LEVEL	VARIABLE						
	DEBT	***GROWTH***	***OPEN***	***GFCF***	***RIR***	***EX_RATE***	***GOV_EFF***
0	9.47249	**5.79392***	6.69022	5.89173	**8.09474***	7.31769	**-1.72912***
1	**9.02459***	5.91796	**6.56145***	**5.3583***	8.21932	**4.76851***	-1.71521
2	9.13928	5.90838	6.68267	5.43455	8.34429	4.83351	-1.64514
3	9.24051	6.0286	6.73295	5.50353	8.46097	4.88081	-1.5246
4	9.27908	6.04665	6.72456	5.62239	8.57502	5.00578	-1.4259

The lag lengths (1 0 1 1 0 1 0) established in the above table using the AIC are included in the Error Correction Model in order to establish the short run impact of the independent variables on public debt.

5.4. ARDL bound test

The ARDL bound test is used to check the co-integration and long-run connection between DEBT, GROWTH, GFCF, OPEN, RIR, EX_RATE, and GOV_EFF. The empirical findings of the ARDL bound test are presented in the table below. The results show that the F - value is higher than the upper bound value, indicating that there is a long-run relationship and co-integration between public and the explanatory variables.

Table 6: ARDL Bounds Test Result

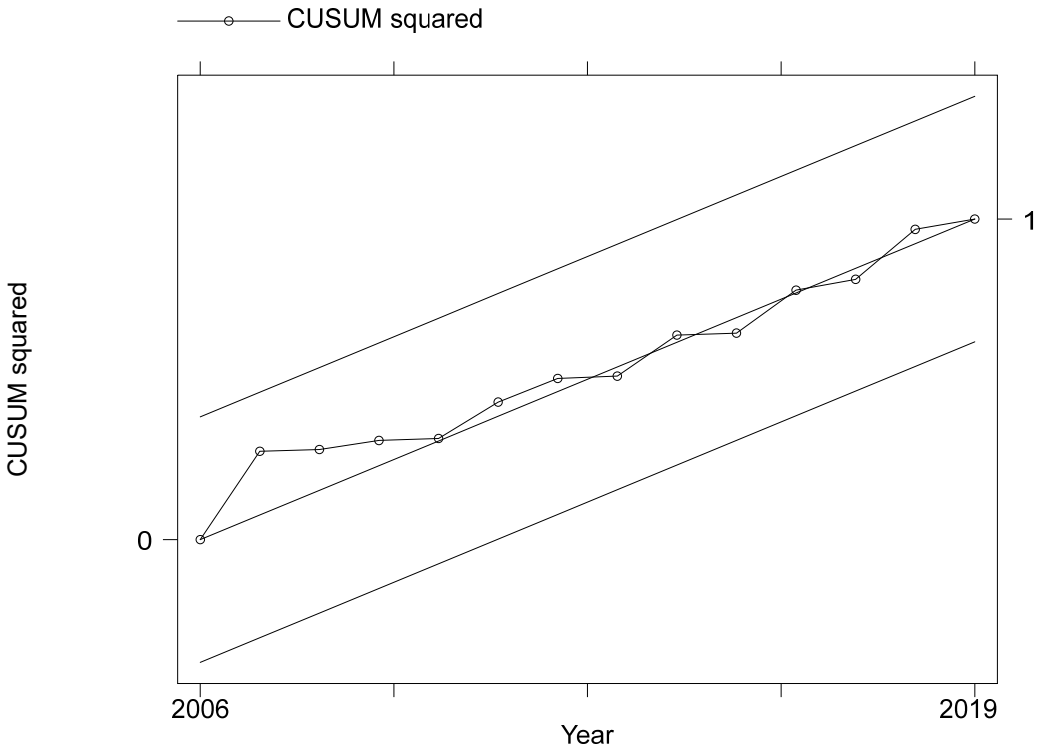
H_0: no levels relationship			F = 11.475 t= -6.356					
Critical Values (0.1 -0.01), F-Statistic, Case 3								
	[I_0] L_1	[I_1] L_1	[I_0] L_05	[I_1] L_05	[I_0] L_025	[I_1] L_025	[I_0] L_01	[I_1] L_01
K_7	2.03	3.13	2.32	3.5	2.6	3.84	2.96	4.26

Note:
accept if F < critical value for I(0) regressors
reject if F > critical value for I(1) regressors

5.5. Stability Check

I used the CUSUM SQUARE to test the long run stability and reliability of the ARDL model as proposed by Brown et al. (1975). As seen in the figure below, the CUSUM of SQUARES test falls within the significant threshold of 5% range. This indicates that all of the parameters utilized in the ARDL regression analysis have remained steady throughout time.

Figure 8**:** CUSUM Squared



CUSUM of Squares 5% Significance

Long Run ARDL Model using AIC criteria

Table 7**:** ARDL model regression output

ARDL(1,1,1,0,0,0,1) regression
Sample: 2000 - 2019

Number of obs = 20
R-squared = 0.7966
Adj R-squared = 0.5424
Log likelihood = -71.131157
Root MSE = 15.7573

D.DEBT	Coef.	Std.Err.	t	P>t	[95%Conf.	Interval]
ADJ						
DEBT						
L1.	-0.836**	0.238	-3.510	0.008	-1.386	-0.286
LR						
GROWTH	-3.169*	1.303	-2.432	0.041	-6.172	-0.165
OPEN	4.834**	0.942	5.131	0.001	2.661	7.006
GFCF	7.820*	3.493	2.240	0.056	-0.234	15.874
RIR	-0.528	0.523	-1.010	0.342	-1.734	0.678
EX_RATE	-5.851**	1.818	-3.220	0.012	-10.043	-1.658
GOV_EFF	-13.346*	6.301	-2.118	0.085	-29.056	23.363
SR						
OPEN						
D1.	-1.415	1.018	-1.390	0.202	-3.762	0.932
GFCF						
D1.	-1.402	1.975	-0.710	0.498	-5.958	3.153
EX_RATE						
D1.	3.869	2.205	1.750	0.117	-1.216	8.955
_cons	-124.885*	52.942	-2.360	0.046	-246.970	-2.801

***Note**: *, **, and *** represent 10%, 5%, and 1% significance levels, respectively*

According to the output of the estimated long run ARDL (1, 1, 1, 0, 0, 0, 0, 1) shown in the table above, it shows that in The Gambia, trade openness, Investment, GDP growth, government effectiveness and official exchange rate are the main determinants of Public Debt in the long run with some degree of statistical significance.

The results shows that trade openness and investment are positively associated with public debt accumulation in the Gambia and are significant at 1% and 10% significant levels respectively. This is in line with our theoretical preposition and findings in earlier literatures.

On the other hand, GDP growth, Government effectiveness, and official exchange rate are inversely related the public debt in the Gambia. This is consistent with their significance levels at 5%, 5%, and 10% respectively.

The negative relationship between GDP growth and public debt levels manifested by the results of this paper is supported by the findings of Hall and Sargent (2010). This is in line with the assertion that higher economic growth enhances a country's domestic revenue generation, this helps in lowering budget deficit, thus reducing the pressure to be always contracting loans to finance the budget.

In the same vein, the decreasing effect of government effectiveness on public debt can be supported by the findings of Melecky (2012) who posits that countries with effective governments have good public debt management strategies and policies that help in mitigating financial risk and lower cost of borrowing, thus keep the debt at a sustainable level.

Gross fixed capital formation shows a significant positive relationship which is in line with most of the findings in the literatures. As government embark on more investment ventures, they tend to borrow more to finance these investment activities.

In the short run, the model shows that none of the selected variables affect public debt in The Gambia as they are all statistically insignificant.

The Error Correction Model (ECM) measures the rate of adjustment back to equilibrium in an ARDL model. If the adjustment speed or error correction term is inside the (0, -1) boundary; it shows that there is a long term convergence of the model. However if the adjustment speed does not lie within the (0, -1) boundary, then projected debt accumulation will be regarded to be growing out of hand. Therefore, the above results show that the evolution of Gambia debt level will not aggressively grow in the long run. This is supported by the ECM coefficient (-0.898) which is statically significant at 5% significant level. The estimate, -0.898, implies

that 89.9% of the deviation from the long-run relation is adjusted in a year, which I would interpret as a result indicating that the short-run dynamics is not really important.

6. Conclusion:

The Gambia's efforts to attain higher and sustainable economic growth are significantly hampered by the country's huge and expanding public debt, as well as its servicing pressure. The aim of this research is to empirically investigate the drivers of public debt levels in The Gambia. This paper contributes to the body of literature on the determinants of public debt with specific focus on the Gambia by using the Simple OLS regression and Autoregressive Redistributive Lags (ARDL) technique as a robustness check. In order to achieve this aim, I used a time series data from year 2000 to 2019 on the selected variables that impact debt accumulation both in the short run and in the long run.

The empirical result from the study shows that an increase in economic growth is associated with a decrease in public debt in the long run. As a result, the government should pursue programs and policies that will enhance economic growth in order to keep the debt at an optimal and sustainable level.

Additionally, the result shows that the effectiveness of a government has a decreasing effect on the public debt levels in The Gambia in the log run. This suggests that an effective government which is characterized with quality policy formulation, implementation, and a well functional debt management office may help in keeping the public debt at a sustainable level. Similarly, the appreciation of The Gambian Dalasi is found to reduce the public debt burden, however, this might eventually be a problem as the appreciation of the currency may lead to an expansion of the current account deficit and hence the external debt. Therefore, policy makers should ensure to have a stable currency in order to mitigate the exposure of external debt to foreign exchange risk.

Trade openness and gross fixed capital formation on the other hand are both associated with an increase in the public debt levels in The Gambia. However, the result of the error correction model shows that none of these variables are significant in determining the public

debt levels in the short run. This implies that the short run dynamics of the public debt may not be that significant, and thus, policy makers should pay more attention to the factors that have a long run influence on the public debt levels.

Given the data quality issues I faced under my limited time in conducting this study, many variables were left out. Therefore, more research is necessary to establish the effects of other variables that are not included in this study and potentially have impact on the public debt levels in The Gambia.

References:

Alfaidi. 2002. The Effect of External Debt on the Developing Countries,

Alshara, M. Khateeb, F. and Maitah, M. (1991). External Debt and its Impact on the Jordanian Economy: An Econometrical Study, Abhath Al-yarmouk, 7: 4, 231-53.

Al-Refai, M. F. (2015). Debt and Economic Growth in Developing Countries: Jordan as a Case Study. International Journal of Economics and Finance, 7(3), p134. https://doi.org/10.5539/ijef.v7n3p134

Atta-Mensah, J., & Ibrahim, M. (2020). Explaining Africa's Debt: The Journey So Far and the Arithmetic of the Policymaker. Theoretical Economics Letters, 10(2), 409–441. https://doi.org/10.4236/tel.2020.102027

Awan, R. U., Anjum, A., & Rahim, S. (2015). An Econometric Analysis of Determinants of External Debt in Pakistan. Journal of Economics, Management and Trade, 382–391. https://doi.org/10.9734/BJEMT/2015/8837

Babu, J. O., Kiprop, S., Kalio, A. M., & Gisore, M. (2014). External debt and economic growth in the East Africa community. African Journal of Business Management, 8(21), 1011–1018. https://doi.org/10.5897/AJBM2014.7418

Bader, M., & Magableh, I. K. (2009). An Enquiry into the Main Determinants of Public Debt in Jordan: An Econometric Study. Administrative Sciences, 36(1), 10.

Benfratello, L., Monte, A. D., & Pennacchio, L. (2018). Corruption and public debt: A cross-country analysis. *Applied Economics Letters*, *25*(5), 340–344. https://doi.org/10.1080/13504851.2017.1321831

Barro, R. J. (1979). On the determination of the public debt. The Journal of Political Economy, 87(5), 940–971.

Bittencourt, M. (2015). Determinants of Government and External Debt: Evidence from the Young Democracies of South America. Emerging Markets Finance and Trade, 51(3), 463–472. https://doi.org/10.1080/1540496X.2015.1025667

Calderón, C., & Zeufack, A. G. (2020). Borrow with sorrow? The changing risk profile of Sub-Saharan Africa's debt. World Bank PRWP. N° 9137.

Cecchetti, S. G., Mohanty, M. S., & Zampolli, F. (2011). The Real Effects of Debt (SSRN Scholarly Paper ID 1946170). Social Science Research Network. https://papers.ssrn.com/abstract=1946170

Cooray, A., Dzhumashev, R., & Schneider, F. (2017). How Does Corruption Affect Public Debt? An Empirical Analysis. *World Development*, *90*, 115–127. https://doi.org/10.1016/j.worlddev.2016.08.020

Eichengreen, B., & Portes, R. (1986). Debt and default in the 1930s: Causes and consequences. European Economic Review, 30(3), 599–640. https://doi.org/10.1016/0014-2921(86)90012-7

Eicher, T. S., Schubert, S. F., & Turnovsky, S. J. (2008). Dynamic effects of terms of trade shocks: The impact on debt and growth. Journal of International Money and Finance, 27(6), 876–896. https://doi.org/10.1016/j.jimonfin.2007.04.015

Esquivel, G., Larraín B., F., & Sachs, J. D. (1998). The External Debt Problem in Central America: Honduras, Nicaragua, and the HIPC Initiative. https://doi.org/10.7916/D8Z325H9

Forslund, K., Limab, L., & Panizza, U. (2011). The determinants of the composition of public debt in developing and emerging market countries. Review of Development Finance, 1(1), 207–222. https://doi.org/ 10.1016/j.rdf.2011.09.004

Gokmenoglu, K., & Rafik, R. A. M. (2014). Determinants of External Debt: The Case of Malaysia. In N. Ozatac & K. K. Gökmenoglu (Eds.), Emerging Trends in Banking and Finance (pp. 16–33). Springer International Publishing. https://doi.org/10.1007/978-3-030-01784-2_2

Greenidge, K., Drakes, L., & Craigwell, R. (2010). The external public debt in the Caribbean Community. Journal of Policy Modeling, 32(3), 418–431. https://doi.org/10.1016/j.jpolmod.2010.02.004

Hajivassiliou, V. A. (1987). The external debt repayments problems of LDC's: An econometric model based on panel data. Journal of Econometrics, 36(1), 205–230. https://doi.org/10.1016/0304-4076(87)90050-9

Hakura, D. S. (2020). Back to Basics: What is Debt Sustainability? Finance & Development, 0057(003). https://doi.org/10.5089/9781513544595.022.A017

IMF. (2018). The Gambia: Second review under the staff-monitored program - press release and staff report for The Gambia. https://www.imf.org/en/Publications/CR/Issues/2018/06/28/The-Gambia-Second-Review-Under-the-Staff-Monitored-Program-Press-Release-and-Staff-Report-46035

IMF. (2019). Recovery amid elevated uncertainty: Regional economic outlook: Sub-Saharan Africa.

Imimole, B., Ehikioya, I. L., & Okhuese, Matthew Asin. (2014). Determinants and Sustainability of External Debt in a Deregulated Economy: A Cointegration Analysis from Nigeria (1986-2010). American International Journal of Contemporary Research, 4(6).

Jalles, J. T. (2011). The impact of democracy and corruption on the debt-growth relationship in developing countries. *Journal of Economic Development*, *36*(4), 41–72. https://doi.org/10.35866/CAUJED.2011.36.4.003

Kiptoo, K. C. (2012). The determinants of Kenya's external debt sustainability. 56.

Kourtellos, A., Stengos, T., & Tan, C. M. (2013). The effect of public debt on growth in multiple regimes. Journal of Macroeconomics, 38, 35–43. https://doi.org/10.1016/j.jmacro.2013.08.023

Krugman, P., & Eggertsson, G. B. (2011). Debt, Deleveraging and the Liquidity Trap. In 2011 Meeting Papers (No. 1166; 2011 Meeting Papers). Society for Economic Dynamics. https://ideas.repec.org/p/red/sed011/1166.html

Lau, E., & Lee, A. S.-Y. (2016). Determinants of External Debt in Thailand and the Philippines. 6(4), 8.

MAHMOOD, T., RAUF, S. A., & AHMAD, H. K. (2009). PUBLIC AND EXTERNAL DEBT SUSTAINABILITY IN PAKISTAN (1970s—2000s). Pakistan Economic and Social Review, 47(2), 243–267.

Megersa, K., & Cassimon, D. (2015). Public Debt, Economic Growth, and Public Sector Management in Developing Countries: Is There a Link? *Public Administration and Development*, *35*(5), 329–346. https://doi.org/10.1002/pad.1733

MoFEA. (2020). Debt sustainability analysis report 2019. https://mofea.gm/directorates/loans-and-debt-management

Mofea. (2020). Medium term debt strategy report (2019 - 2022).

https://mofea.gm/directorates/loans-and-debt-management

North, D. C. (1991). Institutions. Journal of Economic Perspectives, 5(1), 97–112. https://doi.org/10.1257/jep.5.1.97

Pesaran, M. Shin, Y. Smith, R.J. (2001). Bounds testing approaches to the analysis of level relationships. Journal of Applied Econometrics, 16(3), 289-326. https://doi.org/10.1002/jae.616

Rangarajan, C., & Srivastava, D. K. (2003). Dynamics of Debt Accumulation in India: Impact of Primary Deficit, Growth and Interest Rate. Economic and Political Weekly, 38(46), 4851–4858.

Reinhart, C. M., & Rogoff, K. S. (2010). Growth in a time of debt. American Economic Review, 100(2), 573–578. https://doi.org/10.1257/aer.100.2.573

Reinhart, C. M., Reinhart, V. R., & Rogoff, K. S. (2012). Public Debt Overhangs: Advanced-Economy Episodes since 1800. Journal of Economic Perspectives, 26(3), 69–86. https://doi.org/10.1257/jep.26.3.69

Sachs, J. and Larrain, F. 1993. Macroeconomics in the Global Economy, Harverter Wheatsheaf, New York.

Sadik-Zada, E. R., & Gatto, A. (2019). Determinants of the Public Debt and the Role of the Natural Resources: A Cross-Country Analysis (SSRN Scholarly Paper ID 3364174). Social Science Research Network. https://doi.org/10.2139/ssrn.3364174

Stambuli, P. K. (1998). Causes and Consequences of the 1982 World Debt Crisis?

Sinha, P., Arora, V., & Bansal, V. (2011). Determinants of public debt for middle income and high-income group countries using panel Data regression. Munich Personal RePEc Archive (MPRA Paper, 32079)

Wyplosz, C. (2011). Debt Sustainability Assessment: Mission Impossible. Review of Economics and Institutions, 2(3), 37. https://doi.org/10.5202/rei.v2i3.42