PUBLIC DEBT, OUTPUT VOLATILITY, FINANCIAL DEEPENING AND ECONOMIC GROWTH IN EAST AFRICAN COMMUNITY

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DECLARATION

This proposal is my original work and has not been submitted for award of any degree at any University.

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DEDICATION

This thesis is dedicated to my wife Justine and Daughter Blessing Getrude.

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ABBREVIATIONS AND ACRONYMS

ADB	Africa Development Bank
ARDL	Autoregressive Distributed Lag Model
CB	Central Bank
CBK	Central Bank of Kenya
EAC	East African Community
FSR	Financial Sector Regulation
GDP	Gross Domestic Product
GMM	Generalized Methods of Moments
GNP	Gross National Product
HIPC	Heavy Indebted Poor Countries
IMF	International Monetary Fund
INTOSAI	International Organization of Supreme Audit Institution
KBA	Kenya Bankers Association
KNBS	Kenya National Bureau of Statistic
M2	Broad Money Supply, Cash and Coins in Circulation, Short Term deposit and 24 hours Money Market Fund
M1	Broad money supply composed of bank notes and coins, demand and liquid deposits.
NI	National Income
OECD	Organization for economic Cooperation and development.
RIAE	Research Institute of Applied Economics
UK	United Kingdom
UNCTAD	United Nations Conference on Trade and Development
US	United States
USD	United States Dollar

ABSTRACT

The general objective of the study was to establish the relationship among public debt, output volatility, financial deepening and economic growth in EAC, with specific objectives of establishing the relationship between public debt and economic growth, to investigate the moderating effect of output volatility on the relationship between public debt and economic growth, to examine the mediating effect of financial deepening on the relationship between public debt and economic growth and the joint effect among public debt, output volatility, financial deepening and economic growth in EAC. The study deployed longitudinal research design. The population of the study consist of six countries in EAC, Kenya, Tanzania, Uganda, Burundi, Rwanda and South Sudan. However, South Sudan and Burundi was isolated from the study because of paucity data. Data was collected from 2002 - 2020 and analyzed through autoregressive distribution lag model. It was noted that public debt positively and significantly influenced economic growth in EAC. However, the study revealed that there was no significant moderating effect of output volatility on the relationship between public debt and economic growth in EAC. Consequently, there was no mediating effect of financial deepening on the relationship between public debt and economic growth in EAC. On the joint effects among public debt, output volatility, financial deepening and economic growth, it was observed that both the current and lagged values of financial deepening as well as the current public debt were significant in determining the level of economic growth in East African Community. It was concluded that debt is good but only when invested in the productive sector of the economy. The study therefore recommend that greater emphasis should be paid to both current and lagged values of financial deepening and the current level of public debt if the East African Community is to realize meaningful change in economic growth. Similarly, the study provides up to date findings to support existing literature on public debt, output volatility, financial deepening and economic growth in EAC using variables and empirical model which prior studies could not sufficiently cover in developing countries.

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CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

In developing countries, resources to finance optimal level of economic growth are scarce, as a result, developing nations resort to public debt by mobilizing resources at the lowest possible cost. High public debt slows down the scope of fluctuation in economic cycle which may results in high output volatility. On the other hand, increase in government debt may increase output fluctuation by raising probability of default (Kumar and Woo, 2010). Financial intermediaries play essential role in economic growth by establishing a well-functioning financial market which enhances economic efficiency, investment and output growth. Therefore, financial deepening facilitates financial institution to channel and pool resources into proper use thereby contributing towards economic growth (Natwi and Erickson, 2016). Financial deepening reduces fluctuation of output up to a certain limit beyond which any increase in financial deepening may lead to higher output volatility (Aghio, Abhijik and Thomas, 1999). However, it has been observed that variability of output is associated with lowering growth in output, investment and increase in economic uncertainty (Goyal, Mars, Raman, Wang and Ahmed, 2011).

The relationship among the concepts is anchored on Economic growth theory. Other theories that support the main theory are debt overhang theory, business cycle theory and liquidity preference theory. Economic growth theory explains how economic activities generate output. Part of production is consumed and some are invested and saved. The proportion of output saved is constant. Net investment is the rate of increase in capital stock. Two factors of production are deployed to generate output that is labour and capital (Solow, 1956). The preposition of economic growth theory by Solow (1956) is that, not all production is consumed thus part of output is saved and invested. The theory recognizes the contribution of capital and labour as components of economic growth.

The East African Community (EAC) was originally founded in 1967 by Kenya, Tanzania and Uganda. Although resentment and tension between states led to its collapse in 1977, it was later revived in 2002 (Elke and Craig, 2019). Currently, Tanzania, Burundi, Kenya, South Sudan, Rwanda and Uganda are members of EAC. The objective of EAC was to foster political federation, custom unions, monetary union and common markets (Byier,

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Vanheukelom and Kingombe, 2015). EAC is among the fastest growing economic integration in the region. In the last decade, growth rate in EAC has improved considerably outpacing the rest of Sub – Saharan Africa. Growth rate in terms of income per capita was 3.7 % in EAC compared to 3.2 % in sub – Sahara Africa. Whereas all the EAC partners' states have liberalized their economies, the focus of increasing human capital and physical investment with the objective of growing GDP has received attention among member countries (Sweta, Sayena and Yabara, 2012).

1.1.1 Public Debt

Public debt has been defined as a summation of domestic and foreign debt which does not include parastatal borrowing guaranteed by the government (IMF, 2016). Portuguese Public Finance Council (2013) defines public debt as total liability in the balance sheet. This means that it is gross, consolidated and valued at market prices. The concept of gross debt means that it takes into account total liability in the government balance sheet, However, the net liability is determined at by subtracting sector asset from the gross liability. Based on the discussion, public debt is therefore a government liability which requires payment of principal and interest periodically or at the end of the contractual term.

There is no single indicator that can be said to be the best for analytical need. However, studies need to adopt broader set of data to measure public debt (INTOSAI, 2010). UNCTAD (2009) observed that public debt indicators are current account balance ratio, debt service ratio, liquidity gap ratio, reserve to import ratio, debt to GNP ratio and interest service ratio. INTOSAI (2010) noted that appropriate indicators for gross debts are debt / income ratio or debt / GDP ratio. However, other debt indicators include debt service to income ratio, present value of debt to income and interest to income. The study adopts debt to income ratio as a measure of public debt. This indicator is recommended by INTOSAI (2010).

The global economy has experienced waves of debt accumulation over the past fifty years. The first three ended with financial crisis in many emerging market and developing economies. The increase in public debt in these economies has already been larger, faster and broader (Rachel and Summer, 2019). However, rising trend of public debt stock in the 20th century has not only been a problem associated with developing economies, but

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also with developed economies. This has attracted global concern on debt sustainability and whether debt stimulates or drags economic growth (Kiriga, Chemnyongoi and Wachira, 2020).

According to the World Bank (2019), the current environment of low interest rates combined with sub – par global growth has led to a lively debate about the benefit and risk of government debt accumulation to financed increased spending. Although the focus of debate has been on advanced economy, it is also important to center our discussion on developing economies. Whereas borrowing can be beneficial for developing economies, especially economies with substantial development challenges, the value of borrowing can be derived from growth enhancing investments like infrastructure, health care and education. Government debt accumulation can also appropriate temporarily as part of counter cyclical fiscal policy, boost demand and activities during recession (Blanchard, 2019). High public debt carries significant risks since it makes them more vulnerable to external shock limit the size and effectiveness of fiscal stimulus during recession and dampens long – term growth by weighing on productivity enhancing private investment (World Bank, 2019). On the other hand, shock of public debt and its service can affect growth by discouraging private investment and altering the composition of public spending. Higher interest rates can increase a countries budget deficit thereby reducing public saving. Consequently, debt service may suppress growth by squeezing public resources available for investment in infrastructure and human capital (Babu, Kiprop, Kalio and Gisore, 2014).

The conversation about the concept of public debt has generated interest among developing nations. Blanchard (2019) noted that high public debt creates uncertainties especially in low – income countries with debt servicing difficulties. In high and unstable environment, investors continue to exercise their option of waiting when considering whether to invest in costly irreversible project. Based on this argument, resources are likely to be misallocated and poor-quality investment undertaken which slows down productivity and growth. Amola and Odhiambo (2020) argued that public debt arises mainly from debt financed deficit. Countries resort to additional public borrowing to raise government funding needs. However, increased government spending is harmful to macroeconomic stabilization process.

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Public debt exerts neutral or positive effect on economic growth. On the contrary, over borrowing may increase doubts over future fiscal policy. This may lead to crowding out private investments exposing countries to external risks (Park, 2015 and Gomez and Sosvila, 2017). However, Mwaniki (2016) noted that the ability of countries to develop depend on their level of indebtedness. Even though public debt can enhance investments and economic growth, it could have adverse effects on the economy if used in unproductive investments, consumption or if the productive capacity of the economy is less than growth process. In conclusion, rising public debt may increase productive capacity of the economy, enhance effectiveness and may influence economic growth.

1.1.2 Output Volatility

Barseguvan & Riccardo (2010) defined output volatility as persistence variation in growth process. Cede, Chiriacescu, Varaztesi, Lalinsky & Markuli (2016) define output volatility as fluctuation in the growth rate. Therefore, output volatility is the fluctuation, variation or uncertainty in production. Standard deviation of growth rate is the preferred indicator of output volatility (Cede, et.al, 2016, Barseguyan & Riccardo, 2010). However, we have not come across any alternative indicator of output volatility which may warrant variation. Therefore, the indicator output volatility will be standard deviation of growth rate. The indicator has been applied successfully by Park (2015) and Trehan (2005).

The concept of output volatility has received attention among economist and policy makers. The theoretical and empirical literatures show that output volatility does not follow a similar pattern a cross the regions. It has declined overtime in East Asia and Pacific, Latin American, Caribbean, North American, Middle East and North Africa (Noreen and Mageid, 2018). Recent work by Nabwibari (2018) indicates that higher output volatility lower investment in human capital.

A seminal contribution made by Ductor and Leon (2021) suggests that the decline in output volatility has been global phenomenon with importance differences across countries regardless of its magnitude, timing and source. The researchers explained the time variations in business cycle volatility among OECD countries and suggests an important role for the government size and the demographic composition of labor force in stabilizing the economy. However, changes in output volatility have important implication for the economy. They may affect financial markets by generating investor

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uncertainty and influence capital flow, thus, leading to changes in indebtedness position of the country (Nabwibari,2018). Therefore, to mitigate the adverse effect of output volatility, governments and central banks tend to rely on stabilization policies. However, the effectiveness of such policies would heavily depend on the extent to which output volatility of a given country are driven by domestic or foreign development (Ductor and Leon, 2021).

Despite the overall decline in output volatility worldwide, countries have been subject to temporary increase in the size of output fluctuation which are not necessarily related to economic recession. On the contrary, they are associated with episodes of political instability, structural changes, foreign shocks and high uncertainty. Output volatility raises economic uncertainty and thus, hampers investments due to its irreversible nature (Iseringhausen and Vierke, 2018). However, frequent fluctuation in output signals an uncertain economic environment and increased probability of risks. On the other hand, the aggregate instability in output growth is the combination of inconsistent macroeconomic policies, weak institutional environment and county – specific characteristics. Therefore, the nature of foreign capital matters in affecting fluctuation of output. These foreign capital inflows are unpredictable, volatile and have positive impact on output volatility (Noreen and Mageid, 2018).

Financial globalization helps expand the economy to manage output volatility better. Volatility of output reduces when financial depth increases (Prasad, Rogoff, Wei & Kose, 2007). However, Improvement of policies is cited as one of the reasons why there is less output volatility. Growth of output is volatile when the economy experience recession (Trehan, 2005). Kose, Prasad & Terrones (2005) explained that long term growth may be reduced by volatility of output and policies that increase volatility could have negative effects by reducing growth and economic welfare. Previous studies indicate that output volatility reduces growth (Park, 2015, Trehan, 2005, Kose, Prasad & Terrenes, 2005), the study have not come across empirical evidence that reviews the moderating role of output volatility on the relationship between public debt and economic growth. When the government borrowed fund to carry out investment programmes, it is assumed that the investment would generate output that will contribute towards economic growth. But the output is not certain, the output varies and therefore it is volatile. The study seeks to establish if the variability of output increase or decrease the relationship between public

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debt and economic growth in EAC. Consequently, the study seeks to determine the effect of variability of output in moderating the association between public debt and economic growth in EAC.

1.1.3 Financial Deepening

Financial deepening is the composition of access, efficiency and depth of organization to deliver financial services involving lending, investment and management of money and assets. (IMF, 2015). Goyal, et.al (2011) defined financial deepening as a situation where agent and sector are able to use variety of investment decision and financial market for saving. Ekberg & Wyman (2015) define financial deepening as the process whereby the efficiency, depth and reach of financial market is increased. Financial deepening is therefore, the ease with which cash and cash equivalent flow freely in the economy to facilitate transaction and business activities.

Most empirical literature approximates financial deepening by the ratio of private credit / GDP and stock market capitalization / GDP (IMF, 2015). Other measures are broad money (M2), liability of non-bank financial asset (NB), Treasury Bill (TB), Value of Shares (VS), export to import ratio and money market fund (Sidani, 2013 &). However, the standard financial deepening indicators are M3 / GDP, export / import ratio, stock market capitalization / GDP, private credit / GDP, M1 / M2, currency / GDP ratio, currency / M2 ratio and M2 / GDP. The study adopts broad money supply, M1 / M2 as an indicator of financial deepening (Arshad and Sajawal, 2007). The ratio of M1 to M2 provides the extent to which financial system succeeds in mobilization of savings.

Deep market allows investors to invest in variety of investments. An increase in transaction volume and risk management can enhance capacity to intermediate cash flow without large swing in asset prices (Goyal, et al, 2011). Whereas financial deepening enhances resilience of countries to shock and boost economic performance, it can also mobilize savings, facilitates diversification, sharing of risks and promotes information sharing (IMF, 2015). Furthermore, financial systems can alleviate market failures and reduce volatility of output, while shallow financial system can constrain a country's choice of macroeconomic policy (IMF 2012).

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Empirical evidence suggest that financial deepening plays important role in economic development by promoting economic growth and technological progress, increased savings, mobilizing and pooling resources together, information sharing, facilitating and encouraging the flow of foreign capital (Misal, Onsoro and Odongo, 2021). Consequently, financial deepening helps reduce poverty and inequality, promote investment, smoothen consumption and manage financial risks (Muhoza, 2019). The seminal paper of Keho (2016) highlight the effect of financial deepening at house hold firm and national level by increasing financial access through effective financial inclusion. Therefore, financial deepening facilitates greater level of investment by household by improving assets which are associated with production and increase household income in the future.

The discussion on the concept of financial deepening have been associated with financial access, financial use and financial inclusion. Promoting financial access helps to address and reduce inequality thereby reducing poverty and improving economic performance (Ho and Kawai, 2018). On the other hand, financial deepening increases the amount of funds being made available and therefore, reduces borrowing costs, hence, the availability of capital may go up. In addition, Access and use of formal financial services allow people to make financial transaction more effectively, efficiently and with a lot of safety (Onoriode and Coris, 2013).

The conversation about the concept of financial deepening has been received differently. Whereas Chun, Shaoqin, Hao and Tun (2017) indicated that financial deepening is a term used by economists to refer to increase provision of financial services and better access for social economic group, Zahonogo (2017) observed that financial deepening denotes a wide array of changes in financial structures accompanying economic development, credit constrains, more inclusive use of external finance, fewer distortion in the credit market and a general increase in financial activities. In countries where financial markets are not well developed, firms tend to rely more heavily on bank loan rather than equity. As the economy expands, it relies on external finances and securities. In the absence of bank finance and monitoring, investors are unwilling to lend because they expect borrowing firms to grossly misallocate funds (Chakraborly, 2018).

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According to Jambo (2021), economic growth cannot be possible without combine role of financial deepening, labor and investments. The role of money and finances in the economic development has been examined by economist from different aspect and with various degree of emphasis. Ho and Kawal (2018) noted that the role banks and non – banks plays in saving – investment process, where money, whether narrowly or broadly forms part of a wide spectrum of financial assets in the portfolio of wealth holders. Therefore, government intervention in the pricing and allocation of loanable funds impede financial deepening mainly by depressing interest rates (Onsoriode and Coris, 2013). Financial deepening generally can improve the ratio of money supply to GDP, price index, liquidity and access to money which can provide more opportunity for investment and growth (Misal, Osore and Odongo, 2021).

Debates have been going on whether financial deepening promotes growth. Chun, Shaoqin, Hao and Jun (2017) observed that developed financial system broaden access to funds. On the contrary, underdeveloped financial system limit access to fund and people are constrained by the availability of their own resources and have to resort to high-cost informal sources such as money lenders. Therefore, promoting well managed financial deepening in low-income countries can enhance resilience and capacity to cope with shock, improve macroeconomic policy effectiveness and support solid and durable inclusive growth (Adu, Marbua and Mensa, 2013). Therefore, the study seeks to ascertain the mediating influence of financial deepening on the relationship between public debt and economic growth. This can be justified in that, when the government carry out investment programmes, there would be an increase in supply of money in circulation which may have the possible effect of explaining or accounting for the relationship between public debt and economic growth. Therefore, the investigation seeks to explore the effect of financial deepening in mediating the relationship between public debt and economic growth in EAC.

1.1.4 Economic Growth

The process of generating durable increase in real national output is referred to as economic growth. It can also imply an increase of national income per capita that involve GDP, GNP and NI (Haller, 2012). On the other hand, it can be defined as a continuous rise in capacity of the country to improve productivity UKaid (2018). Based on the

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explanation, we can therefore suggest economic growth as an increase in productive capacity of the nation.

GDP is the standard measure of economic growth though Gross National Product can also be used (IMF, 2012, Park 2015)). Therefore, the study adopts GDP as an indicator of economic growth. Most developing countries have unutilized potential which may improve economic growth and social equity. Economic growth is the best avenue for improving the quality of life and reducing poverty in developing countries. The growth of the economy can thus be facilitated by increasing productive capacity and efficient utilization of available resources. When the economy grows, unemployment decreases, productivity increases, job opportunity rises and living standards improve (Haller, 2012, IMF, 2017).

The dynamic and inclusive global economy is essential to meeting target for sustainable development. Consequently, the world economy has seen a significant and broad-based deterioration of the past years. The world gross domestic product decreased to 2.3% in 2019, the lowest rate since the global financial crisis of 2008 – 2009 (United Nation. 2020). The seminal paper by Berg and Ostry (2017) attributed economic meltdown to discontentment with the social and environmental quality of economic growth, amid pervasive inequality and the deepening climate crisis. Whereas the GDP is the measure most widely used to assess economic prosperity and performance, it reveals nothing about how income is distributed within a country, the impact of economic activities on natural resources and the environmental or the quality of life enjoyed by the population (Africa Development Bank, 2021).

According to Keho (2018), economic growth is the availability of factors of production such as labor, technology and capital. It is based on increasing return to scale in the economy. On the other hand, economic growth is a process that generates economic, social, qualitative and quantitative changes which causes national economy to cumulatively and durably increase in real national product (Hailer, 2012). Therefore, the economy can record positive, negative and even zero growth. Positive growth means that the annual average macroeconomic indicators are higher than the average growth of population. When the macroeconomic indicators are equal to population growth, we can

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report a zero growth in economy. Negative economic growth emerges when population growth is higher than macroeconomic indicators (Mlanden, 2015).

Whereas economic growth is obtained by efficient use of available resources and increased capacity of production of a country, it can also be noted that economic growth is confounded with economic fluctuations where the application of expansionist monetary and tax policies could lead to elimination of recessionary gaps and increase GDP beyond its potential level (Berg, Ostry, Tsangarides and Yakshikon, 2018). However, economic growth is the most powerful tool for reducing poverty and improving the quality of life in developing countries. In addition, both cross country research and country case studies provide overwhelming evidence that rapid and sustained growth is critical in making faster progress towards millennium development goal (United Nation, 2020).

1.1.5 East African Community

EAC is a regional economic block comprising 6 countries in East Africa. The countries include of Kenya, South Sudan, Tanzania, Burundi, Rwanda, and Uganda. The objectives of EAC are to foster monetary union, custom union, political federation and common market (Byuer, Vanhenkelom & Kingombe, 2015). With output growth per capita, income in the region are averaging US$ 411 in 2010. It remains low with variation of output within the region from US$ 464 in Kenya to US$ 147 in Burundi. During 2018, EAC registered an estimated 5.7% real GDP growth, this was less than 5.9% recorded in 2017. In Tanzania, Debt / GDP ratio stood at 34.6%, Uganda 45%, Kenya 47.6%, Burundi 26.4% and Rwanda 39% over the same period (ADB, 2019). Whereas credit financing in EAC has decreased by 20% from 2012 to 2017, EAC has witnessed expansion in broad money supply by Kenya shillings 2.9 billion for the last five years. Consequently, financial market has grown from Kenya shillings 0.4 trillion to 1.3 trillion. (Kamenchu, 2018)

Even though regional economies experienced global financial crisis between mid-2007 and early 2009, EAC has recorded growth among Sub – Saharan Africa (EAC, 2011). However, unregulated supply of money, high level of public borrowing and increased level of default in financial sector affect economic growth in EAC member states (Kamenchu, 2018). Therefore, the implications of regional integration under EAC for the overall welfare of its member states have been a subject of research in different areas.

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The seminal paper by Babu, Kiprop, Kalio and Gesore (2014) contributed on the reason why there is an increase in the level of public debt in East Africa Community for the last decade. They argued that most public debt are long term in nature and either public or publicly guaranteed. Whereas the terms of borrowing have improved, the burden of public debt in EAC has not been addressed through explicit regional policy. Member states have individually negotiated with creditors in terms of loan procurement plan. However, the number of internal and external factors have contributed to inability of the region to meet the convergence for monetary integration as a solution to the current debt crisis (ADB, 2019).

The growing public debt in the region have raised conversation among policy makers as to whether EAC countries cumulation of public debt has majorly attributed by increase in government expenditure (Kwob and, Kosimba, 2015). Further, concerns have been raised on whether growth in public debt levels might lead to shifting of economic growth in the region especially as member countries makes effort toward deepening economic and political integration in EAC (Babu, Kiprop, Kalio and Gisore, 2014).

The financial sector in East African Community is among the least developed within the economic blocks in Africa. (UNCTAD, 2018). Therefore, the EAC governments have embarked on policies to reduce controls and allows for liberalization of financial markets by granting autonomy to central banks, privatization of states owned financial institution, liberalization of interest rates as well as opening up of economy for international trade (Wanjala and Gogo, 2020). However, the EAC economic growth performance during the past decade has been impressive with growth rate of 6.2% on average. The performance was even more remarkable taking into account the global economic and financial crisis that began in 2007 (Gigineishvili, Mauro and Wang, 2014). Rwanda, Tanzania, and Kenya had high economic growth rate over the last decade, with Burundi being an exceptional due to its political and socioeconomic challenges (ADB, 2019).

Consequently, the overall performance of the EAC translated into sustained growth in real per capita GDP for all countries except Burundi. In 2016, Kenya had GDP per capita of US $ 1455, Tanzania US $ 879, Rwanda US $ 703, Uganda US $ 615 and Burundi US $ 286. As a result, poverty fell significantly; however, inequality remained high across EAC partner states, implying that the benefits of growth were not equally distributed

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among individuals in the society. This indicates the importance of taking distributional concern further into account (UNCTAD, 2018).

1.2 Statement of the Problem

Public debt and economic growth relate in a nonlinear function and the shape is inverted U. The main argument advanced in this preposition is that government borrowing is likely to affect growth up to a certain limit. Any increase in public debt beyond a certain threshold may have deleterious effect on growth. Debates have been going on concerning the threshold of debt that may reverse the growth prospect. Checcherita and Rother (2010) set the limit of debt to GDP ratio at 100%. Rainhart and Rogoff (2010) provide the threshold of debt to GDP ratio to be 90%. On the other hand, Ndieupa (2018) observed that a debt to GDP ratio beyond 67% may negatively affect growth. These observations suggest that there is no agreement on the level of debt beyond which the economy may experience negative growth. Therefore, it appears that, no conclusive research has been done on the relationship between public debt economic growths in low- and middle-income countries.

EAC partner states have liberalized their economies, the pursuit of stable level of inflation, sustainable budget deficit, minimal public debt and equitable current account balance remains a key focus in all member states. Debt stock as a share of GDP is above 30% in all EAC countries except Burundi. Debt service puts tremendous pressure on limited foreign exchange earnings (ADB, 2019). EAC registered progressive growth among Sub – Saharan Africa in the past decade. However, EAC member states have a lower degree of financial deepening, lower level of domestic saving, high public debt and over reliance on donor aid (Sweta, Sayena and Yabora, 2012). This has been attributed to inability for most African States to develop effective framework for regional cooperation, inherent high intra – country trade cost, lack of resource pooling and inability to access larger market (Elke and Craig, 2019).

Results from empirical evidence suggest that no conclusive research has been carried out to establish the influence of public debt on economic growth. The question as to whether government borrowing is harmful or useful on economic growth has been subject for discussion for some time. Globally, Checcherita and Rother (2010) reported that public debt exerts positive and significant influence on economic growth. The result is consistent

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with the findings of Bailan and Iulian (2015), Park (2015), and Rahman (2019). On the contrary, Mordecal and Mathew (2016), Zouhair and Fatuma (2014) and Ahiborn and Schweicert (2016) observed that public debt significantly and negatively affects growth. From the review, it can be suggested that there is absence of empirical and theoretical consensus on the association between public debt and economic growth. The study therefore sought to incorporate the mediating and moderating variable to establish the influence of public debt on economic growth.

Empirical literature carried out in this area focused on developed countries (Benzooijien and Bekker, 2017, Park, 2015). Developed countries are characterized by high income per capita, high gross domestic product, high level of industrialization and efficient technological infrastructure (Antonakakis and Bandigen, 2012), and therefore, their findings may not apply to developing nation which have different macroeconomic conditions (Sweta, Savena and Yabora, 2012). These give rise to contextual gaps which the study sought to explore.

Different methodologies were deployed to carry out research. Most scholars used least square model, pooling ordinary least square model and instrumental variable analysis (Mirdala, et al, 2015, Ahiborn and Schweicert, 2016 and Berseguya and Riccordo, 2014). Least square model suffers from experimental error and the underlying relationship may not be exactly linear. Uncertainty around prediction in instrumental variable analysis may result in incorrect precision. Further, instrumental variable analysis makes strong assumptions that cannot be conclusively tested by data (O'melly, 2012). The investigation deploys Auto Regressive Distribution Lag Model (ARDL). The model has been successfully used by Gomez and Sosvila (2017). The use of ARDL may not require pretest for unit root test, unlike other models. It is preferred when dealing with different order, 1(0), 1(1) or amalgamation or both. In a small sample, the ARDL is ideal when dealing with long run association between the variables (Emekan and Aham, 2016). Therefore, based on the above review, it can be noted that the relationship among public debt, output volatility, financial deepening and economic growth in EAC remained unknown.

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1.3 Research Objectives

The main objective of investigation was to explore the relationship among public debt, output volatility, financial deepening and economic growth in the East African Community. The specific objectives of the study were,

i. To establish the relationship between public debt and economic growth in East African Community.

ii. To assess the effect of output volatility on the relationship between public debt and economic growth in East African Community.

iii. To ascertain the effect of financial deepening on the relationship between public debt and economic growth in East African Community.

iv. To determine the joint effects among public debt, output volatility, financial deepening and economic growth in East African Community.

1.4 Significance of the Study

Exchange of knowledge with business, public sector and social organization is very important for users to have the ability to recognize, assimilate and apply information to improve operation. Acquisition of knowledge helps bring high value change in the society. The knowledge of public debt, output volatility, financial deepening and economic growth helps researchers and readers to better understand the relationship between the variables. The study findings are of value to Knowledge because knowledge is the main factor bringing competitive advantage to the institution. Financial knowledge tends to support all tasks related to the institutional survival. Therefore, the study contributes towards knowledge building.

In practice, the report will provide effective way to develop policy that will streamline borrowing and investment criteria. The findings of the study will facilitate the government and agencies to formulate macroeconomic policies that guide the process and framework to enhance economic growth, improve uptake of public debt, deepened financial sector and moderate output volatility. Properly managed growth would cure perennial challenges in the EAC member states such as unemployment. Further, the findings will ease government and interested parties to mitigate adverse effects in the economy.

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Theory building will smoothen efficient development of finance and framework for analysis and application to real world problems. This can be helpful in trying to think through a conceptual framework for approaching financial decision, related empirical tests and their implication for financial decision making. The study promotes development of finance theory. This is done through intensive use of empirical evidence by reconciling contradictions, types of data and different investigators which in turn increase the likelihood of reframing a new theoretical vision. It adds value to explaining and predicting how public debt, output volatility, financial deepening and economic growth relate to one another. It contributes to available literature in the area of economic growth in EAC where limited literature is available.

In summary, the investigation seeks to examine the association among public debt, output volatility, financial deepening and economic growth in the East African community. The subsequent chapters were organized as follows, chapter two deals with literature review where the theory underpinning the study and assessment of study variables were undertaken. Chapter three highlights research methodology, chapter four analyzes descriptive statistics and chapter five provides hypothesis testing, finally, chapter six presents summary of the study, conclusions and recommendations based on empirical evidence.

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CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The section reviews both empirical and theoretical literature relating to public debt, output volatility, financial deepening and economic growth.

2.2 Theoretical Foundation

Economic growth model by Solow (1956) forms the main theory that anchored the study and explain the concept of production and output. However, since output volatility is a subset of economic growth, Business cycle theory by Burns & Mitchell (1946) came in handy to explain the fluctuation of output. Debt overhang theory by Myers (1977) presents a situation where there are set threshold beyond which any rise in public debt may be deleterious to the nation. Though a rise in public debt has a productive effect in financial deepening (Kutivadze, 2011), liquidity preference theory by Keyne (1935) will help predict and explain the concept of financial deepening.

2.2.1 Theory of Economic Growth

Economic growth theory developed by Solow (1956) explains the concept of production. It states that production is a function of output. Some of the production is consumed and the remaining is invested and saved. The theory acknowledges that there are two factors of production that create output. These factors are labour and capital. This theory helps one to understanding the importance and contribution made by capital and labour in the production process. Lukasz (2014) observed that the economic growth model fails to recognize contribution made by informal market and time value of money. In addition, the measurement of economic growth does not take into account the negative process associated with economic activities such as noise pollution, environmental pollution and its progressive degradation.

However, Solow's theory of growth was criticized by Ozdemir (2017) who indicated that Solow assumed that continuous production can take place in the absence of investment. Production function is a subset of investments function, and the moment one function is ignored, the model becomes unrealistic. The model also assumed that there is full employment of labour and capital. However, most of the economy finds it difficult to

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achieve full employment of capital stock and labour. This theory is important for the study because production is a function of labour and capital. The aggregate increase in output (GDP) is a measure of economic growth. However, the genesis of economic growth theory helps facilitate the development of growth model where an increase in investment leads to higher return up to a certain limit as higher proportion of investment leads to diminishing returns and convergence on the steady state of growth.

2.2.2 Debt Overhang Theory

Myers (1977) suggested that debt overhang is a situation where the implication of excessive debt is far - reaching that an entity may not consider procuring extra debt to finance future projects. Since earning from projects would go towards debt servicing Therefore, debt overhang may distress investment. The proposition of Myers (1977) was supported by Hennessy (2004) who observed that debt overhang may lead to distortion and slowing down economic growth. This may be demonstrated by the fact that servicing of debt exhaust considerable revenue, this may affect the potential to return to growth trajectory. However, Owen (1995) noted that debt overhang is relevant in corporate governance. He pointed out that credibility of government policy by postponing fiscal consolidations are undermined by unsustainable public debt. Debt overhang can lead to underinvestment and when an entity cannot generate sufficient revenue to finance its operation, it finds it hard to raise capital for investment (Hennessy, 2004).

Many economists indicated that the weaknesses of corporate balance sheet are constraining business spending and investment and therefore affects growth of the economy. Debt holders may lay claim on part of the profit which may render net present value negative. Debt overhang can be alleviated if various creditors and shareholders manage to negotiate their contract and restructure their balance sheet (Filipp, 2010). This theory is essential for the study in that it helps one understand the influence of excessive public debt on investment which may in tern affect the economic growth. Debt overhang theory made a contribution in the current society. It introduces discipline to the management of debt and liquidity in the institution. (Mike, 2009).

2.2.3 Business Cycle Theory

Business cycle is the fluctuation of real output around potential output of the economy. The economic cycle means altering the period of growth (Burns and Mitchell, 1947).

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Burns and Mitchell definition of business cycle has two features. The first is the movements among economic variable which take the possible leads and lags in timing. The second element is the definition of business cycle which treats expansion separately from contraction. This theory is important because it explains the variation of output which is one of the variables under consideration.

However, some scholars expressed reservations on the business cycle theory. Manuel (1986) noted that the theory lacks the ability to explain the intermediary phase. Much of the explanation is focused on expansion and recession. It is also observed that emphasis on monetary phenomena may not be true, because, apart from monetary factors, other non –monetary factors such as cost structure, new investment demand and expectation of businessmen can also generate changes in economic activities. Kiyotaki (2011) indicated that business cycle theory has little impact on economic policies to stop recession and the true reason for recurring of business cycle lies in the manipulation of monetary supplies. This theory contributes towards government policy during periods of economic recession. The government usually provides economic stimulus package to alleviate certain sectors from economic recession.

2.2.4 The Liquidity Preference Theory

The theory was proposed by Keyne (1935). The theory advance motivation for demand for money. It indicates that borrowing is not the demand for money but the desire to remain liquid. The price of money is interest rate. Keyne classified demand for money into three motives, speculative, precautionary and transaction, and reiterated that money is the most liquid asset and the quicker a financial asset can be converted into cash, the more liquid it is. This statement is important for the study. Remember that IMF classified financial assets into broad money supply. The classification of financial asset into broad money supply was based on liquidity. Therefore, the faster a financial asset will be converted into cash will determine how we measure financial deepening.

Appeit (2016) does not however agree with Keynes' argument. He noted that the concept of rate of interest lacks consistency in that, the rate of interest cannot reflect the valuation. The recognition of interest rate as a price and as a compensation at the same time is unclear. However, the observation of Hicks (1939) was consistent with that of Appeit (2016) who found that liquidity preference orthodoxy fails to address equilibrium prices

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and interest rate. This weakness was however addressed by loanable fund theory. The theory set to determine the equilibrium interest rate and asset pricing, popularly known as IS – LM curve. The liquidity preference theory plays an important role in monetary policy. For instance, it explains the determination of interest rate through demand and supply of money.

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2.3 Empirical Review

The section discusses empirical review on the link among public debt, financial deepening output volatility and economic growth in line with the objective of the study. It also entails summary of literature review, conceptual model and research hypotheses.

2.3.1 Public Debt and Economic Growth

Discussion on whether government debt influences economic growth has attracted attention of many scholars. The debate on whether public debt exerts positive or negative influence on growth is still on course in the academic world. Some scholars believe that public debt exerts positive and significant influence on economic growth, while others argue that there is negative influence on the association between public debt and economic growth. Park (2015) explored the nexus between public debt and economic growth in developed economies. GMM dynamic was deployed as the analytical tool. It was established that government debt statistically connected with increased economic growth. The findings were supported by Rahma (2019) who examined how public debt and economic growth correlate. A review of 33 quantitative articles was conducted and analyzed. Positive relation was observed between public debt and economic growth. Consequently, the link between debt and economic growth was studied by Natwi and Erickson (2016) in Ghana. The study was carried out using Johansen integration model. Data was gathered from 1970 – 2012. The study confirms a positive and significant influence of government debt on economic growth in Ghana. The finding was in line with studies conducted by Bilan and Iuian (2015) and Checherita and Rother (2010).

However, other scholars hold contrasting positions. They hold that public debt exerts negative influence on economic growth. This position is supported by Ahiborn and Schweicert (2016). The researchers conducted a study on the influence of public debt on economic growth. A panel data of 111 from OECD countries was collected from developed countries from 1971 – 2010. Haussmann test and pooled ordinary least square estimation model was employed to analyze data. Public debt was found to exert negative or neutral effect on economic growth. The finding was consistent with results obtained by Zouhair and Fatuma (2014). The scholars investigated debt and economic growth. Dynamic data from nineteen nations over a period from 1990 to 2011 were used. The analysis was carried out through Arellano bond dynamic panel data estimation. Public debt was found to negatively and significantly relate to economic growth. The outcome

was supported by Immole and Ehikioya (2012) who established the influence of debt on emerging economies. The analysis was carried out through panel data from 1980 to 2009. The study used ordinary least square regression model as the analytical tool to analyze the data. The results indicate negative influence of public debt on economic growth.

Research shows that it is highly unlikely for a country to run a surplus budget, and therefore, the acquisition of public debt becomes inevitable (Hilton, 2021). Whereas the acquisition of public debt is not the problem, building up public debt to unsustainable levels may suppress economic growth. Previous research on the effect of government debt on economic growth produced mixed findings. Consequently, other scholars argued that the inconsistent results on the relationship between public debt and economic growth arises due to estimated threshold that varies from one study to another, and providing inadequate insight regarding the effect of debt on growth (Maleka, Biyase and Zwane, 2019). The theoretical review provides that public debt and its service affect growth by discouraging private investment and alter the composition of public spending; further, it may have non – linear effects on growth through capital accumulation (Babu, Kiprop, Kalio and Gisore, 2014).

According to debt overhang hypothesis, public debt may grow to a level where future debt will be larger than the countries repayment abilities, therefore, expected debt service costs may discourage further domestic and sovereign investments. In this context, the potential investors may fear that the more the production, the more taxes may be levied on their produce, thus, less willing to incur investments cost (Jallod and Tarawache, 2021). Even though the issue of debt and its impact on economic growth and development remains a major concern for most developing nations, most of these countries are characterized by low level of domestic resource mobilization, low savings, low per capita income, large fiscal deficit, rising current account imbalance and high saving gap (Adom, 2016). Such a situation constrains developing economies to raise adequate resources required to promote investment and boost economic growth.

High public debt burden makes economy more vulnerable to shock, on the other hand, public debt overhang can constrain economic recovery, makes a country more prone to liquidity shock and defaults. Therefore, both theoretical and empirical literature suggests that high debt burden impede long term growth (Panizza and Presbitero, 2013). However,

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most developing countries resort to borrowing with a view to complementing domestic savings and enhance their ability to undertake productive investment, though a number of empirical papers finds that the relationship between public debt and economic growth is a non – linear and characterized by the presence of a threshold above which debt starts having a negative effect on economic growth (Mushbau, Mahmood, Ismail, Shamsuddin and Rashid, 2018).

According to Calderon and Fuentes (2013), there exist a non – linear relationship between public debt levels and economic growth. This implies that rising government debt have positive growth effects when debt levels are low. on the contrary, these effects become negative when debt levels increase beyond a certain limit. A non – linear threshold could suggest that an increase in government borrowing competes for funds in the capital market which intern raises interest rates and crowds out private investments (Adom, 2013). This indicates that debt overhang theory on the relationship between public debt and economic growth is well grounded.

The review indicates that the influence of public debt on economic growth has not been resolved and is still contentious. This creates a knowledge gap which calls for investigation. The study seeks to incorporate mediating and moderating variables to explain the association between public debt and economic growth.

Most studies carried out in this area were done in developed economies (Benzooijien and Bekker, 2017, Park 2015, Antonakakis and Bandiger 2012 and Mirdala et.al. 2015). The developed countries have different macroeconomic condition like high income per capita, high level of industrialization and efficient technological infrastructure (Antonaskakis and Bandgen, 2012). Their findings may thus not apply to EAC where there is a different macroeconomic environment.

2.3.2 Public Debt, Output Volatility and Economic Growth
Investigations on the relationship between public debt and output volatility have posted consistent outcomes. There appears to be unanimity among the scholars on the direction of causality between public debt and output volatility. The researchers agree that there is a positive relationship between public and output volatility. Those who support the position argue that high public debt slows down the scope of fluctuation in economic

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cycle which may results in high output volatility (Kumar and Woo, 2010). However, increase in government debt may increase output fluctuation by raising probability of default. When government debt becomes significant, uncertainty of output becomes more volatile because risk premium on government bond is countercyclical (Schun, 2012).

On the other hand, the influence of public debt on variability of output was studied by Pescator, Damarco and John (2014). The researchers focused on advance economies. The study on the influence of public debt on output volatility fails to find a nonlinear correlation between variables. However, they suggested positive correlation even though there were large interquartile ranges above 56% of debt / GDP ratio. The finding was in line with research conducted by Sutherland and Hoeller (2012) which suggest bivariate association between public debt and output volatility. However, they observed that rising public debt may lead to an increment in fluctuation of output.

The conversation that fluctuation of output correlates negatively with economic growth is widely accepted. This theoretical view was supported by Kodama (2014) who explored the influence of output volatility on growth in low- and middle-income countries. GMM estimation model was employed as the analytical tool. The results indicate that output volatility relates negatively with economic growth. In addition, Ramey and Raney (1995) carried out study evidence of cross country between volatility and growth. It was noted that countries with lower growth experienced higher volatility. The evidence was corroborated by a study conducted by Dobosinsica, Kulikoo and Randreat (2012) which established that output volatility and economic growth relate inversely.

Jean (2002) investigated the reason why the association between output volatility and economic growth are both negative and positive. The panel data technique was used to analyze data to estimate growth equation. It was found that output volatility and economic growth relates negatively across countries. However, the relationship reverses itself across various sectors. An examination of cross – sector influence of output volatility on economic growth was carried out by Kose, Prsasad and Terrones (2005). The study established that output volatility exerts a negative effect on economic growth.

From the above discussion, the scholars appear to build consensus on the influence of output volatility on economic growth (Kodama, 2014, Ramey and Ramey, 1995,

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Dobosinsica, Kulikoo and Rabdreat, 2012). However, there is absence of empirical and theoretical consensus on how public debt relates to economic growth. On the other hand, during review of literature, we did not come across any article considering any other factor that may influence the association between   public debt and economic growth. Based on this argument, the study seeks to introduce output volatility as an additional factor to establish its moderating influence on the association between public debt and economic growth. The reasoning behind this logic is that when the government borrowed funds, it is assumed that the borrowing will be invested in the productive sector of the economy. The investment would generate output that will contribute towards economic growth. However, the output is not certain, it fluctuates and therefore it is volatile. The study seeks to investigate if the variability of output increase or decrease the relationship between public debt and economic growth.

2.3.3 Public Debt, Financial Deepening and Economic Growth

Debate on how public debt relates to financial deepening has generated inconsistent outcome among policy makers and scholars in the academic field. There has been conflicting opinion on how public debt affects financial deepening. Whereas some scholars argue that public debt relates positively to financial deepening, others noted that public debt negatively influence financial deepening. Kutivadze (2011) examine the influence of public debt on financial deepening. The study was conducted by controlling macro and institutional factors where debt is grouped by income levels for a period from 1994 – 2007. The study deployed GMM for robustness. The results provide strong evidence that financial deepening is determined by public debt. This finding was supported by Guscina and Jeanne (2006) who employed data from 19 countries using static panel approach. The measurement of financial deepening was M2 to GDP. This was used to determine the role of domestic debt composition. It was found that domestic borrowing relates positively to financial deepening.

In addition, Azzimonte, Franscar and Quadrini (2012) studied the effect of rising stock of domestic debt on financial deepening on a sample of 26 European countries for the period of 1990 – 2010. The study employed fixed effect method and showed that domestic debt composition has a significant and positive relationship with financial deepening. The finding was consistent with Forstund, Lima and Panizza (2011). The researchers

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investigated the effects of public debt on financial deepening. The finding presents a positive association between public debt and financial deepening.

On the contrary, other researchers presented a different theoretical and empirical finding that public debt relates negatively to financial deepening. A case in point was Attyligit and Akkey (2013) who researched in Turkey's economy. Their results indicate that public debt exerts a negative influence on financial deepening. Analysis of the correlation between public debt and financial deepening was done by Mun and Ismail (2015) in Malaysia. Time series data was collected for 38 years from 1980 – 2011. Analysis was carried out using autoregressive distribution lag model. The result indicates that public debt negatively influences financial deepening. The finding was consistent with that of Emran and Farazi (2009), Ayadi, Arbak, Naceur and Groen (2015) and IIgun (2016).

Consequently, Aliero and Abubakar (2021) analyzed the domestic debt on financial deepening in Nigeria using time series data from 1980 – to 2018. The analysis was done using autoregressive distribution lag model and asymmetric causality tests. It was found that domestic debt has a significant negative influence on financial deepening in Nigeria. However, the asymmetrical causality test showed unidirectional causal relationship from cumulative positive domestic public debt shock to cumulative positive financial deepening shock. Even though Alier and Abubakar (2021) used two variables, that is public debt and financial deepening. Aliero Dantama and Abubakar (2019) introduced institutional quality to determine public debt and institutional quality on financial deepening in Nigeria. Using time series data from 1980 – 2017. The auto regressive distribution lag model was deployed as analytical tool. The result indicates that the interaction between public debt composition and institutional quality has a significant positive effect on financial deepening. However, the results are negative and significant without interaction. Therefore, the study concludes that public debt in the presence of strong institutional quality, promotes financial deepening.

On the other hand, Ersoy (2012) investigated sovereign debt exposures on financial deepening in Turkey. The results reveal a long run and negative association between sovereign debt and financial deepening. Consequently, Kravtson (2017) explored public debt and financial deepening using finite distributed lag model and time varying effects in the countries of the Central, Eastern, Europe, Balkan and Baltics region. The results

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present that public debt negatively influence financial deepening. The result was in agreement with the finding of Shetta and Kawaley (2014).

The review provides a clear indication that the influence of public debt on financial deepening has not been resolved and is still contentious. Other scholars observed a positive influence of public debt on financial deepening (Kutivadze, 2011, Guscina and Jeanne, 2006). On the contrary, Attiligit (2013), Mun and Ismail (2015), Emran and Farazi (2009), Ayadi, Arbak, Naceur and Groan (2015) and IIgun (2016) noted a negative influence of government debt on financial deepening. Therefore, the relationship between public debt and financial deepening remains unknown. This posed a gap which the study sought to explore.

Questions have been raised on whether financial deepening affects growth. Other schools of thought argued that Deeper financial systems have been associated with economic growth in economic literature Ogbebor and Okungbowa (2019), while others argued that financial deepening involves efforts to develop financial system in an economy that results in increased financial instruments, and assets in the financial markets which invariably lead to the expansion of the real sector of an economy (Adu, Mabua and Mensah, 2013). Considering the relative slow growth of African countries, some economies have turned their attention to investigating the relationship between financial deepening and economic growth in developing nations. Consequently, the stagnation of economic growth in most sub – Saharan African countries is partly attributed to shallow financial debt which means that the range of financial assets in these countries are narrow (Jombo, 2021)

Damar and Ardigo (2006) focused on the effect of financial deepening on economic growth in Turkey. Analysis was done through cross sectional growth model. Financial deepening was found to relate negatively with economic growth. On the contrary, Chan and Wu (2012) carried out a study on the cointegration effect of financial deepening on economic growth in Taiwan. Cointegration effect of financial deepening on economic growth was established and financial deepening was found to cointegrate positively with economic growth. This finding was consistent with the finding by Rashit, Araghi and Shayeste (2014). Researchers explored the influence of financial deepening on economic

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growth. The General Method of Moment model was employed to analyze data and financial deepening was found to relate positively with economic growth.

Consequently, Iyoboyo (2013) explored a study of the effect of financial deepening on economic growth. Bound testing approach to cointegration was used. Data was gathered from 1981 – 2010. Financial deepening was found to cointegrate with economic growth. On the other hand, Adenola and Biodum (2020) examine the influence of financial deepening on economic growth in Nigeria. Error correction model and regression analysis were used. It was revealed that financial deepening significantly and positively affects economic growth in Nigeria. The result was consistent with the finding of Ghildiyal, Pokhriyal and Mohan (2015). The researchers investigated the causal relationship between financial deepening and economic growth in India. Autoregressive distribution lag model was deployed to analyses the data.it was found that there exists an equilibrium relationship in the long run between financial deepening and economic growth. It was also observed that financial deepening causes economy growth in the short run. Therefore, the study concludes that financial deepening positively influences economic growth.

The seminal paper by Adu, Marbua and Mensah (2013) contributed towards establishing the nexus between financial deepening and economic growth. The paper ascertains positive relationship between financial deepening and economic growth. The finding was consistent with the results attained by Asiedu, Effah, Joel and Nkwantabi (2021) and Gezer (2018). However, Nyamweya, Ochieng, Odipo and Magutu (2020) examined the mediating role of financial deepening on the association between economic growth and poverty levels in EAC. Annual data for 30 years from 1989 – 2018 was used and analyzed through descriptive and inferential statistics. Feasible least square model was adopted. Financial deepening was found to have a significant influence on the link between economic growth and poverty levels in EAC.

In line with the review of literature on the association between financial deepening and economic growth, much is unknown on the relationship between financial deepening and economic growth. This was confirmed by empirical review where damar and Ardigo (2006) argued that, there was a negative association between financial deepening and economic growth, while, Chan and Wu (2012), Rashit, Araghi and Shayeste (2014) and

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Adu, Marbua and Mensal (2013) noted positive relationship between financial deepening and economic growth. This indicates that the relationship between financial deepening and economic growth remains unknown. This creates a gap which the study sought to establish.

Based on the review, the discussion on the effect of financial deepening on economic growth has not been concluded. One scholar argued that financial deepening negatively influenced economic growth (Damar and Ardigo, 2016), while others observed a positive and significant influence of financial deepening on economic growth (Goyal,et. al, 2011, Iyoboyi, 2013, Chang and Wu, 2012). Therefore, there seem to be lack of theoretical and empirical consensus on the association between financial deepening and economic growth. The study therefore sought to establish the influence of financial deepening in mediating the association between public debt and economic growth in East Africa Community. This can be explained by the facts that, when the government carry out investment programme, there would be an increase in supply of money in the economy which may have the possible effect of explaining or accounting for the relationship between public debt and economic growth.

2.3.4 Public Debt, Output Volatility, Financial Deepening and Economic Growth

Discussion has been going on concerning the influence of public debt on fluctuation of output. Investigation conducted by Pescator, Damarce and John (2014) focused on advanced economies but failed to find a nonlinear connection between public debt and variation of output. However, a positive relationship was suggested even though there were large interquartile ranges above 56% of government debt / GDP ratio. The finding was in agreement with the study conducted by Sutherland and Hoeller (2012) which noted that an increase in government debt may lead to an increase in variability of output.

Significant studies considered the nexus between fluctuation of output and financial deepening. Other papers analyzed the theoretical connection between the two variables specifically Aghion, Abhijik and Thomas (1999) which found that financial deepening reduces output volatility. The study used over lapping generational model where firms espoused two types of investment, long term productivity enhancement and short-term investment. However, Wagner (2010) shows that risk diversification within financial institutions raises probability of system crisis even though it reduces institutional risks. A

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number of studies attempted to investigate whether financial deepening decrease uncertainty of output, Ferreira (2002) found that output volatility was inversely related to all proxies of financial deepening.

However, Easterly, Islam and Sliglits (2011) found evidences for non – linear relationship which indicates that financial deepening reduces fluctuation of production up to a certain limit but thereafter any increase in financial deepening give rise to higher volatility of output. Using a panel data of 60 countries from 1960 – 1997. Consequently, Dabla, Norris and Srivisal (2013) conduct a study using 110 country panel data set over the period 1974 – 2008. The evidence indicates that there is a non – linear relationship between financial deepening and variability of output. Specifically, financial deepening has a beneficial role of dampening volatility but only up to a certain limit.

Financial deepening positively influences economic growth (Carmen, 2011). Jalil, Wasid and Shalibaz (2010) analyzed the effect of financial deepening on economic growth. Data was collected from 1965 – 2007. Analysis was carried out through ARDL model. The result indicates that financial deepening exerts a positive and significant influence on economic growth. The finding was in agreement with the study conducted by Omwumere, Ibe and Maunani (2012) whereby the researchers examined the influence of financial deepening on economic growth from Nigeria's perspective. A multiple regression model was deployed. Financial deepening was found to influenced economic growth positively. The theoretical review underpins the interconnection among public debt, output volatility, financial deepening and economic growth. Therefore, this study sought to establish the joint effect among public debt, output volatility, financial deepening and economic growth in EAC.

2.3.5 Summary of Literature Review

Table 2.1: Summary of Literature Review

Author	Context	Research Topic	Findings	Research Gap	How Current Study Differs from Previous Studies
Damar & Ardego (2006)	Turkey	Influence of Financial Deepening on Economic Growth.	Financial deepening exerts strong and negative influence on economic growth.	Covered private public sector and adopted cross – sectional approach	The study covers EAC and adopts longitudinal approach
Barseguyan &Riccordo (2010)	Europe	Institutional Cause of Output Volatility	One standard deviation increases in entry cost increases output by 40% of its average value	Focused on institutional cause of volatility.	The study focuses on influence of output volatility on economic growth
Antonakakis & Bandiger (2012)	US	Cross – Countries Spillovers effect of output volatility on economic growth	Average growth and volatility spillover	Concentrated on spillovers.	The study focuses on volatility and economic growth
Imimole & Imoughel (2012)	Nigeria	Impact of Public debt on emerging economies	Domestic debt has inverse relationship with economic growth.	Focused on corporate as a contextual environment	The study focuses on EAC economy
Iyoboyi (2013)	Nigeria	Effect of financial deepening on economic Growth	Financial deepening Cointegration with economic growth	It tested the length of relationship (whether long or short).	The study tests linear relationship
Zouhaies & Fatuma	Panel Data of 19	The influence of public debt on economic growth	Negative effect on total external debt to GDP	Done in 19 developing countries.	The context of the study is EAC.

Author	Context	Research Topic	Findings	Research Gap	How Current Study Differs from Previous Studies
(2014)	Developing Countries				
Park (2015)	Panel Data	Financial Development, Fiscal and Macroeconomic Volatility	Output volatility increase Government debt	Focused on fiscal policy, macroeconomic volatility and financial development.	The study focuses on public debt, output volatility, financial deepening and economic growth
Marlyse (2015)	Kenya	The influence of Financial Deepening on Economic Growth	Commercial bank deposit, Liquid liability, commercial banks to central bank asset, credit to private sector are positively related to economic growth.	Focused on Banking sector	The study focuses on EAC economic environment
Mirdala et,al (2015)	Developed and Developing Countries	The association among macroeconomic volatility, financial liberalization and Financial Integration.	Financial integration has significant contribution on output volatility	Focused on macroeconomic volatility, financial liberalization and financial integration.	The study focuses on public debt, output volatility, financial deepening and economic growth
Ahlborn & Schweickert (2016)	111 OECD and Developing Countries	Public Debt and Economic Growth	European countries face more growth reducing public debt effect than liberal countries	The study was carried out in developed countries with group data from several countries.	The study was be carried out in EAC and data was be collected from five countries of member states.

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Author	Context	Research Topic	Findings	Research Gap	How Current Study Differs from Previous Studies
Nantwi & Erickson (2016)	Ghana	The influence of public debt on economic growth	Positive and significant long run relationship between public debt and economic growth.	The study focused on causality of public debt and economic growth.	The study focuses on linear association between public debt and economic growth.
Mwanna & Chinwudu (2016)	Nigeria	The influence of financial deepening on Economic Growth	Both financial deepening, bank and financial market positively and significantly affects economic growth	Focused on stock market and banks.	The study focuses on East African economic environment
Bezooijen & Bikker (2017)	Panel Data of 55 Countries	Financial Structure and Macroeconomic Volatility	Increase in stock market sizes has a positive effect on volatility of investments.	Focused on market size and investment volatility.	The study focuses on output volatility and economic growth.

Source: Author 2020

2.4 Conceptual Framework

The framework outlines the link between public debt, output volatility, financial deepening and economic growth. The framework can only hold when public debt and output volatility affect economic growth. When the government borrows fund, the borrowing is assumed to be directed to the productive sector of the economy. the investments generate output which helps boost productive capacity and increase economic growth (Natwi & Erickson, 2016). The study predicts that public debt exerts a positive influence on economic growth. However, the output is not certain as it fluctuates. It varies and therefore, it is volatile (Goyal,et.al. 2011), this study sought to explore whether the connection between public debt and economic growth can be moderated by output volatility. On the other hand, when the governments undertake investment programme, the economy would experience an increased supply of money (Ramey & Ramey, 1995). The rise in liquid asset in the economy may promote economic activities that may enhance economic growth. Therefore, this study sought to determine whether the nexus between public debt and economic growth would be explained or accounted for by financial deepening.

Figure 2.1: Conceptual Model
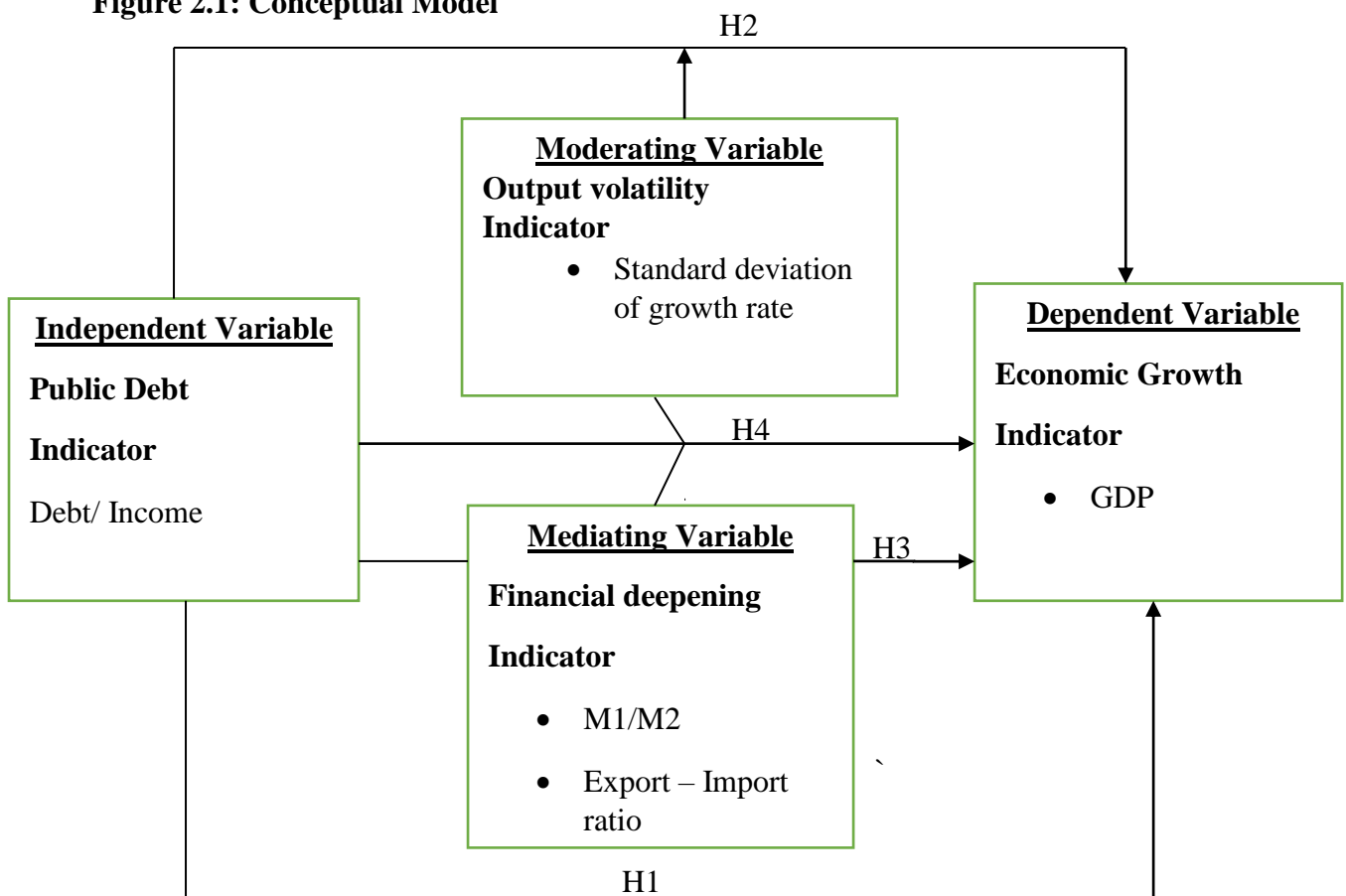
Source: Author. 2020

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In the conceptual model, economic growth is the dependent variable, measured by GDP, while public debt is the independent variable. The indicator is the ratio of debt to government income, output volatility is the moderating variable, the indicator is standard deviation of economic growth rate and financial deepening is the mediating variable and the indicator is a ratio of M1 to M2. H1, investigates the influence of public debt on economic growth. In H2, the model examined the effect of output volatility in moderating the connection between public debt and economic growth. H3 explored whether financial deepening has an explanatory role on the association between public debt and economic growth. Finally, H4 established the joint effect among public debt, output volatility, financial deepening and economic growth.

2.5 Research Hypotheses

The following hypotheses were informed by empirical review and objective of the study. Below are hypotheses which guided the study.

$H_0$1:   There is no significant effect on the relationship between public debt and
          economic growth in East African Community.

$H_0$2:   There is no significant moderating effect of output volatility on the relationship
          between public debt and economic growth in East African Community.

$H_0$3:   There is no significant mediating effect of financial deepening on the
          relationship between public debt and economic growth in East African
          Community.

$H_0$4:   There is no significant joint effect among public debt, output volatility, financial
          deepening and economic growth in East African Community.

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CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

The section discusses the research philosophy, research design, operationalization of variables, data collection techniques, statistical tests and data analysis.

3.2 Research Philosophy

Research philosophy is a belief regarding the method in which data about a phenomenon are utilized, collected and analyzed. The purpose of social science is to transform beliefs into things known (Hunt, 2005). Realism, positivism and interpretivism are the main classification of research philosophy. Positivism paradigm strives to investigate, confirm and predict law – like patterns of behavior and is commonly used in theories and hypotheses. Interpretivism is guided by the researcher's set of feelings and beliefs about the world and how it should be understood and studied. Finally, the essence of realism is the truth (Taylor and Medina, 2013). Knowing about reality is called ontology. The reality may be our point view or something we are going to prove towards the state of things as they actually exist. Whereas epistemology is the inquiry on how to carry out the study or test the point view, ontology is the philosophical discipline revolving around the nature of reality (Smith, 2004). Therefore, this study adopted positivism philosophy. This is because, positivism strives to investigate, confirm and predict law - like patterns and are commonly used in theories and hypotheses.

The research was grounded on deductive reasoning with positivism as philosophical foundation. This is where scientific principles guided the need to justify the association between the variables, gathering quantitative data, movement from theory to data, the application of control to safeguard reasonableness of data, the importance of gathering sufficient sample size to generalize and reach conclusions. Here researchers are independent of what is being researched and there is operationalization of concept to ensure clarity of definition (Samparadja & Carlasasmita, 2016).

3.3 Research Design

Since the study deployed a panel data, the design is both longitudinal and cross sectional. However, Correlation analysis was conducted to establish the relationship among the variables. Longitudinal study is where an object is observed on more than one occasion and offers increased precisions of treatment of constructs by eliminating inter individual

variations. This is achieved by observing each subject under several treatments. It also examines individual changing responses over time. It has a natural appeal for the study of changes associated with aging or development, and has value for describing both their dependence on individual characteristics and temporal changes (Cook and Ware, 1983). Longitudinal studies employ continuous measures to follow particular individuals over prolonged period of time, often years or decades. They are usually observational in nature with qualitative or quantitative data being collected on any combination of exposures, and outcome, without any external influence being applied (Carvana, Roman, Sanchez and Solli, 2015). The advantages of longitudinal design are that it has the ability to identify and relate events particularly exposures, exclude recall bias in participant and have ability to correct for Cohort – effect (Ployhart and Vendenberge, 2010)

On the other hand, Cross – sectional study refers to observational inquiries that analyzed population from a single point in time. The investigation measures the outcome and the exposures in the study participant at the same time (Raimunda, Echeimbery and Leone, 2018). Cross – sectional design is relatively inexpensive and takes up little time to conduct, and many outcome and risk factors can be assessed. On the contrary, cross – sectional studies have a limitation in that surveys and questioners about certain aspects of people lives may not always results in accurate reporting, and there is usually no mechanism to verify information. However, this limitation may not affect the validity of the outcome of the investigation. It is still widely used by the researchers (Wang and Cheng, 2020).

Consequently, descriptive statistics involves a range of qualitative and quantitative research methods to collect data that aids in accurately describing a research problem. It helps to answer what, when, where and how question regarding research problems. In descriptive method of research, researcher does not control or manipulate any variable. Variables are identified, observed, and measured (Nassaji, 2016). Apart from longitudinal and cross – sectional research design, correlation will be conducted to establish the relationship among the variables. Correlation research is ideal for generalized findings to real – life situation in externally valid way. Further, it is useful where the inquiries are non – causal relationship to test new measurement tool (Apuke, 2017).

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The longitudinal research design was chosen because the study is carried out for along period of time. From 2002 to 2020. Cross sectional research design is ideal in that, though the study period is long, the data was collected at one particular point in time. The descriptive statistics applied where the data are being described to obtain mean, standard deviation, skewness, kurtosis and the mode. The design has been used successfully in previous studies by Zouhair and Fatuma (2014), Ahiborn and Schwecert (2016) and Natwi and Erickson (2016).

3.4 Population of the Study

The total of entire individuals who are of interest to the researcher and have certain characteristics is referred to us population of the study (Rahi, 2017). Population of the study consists of 6 countries in EAC that is Uganda, Tanzania, Kenya, Burundi, Rwanda and South Sudan. However, South Sudan and Burundi was isolated from the study. This was because macro-economic data of South Sudan was not available online leading to its exclusion from the population. In the case of Burundi, we were unable to get quarterly GDP data and public debt data. In the absence of quarterly GDP data, it may not have been possible to compute standard deviation of growth rate which was an indicator of output volatility. Technically, it was difficult to proceed with the analysis without isolating South Sudan and Burundi because of insufficient data. This means that we could not generate meaningful regression analysis due to paucity of data. The study was carried out from 2002 to 2020. The choice of 2002 was informed by the year EAC was revived after its collapse in 1977.

3.5 Data Collection

The inquiry deployed secondary data. Quarterly data was collected from 2002 to 2020. Data on public debt and financial deepening was gathered from the websites of Central Bank of the member states and gross domestic product from the National Bureau of Statistic of East African Community member state. The choice of secondary data was informed by its flexibility, empirically exercised on systematic methods with procedural and evaluation steps. It was a viable method because it presents an illustrative research application and systematic procedures (Johnson, 2014).

Data on public debt was based on total external and internal debt. The standard deviation of economic growth rate was deployed as an indicator of output volatility. Financial deepening was measured by broad money supply M1 as a ratio of M2. Where M1 is the

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broad money supply composed of bank notes and coins, demand deposits and liquid deposits, and M2 is the broad money supply which include M1, short term deposit and 24hrs money market fund. Economic growth was collected from total output of goods and service from NBS report of EAC member states. Since data collection was done from government agencies responsible for gathering and analyzing macroeconomic data and financial regulators, reliability of data is enhanced.

3.6 Operationalization of Variables

Variable operationalization is a set of basic concepts for social science research and question that can be formulated to measure the concept (Hofer and Saris, 2015). The basic concepts are evaluation, cognitive judgment, relation, evaluative belief, feelings, preferences, right norms, policies, action, tendencies, expectation, behavior, events, knowledge, demographic characteristics and information about time and procedure. To operationalize the variables, public debt was measured as a ratio of government income, output volatility through standard deviation of growth rate, financial deepening, M1 as a ratio of M2 and economic growth measured through GDP. This indicator had been used by Arshad and Sajawal (2007), Ayadi, Arbak, Naceur and Groen (2015), Mwanna and Chinwada (2016), Ondo (2017), Park (2015), Damar and Ardego (2006) and Muhoza (2019).

Table 3.1: Source, Data and Description of Variable

Variable Name	Type of Variable	Period of Data	Data Source	Measurement	Data Type	Source
Public Debt	Independent	2002 to 2020	Central Bank of E.A.C States	Public Debt as a ratio of Income	Ratio	Intosai (2010)
Output Volatility	Moderating	2002 to 2020	NBS of EAC States	Standard Deviation of Economic Growth Rate	Ratio	Park (2015)
Financial Deepening	Mediating	2002 to 2020	Central Bank of EAC States	M1 as a ratio of M2	Ratio	Arshad and Sajawal (2007)
Real Economic Growth	Dependent	2002 to 2020	NBS of EAC states	GDP	Ratio	IMF (2012)

Source: Author 2020

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3.7 Validity and Reliability

Validity can be classified into four types. These are construct validity, content validity, face validity and criterion validity. Whereas construct validity evaluates whether a measurement tool really represent what we are interested in, content validity assesses whether a test is representative of all aspects of constructs. However, face validity considers how suitable the content of a test seems to be on the surface. Even though face validity seems to be similar to content validity, face validity is more informal and subjective in assessment. The last validity to be considered is criterion validity. It evaluates how well a test can predict a concrete outcome or how well the result of the tests approximate the results of another tests (Sekaran, 2006).

Prior theoretical and empirical research in the area of the study informed the selection of study variables and how they were measured. A pilot study involving two countries were carried out to tests the model. The results were used to refine the model. Data validity was achieved through ensuring that data collection instrument was simple, unambiguous and contained variable for which data about EAC was available to increase likelihood of external validity. The study used secondary data collected from government agencies and regulators responsible for collection, collation and storage of data. To enhance data reliability, secondary data was collected by researcher and assistant who were specifically trained and closely monitored. The study deployed secondary data hence no primary data reliability tests were conducted.

3.8 Diagnostic Tests

Before analyzing the data, a statistical test was conducted to establish the presence of multi - collinearity, serial correlation, heteroscedasticity, normality, stationarity and co integration. Table 3.2 provides diagnostic tests.

Table 3.2 Present Summary of Diagnostic Test

S/No.	Assumption	Description of Test	Effect on the model	Test	Interpretation	Treatment
1	Multi - collinearity	Exists where predictor variable are themselves correlated	It may inflate p value, widen confidence interval and suppress t value	Variable inflation factor	Exist where VIF > 10	Remove highly correlated predictors variable from the model
2	Autocorrelation	It happens when disturbance term is correlated to one another	The presence of autocorrelation may invalidate the use of t and f test	Durbin - Watson test	Where p = 2, no autocorrelation, 0<p<2 positive autocorrelation, 2<p<4 negative autocorrelation	Convert the data into percentiles
3	Heteroscedasticity	This is where the variance of disturbance term in each and every observation is not constant	The presence of heteroscedasticity in the model may invalidate the use of t and f test	Peseran scaled LM & Peseran CD.	It exists where P > 0.05	Transform the dependent variables data to natural logarithm
4	Normality	This is where sample distribution of mean is normal	Non - normality may invalidate the use of parametric tests	Jarcque - bera test	Jarque - bera test whose value lies between 0.5 >p>0.1 would support the model	Conduct Quantile - Quantile (QQ) plot for further test
5	Stationarity	This is a situation where variance, autocorrelation and mean are constant over time	Non - stationary data may lead to spurious regression result	Schwartz info Criterion	The data will be stationary when unit root: $\varnothing_1 = 1$ and non - stationary when unit root: $\varnothing_1 < 1$	The data will be transformed to natural log X/Y = log (x) log (Y)
6	Cointegration	Technique test whether there is long-term or short - association between the variables		Padroni Residual Cointegration Test	Cointegration exists when test statistic exceeds 5% critical value and no cointegration when test statistic is less than 5% critical value	

Source:Author2020

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3.9 Data Analysis

Autoregressive Distribution Lag Model was deployed as an analytical tool. This is because, the investment carried by the borrowed fund may not generate output immediately. This imply that there is a time lag between investment and output generation. A negative log likelihood is a cost function that is used as a loss for learning model. A negative imply multiplying by -1. On the other hand, descriptive statistic measured central tendency and variability. The time lag was determined by $dy_{t+s}/dx_{t} = dy_{t}$ $/dx_{t-s} = \beta s$. Where, s is 0, 1, 2 which explain the influence of change in X at period t on the significant of Y in period t, t + 1, t + 2 ……t + n, β is beta. A significant test was done at the level 0.05. The general model was therefore,

$$\sum Y_t = f\sum(X_{it}) \text{ …………………………………………….………… (1)}$$

where, $\sum Y_t$ is economic growth at time t, $\sum X_{it}$ are macro-economic factors, i is 1, 2, 3………. n and t is time. To operationalize the model with the lag variable, the general model would therefore be,

$$\sum EG_{t} = \sum (EG_{-1}, PD_t, PD_{t-1}, OV_t, OVt_{-1}, FD_t, FD_{t-1}) \text{ ………….………………….…… (2)}$$

Where, EG_t is economic growth measured by GDP at time t, PD_{1t}, OV_{2t}, and FD_{3t} are the macroeconomic factors at time t., t is time, t - 1 is optimal lag. Optimal lag is the amount of time taken by independent variable to influence dependent variable.

3.9.1 Hypothesis to test the relationship between public debts on economic growth

$$\sum EG_{t} = \sum (\alpha_0 + \alpha_1 EGt_{-1} + \beta_1 PD_t + \beta_1 PD_{t-1} + e) \text{ ………………………….... ……. (3)}$$

Regress EG_t on PD_t, to proof β_1 is significant.

Where, EG_t is Real Economic Growth at time $_t$, PD_t is Public Debt at time t, β_1 is Coefficient, t is time, t - 1 is optimal lag, α_0 is Constant, and e is Residual.

3.9.2 Hypothesis to test the moderating effect of output volatility on the association between public debt and economic growth

Judd and Kenny (1981) and Baron and Kenny (1986) model was deployed to test the moderating effect of output volatility on the connection between public debt and economic growth in the East African Community. The model uses hierarchical approach to determine the moderating influence on the variables.

$$\sum EG_{t} = \sum (\alpha_0 + \alpha_1 EG_{t-1} + \beta_2 OV_t + \beta_2 OVt_{-1} + e) \text{ .... ……. (4)}$$

Regress EG_t on OV_t to authenticate β_2 is significant.

$$\sum OV_{t} = \sum (\alpha_0 + \alpha_1 OV_{t-1} + \beta 1 PDt + \beta_1 PD_{t-1} + e \text{ …………………………………………… (5)}$$

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Regress OV_t on PD_t to proof β_1 is insignificant.

$$\sum EG_t = \sum (\alpha_0 + \alpha_1 EG_{-1} + \beta_1 PD_t + \beta_1 PD_{t-1} + \beta_2 OV_t + \beta_2 OV_{t-1} + \beta_2 (PD_t*OV_t) + \beta_2 (PD_{t-1}*OV_{t-1}) + e) \dots\dots\dots\dots\dots\dots\dots\dots \; (6)$$

Regress EG_t on PD_t and OV_t to test β_2 is significant as evidence of the moderating influence.

Where EG_t is Real Economic Growth at time t, OV_t is output volatility at time t, PD is public debt at time $_t$, $t-1$ is optimal lag, α_0 is Constant, β_1, and β_2 are Coefficients, t is time and e is Residual.

3.9.3 Hypothesis to test the mediating effect of financial deepening on the connection between public debt and economic growth

Mediating effect of financial deepening on the nexus between public debt and economic growth was built on Judd and Kenny (1981) and Barron and Kenny (1986) model. This model investigates the mediating influence on the association between independent and dependent variables. The model deploys stepwise method to ascertain the mediating role on the relationship between public debt and economic growth.

$$\sum EG_t = \sum (\alpha_0 + \alpha_1 EG_{t-1} + \beta_3 FD_t + \beta_3 FD_{t-1} + e) \dots\dots\dots\dots\dots\dots\dots\dots \; (7)$$

Regress EG_t on FD_t to proof β_3 is significant.

$$\sum FD_t = \sum (\alpha_0 + \alpha_1 FD_{t-1} + \beta_1 PD_t + \beta_1 PD_{t-1} + e) \dots\dots\dots\dots\dots\dots\dots\dots \; (8)$$

Regress FD_t on PD_t to test β_1 is significant.

$$\sum EG_t = \sum (\alpha_0 + \alpha_1 EG_{t-1} + \beta_1 PD_t + \beta_1 PD_{t-1} + \beta_3 FD_t + \beta_3 FD_{t-1} + e) \dots\dots\dots\dots\dots\dots \; (9)$$

Regress EG_t on PD_t and FD_t to authenticate β_1 is significant and β_3 is smaller.

EG_t is Real Economic Growth at time $_t$, PD_t is Public Debt at time $_t$, FD_t is financial deepening at time t, $t-1$ is optimal lag, α_0 is constant, β_1 and β_3 are Coefficient, t is time, and e is residual.

3.9.4 Hypothesis to test the joint effect among public debt, output volatility, financial deepening and economic growth

$$\sum EG_t = \sum (\alpha_0 + \alpha_1 EG_{t-1} + \beta_1 PD_t + \beta_1 PD_{t-1} + \beta_2 OV_t + \beta_2 OV_{t-1} + \beta_3 FD_t + \beta_3 FD_{t-1} + e)$$
$$\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \text{Equation 10}$$

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Where EG_t is Real Economic Growth at time t, PD_t is Public Debt at time t, OV_t is Output Volatility at time t, FD_t Financial Deepening at time t, $t-1$ is optimal lag, α_0 is Constant, β_1, β_2 and β_3 are Coefficients, t is time and e are Residual.

The main objective of this study was to explore the relationship among public debt, output volatility, financial deepening and economic growth in the East African Community. The study adopts positivism as a research philosophy and a longitudinal as research design. The populations of the study consist of six countries that form EAC namely South Sudan, Rwanda, Kenya, Tanzania, Burundi and Uganda. Data was collected from 2002 to 2020 and analysis carried out using Auto Regressive Distribution Lag (ARDL) model.

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CHAPTER FOUR: DESCRIPTIVE STATISTICS

4.1 Introduction

This section highlights the descriptive statistics and diagnostic test preceding the analysis. This helps validate the data. Descriptive statistics provide the simplest way to summarize data on public debt, output volatility, financial deepening and economic growth in the EAC.

4.2 Descriptive Statistics for Public Debt, Output Volatility, Financial Deepening and Economic Growth in EAC

This analysis helps describe data in a more meaningful way in order to identify the data patterns. However, they do not allow for conclusions (Laerd statistics, 2018). In this study, the mean, standard deviation and normality tests (in terms of skewness, kurtosis and Jarque Bera) were conducted. The table below presents results of descriptive statistics.

Table 4.1. Descriptive statistics for Public Debt, Output Volatility, Financial Deepening and economic Growth

	EG	FD	OV	PD
Mean	5.775	0.589	1.466	26.737
Std. Dev.	2.882	0.083	1.542	49.296
Skewness	-1.142	0.244	2.735	3.626
Kurtosis	5.446	2.813	13.508	15.247
Jarque-Bera	103.136	2.521	1292.353	1865.520
Probability	0.000	0.284	0.000	0.000
Sum	1276.300	130.097	324.032	5908.876
Sum Sq. Dev.	1827.313	1.510	523.226	534618.435
Observations	221	221	221	221

Source: Research Data, 2020.

4.2.1 Mean and Standard Deviation

Mean describes the central position of a distribution. It is the well-known and most popular measure of central tendency. It is computed by summing up all values in the data set, divided by the total number of values in the data set. The results for economic

growth, financial deepening, output volatility and public debt were, on average, 5.775; 0.589; 1.466 and 26.737 respectively. This indicates that the center of the data of economic growth, financial deepening, output volatility and public debt are located at 5.775, 0.589, 1.466 and 26.737 respectively. The mean may enable the researcher estimate succeeding data point if the process remains stable.

Standard deviation is an indicator of dispersion of the data set from its mean. The further the deviation, the more their values spread. From Table 4.1, the standard deviations of economic growth, financial deepening, output volatility and public debt were 2.882; 0.083; 1.542 and 49.296 respectively. This means that economic growth, output volatility and public debt had a relatively high spread from their means since their values were greater than 1.

4.2.2 Skewness and Kurtosis

The degree to which the spread varies from normal distribution is defined by skewness. Skewness is the indicator of normal distribution, which usually revolves around zero. When the mean is less than the mode, then it means negative skewness. In contrast, when the mean is greater than the mode, it means positive skewness. From Table 4.1, EG has a value less than 0 (-1.124). This is an indication that it is negatively skewed while FD oscillated around 0 (0.244) meaning that it was normally distributed while OV and PD had values greater than 0 (2.735 and 3.626 respectively). This meant that they were positively skewed.

The measure of thinness or thickness of the distribution tails is called kurtosis. The normal distribution usually has 3 kurtoses. A thick tail implies that the distribution has kurtosis more than 3 and a thin tail when kurtosis is less than 3. From Table 4.1, most of the variables namely economic growth, output volatility and public debt had kurtosis of value more than 3, except financial deepening which had a kurtosis of value less than 3. This means that economic growth, output volatility and public debt have thick tails while financial deepening has a thin tail. The p – values were less than the critical values of 0.05 in the Jarque – bera row for economic growth, output volatility and public debt. This indicates that the study rejects the null hypothesis. The observation was not normally distributed. However, the probability value for financial deepening was 0.284 meaning that the study accepts the null hypothesis of normal distribution.

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4.2.3 Stationarity Test

Before estimating the relationships among the variables that this study considered, the panel data stationarity properties were investigated. The stationarity test is important in time series analysis because statistical properties of time series do not change over time. In addition, many useful analytical tool and statistical tests and models rely on it. When the data is non – stationary, it can be transformed into stationarity through differencing depending on the levels. This is informed by the fact that non – stationary data may generate meaningless results. A Schwartz info criterion was therefore automatically selected and the outcomes were provided in table 4.2 below. From the table, EG represents economic growth, FD – financial deepening, OV – output volatility, PD – public debt and C is the intercept.

Table 4.2: Unit Root Test

			Levin, Lin & Chu t*	Im, Pesaran and Shin W-stat	ADF - Fisher Chi-square	PP - Fisher Chi-square
		Method				
EG	At levels	Statistic	-4.86	-5.56	47.02	46.50
		Prob.	0.00*	0.00*	0.00*	0.00*
	First difference	Statistic	-11.40	-10.78	85.25	61.84
		Prob.	0.00*	0.00*	0.00*	0.00*
FD	At levels	Statistic	-1.08	-1.98	20.98	21.60
		Prob.	0.14	0.02*	0.00*	0.00*
	First difference	Statistic	-9.08	-8.48	100.99	56.77
		Prob.	0.00*	0.00*	0.00*	0.00*
OV	At levels	Statistic	0.39	-6.29	72.93	94.88
		Prob.	0.65	0.00*	0.00*	0.00*
	First difference	Statistic	-7.05	-10.85	77.93	72.96
		Prob.	0.00*	0.00*	0.00*	0.00*
PD	At levels	Statistic	-6.93	-11.25	54.096	32.33
		Prob.	0.00*	0.00*	0.00*	0.00*
	First difference	Statistic	-12.55	-13.59	91.72	72.10
		Prob.	0.00*	0.00*	0.00*	0.00*

Source: Research Data, 2020.

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From Table 4.2, the unit root test was conducted both at levels and at first difference. This was, because at levels, the probabilities of some of the variables were not significant. For example, on output volatility and financial deepening, the probabilities of Levin, Lin &Chu test were insignificant at levels i.e. ($\alpha_3 = -1.08; p = 0.14$) and ($\alpha_5 = 0.39; p = 0.65$). However, when the first differencing was conducted, all the variables have their unit roots significant across all the tests. These were shown by the *. Since other variables are stationary at levels and some at first difference, Autoregressive Distributed Lag (ARDL) model can therefore be run.

4.2.4 Cointegration Test

The test provides long run association between the variables. If there are non-stationary variables i.e have a unit root and the normal regression are conducted, the results may be meaningless (spurious). When differenced, the variable becomes stationary but long run information disappears. Cointegration is therefore run to apprehend long run association between the variables and only applies if the variables used are non- stationary at levels. Padroni residual cointegration test (at intercept and trend) was used to give long run parameter estimates and also to detect all cointegrated vectors. The results of cointegration tests are indicated in the table below.

Table 4.3: Cointegration Test

Alternative hypothesis: common AR coefs. (Within-dimension)			Weighted	
	Statistic	Prob.	Statistic	Prob.
Panel v-Statistic	0.455	0.324	0.635	0.263
Panel rho-Statistic	-4.923	0.000	-4.577	0.000
Panel PP-Statistic	-5.511	0.000	-4.482	0.000
Panel ADF-Statistic	-5.850	0.000	-6.253	0.000
Alternative hypothesis: individual AR coefs. (Between-dimension)				
	Statistic	Prob.		
Group rho-Statistic	-2.628	0.004		
Group PP-Statistic	-5.869	0.000		
Group ADF-Statistic	-6.337	0.000		

Source: Research Data, 2020.

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From Table 4.3, there are seven (7) tests with eleven (11) outcomes. In the null hypothesis (no cointegration), the outcome indicates that out of the eleven outcomes, nine (9) were significant i.e. Panel V statistics had insignificant probabilities of 0.324 and 0.263 while the other remaining tests had significant probabilities. As a result, this study rejected the null hypothesis of no cointegration premised on the higher number of significant probabilities.

4.2.5 Correlation Matrix

We conducted a correlation test to evaluate linear association between the independent and dependent variable. The coefficient of correlation ranges between +1 and -1. However, a strong correlation exists when (-, +) level of association exceeds 50%, and it is weaker when the correlation is below 50%. There exists a negative correlation when variable moves in linear format, but in the opposite direction. Positive correlation is in respect of variable that moves in linear format and in the same direction. Table 4.4 shows the kind of associations that exist between economic growth, financial deepening, output volatility and public debt.

Table 4.4 Correlation Matrix

The correlation matrix among economic growth, financial deepening, output volatility and public debt in the East African Community is presented in table 4.4. From the Table, EG represent economic growth, FD – financial deepening, OV – output volatility and PD represent public debt.

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Table 4.4. Correlation Matrix

Variables	EG	FD	OV	PD
EG	1			

FD	0.296	1		
	(0.000) *	-----		
OV	-0.247	0.177	1	
	(0.000) *	(0.009) *	-----	
PD	0.071	0.573	0.298	1
	(0.295)	(0.000) *	(0.000) *	-----

() * are the significant probabilities

Source: Research, Data 2020.

Table 4.4 provides a weak significant positive correlation between financial deepening and economic growth. This means that, as financial deepening increases, economic growth is also likely to increase by 0.296. However, the degree of association between economic growth and output volatility is significant and negative. This means that, as output volatility increases, economic growth reduces by -0.247. However, the degree of association between public debt and economic growth is insignificant.

4.2.6 Multicollinearity Test

Multicollinearity is a situation where two or more predictor variables are correlated to one another. Multicollinearity reduces the precision estimates which may weaken statistical power of regression model. This implies that the results may not be relied upon. Econometric data is normally associated with multicollinearity. However, the auto regressive distribution lag model (ARDL) deals with multicollinearity by choosing an optimal lag length. ARDL automatically eliminates multicollinearity by making the lag weights lie on the lag distribution. (Nkoro and Uko, 2016). The polynomial distributed lag removes multicollinearity by making the lag wights lie on the lag distribution and this puts successive lag weights in the model declines geometrically (Ojo and Aiyebutajui, 2015). This implies that ARDL can be used as an alternative tool to avoid spurious regression problems. Based on the above observation, the model does not have a provision of testing multicollinearity. Therefore, multicollinearity test was not conducted.

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4.2.7 Heteroscedasticity Test

In statistics, heteroscedasticity happens when the disturbance term of the independent variable is not constant for each and every observation. The presence of heteroscedasticity in the model is a violation of the assumption for linear regression model which may lead to results of ordinary least square regression model being less efficient.

The model of Breusch and Pagan (1979), Pesaran (2004) and Pasaran (2015) were deployed to tests heteroscedasticity in the model. The tests were done at the end of each and every objective analysis in chapter five. The tests are used to determine whether or not heteroscedasticity is present in the model. If the p – values of test statistics is less than critical value of 0.05, then we accept the null hypothesis and conclude that homoscedasticity is present in the regression model

4.2.8 Summary of Descriptive Statistics

This chapter has presented descriptive statistics on public debt, output volatility, financial deepening and economic growth in EAC. In summary, the mean of economic growth, financial deepening, output volatility and public debt are 5.775, 0.589, 1.466 and 26.737 with a standard deviation of 2.882, 0.083, 1.542 and 49.296 respectively. This indicates that the economic growth, financial deepening, output volatility and public debt had a relatively high spread from the mean since their values are greater than one.

The non-stationary test was conducted both at level and at first difference. because at levels, the probability of some of the variables were not significant. This applied to economic growth and financial deepening where their probability of Levin, Lin & Chu test were not significant at the level ($\alpha_1 = -1.05$, $p = 0.14$) and ($\alpha_5 = 39$, $p = 0.65$) respectively. However, for cointegration tests, there are seven (7) tests with eleven (11) outcomes. The results indicate that, out of eleven outcomes, nine (9) were significant while two (2) were not significant. As a result, it was concluded that there is cointegration.

The result from the correlation matrix presents a weak significant and positive correlation between financial deepening and economic growth. This means that, an increase in financial deepening may result in 0.296 rise in economic growth. However, the degree of

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connection between economic growth and output volatility is significant and negative. This further means that, as output volatility increases, economic growth reduces by -0.247. The level of association between economic growth and public debt is therefore insignificant.

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CHAPTER FIVE: HYPOTHESIS TESTING AND DISCUSSION OF THE FINDNGS

5.1 Introduction

The section entails the findings of the study and testing of hypotheses. The tests are conducted by comparing test statistics from empirical data with critical value. Where the p – value will be equal to or less than the critical values, the null hypothesis will be rejected. In a situation where the p – value is greater than critical values, it will lead to acceptance of the null hypothesis.

5.2 Effect of Public Debt on Economic Growth

Objective number one was to determine the relationship between public debt and economic growth in East African Community. The study predicts a significant relationship between public debt and economic growth. Auto regressive distributed lag model was used to analyzed data. Therefore, the following null hypothesis was tested.

Hypothesis 1: There is no significant effect on the relationship between public debt and economic growth in East African Community.

The inquiry purposed to explore the relationship between public debt and economic growth in the EAC. Therefore, public debt is regressed on economic growth. EG (-1) represents economic growth (lagged), PD – public debt (current), PD (-1) – public debt (lagged) and C is the intercept. The regression analysis on the effect of public debt on economic growth in the EAC is presented in Table 5.1.

Table 5.1: Regression analysis on the influence of public debt on economic growth

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.164	0.232	-0.707	0.480
D(EG1(-1))	-0.374	0.053	-7.061	0.000
D(PD)	0.034	0.012	2.902	0.004
D (PD (-1))	0.016	0.012	1.379	0.169
R-squared	0.227	Mean dependent var		-0.226
Adjusted R-squared	0.216	S.D. dependent var		3.842
S.E. of regression	3.401	Akaike info criterion		5.305
Sum squared resid	2452.798	Schwarz criterion		5.367
Log likelihood	-568.899	Hannan-Quinn criter.		5.330
F-statistic	20.756	Durbin-Watson stat		2.152
Prob(F-statistic)	0.000			

Source: Research Data, 2020.

From Table 5.1, results indicate that economic growth (-1) and public debt were significantly related to economic growth ($\alpha_1 = -0.374; \rho = 0.000$) and ($\alpha_2 = 0.034; \rho = 0.004$) respectively. This implies that, as the previous economic growth (-1) increases by one-unit, economic growth reduces by -0.347. However, as the current public debt rises by one-unit, economic growth also increases by 0.034. the results is consistent with the finding of Park (2015), Rahman (2019, Natwi and Erickson (2016) which argued that the relationship between public debt and economic growth is positive and statistically significant.

The R-square is 0.227. This indicates that the combined effect of public debt (both current and lagged) and lagged economic growth jointly contributed to 22.7% change in economic growth. The adjusted R square is 0.216 which indicates that economic growth (-1) and public debt both current and lagged are significant accounting for 21.6% change in economic growth. The F-statistics is 20.756 and a probability of 0.000. This implies that the model can be used for prediction even though the R square is low. The DW statistics is at 2.152. This means that there is no problem of autocorrelation within the estimates. Since p – value in table 5.1 is 0.004 (<0.05). Therefore, the null hypothesis is

rejected. There was a significant and positive influence of public debt on economic growth in the East African Community.

Given that the data set in Table 5.1 depicted the East African Community scenario, the country- specific ARDL extraction resulted into an outcome in Table 5.2. Therefore, the effect of public debt on economic growth, country specific is presented in Table 5.2. EG (-1) represent economic growth (lagged), PD (-1) represent public debt (lagged), PD represent public debt (current) and C is the intercept.

Table 5.2: Indicates ARDL model on effect of public debt on economic growth, country specific

	Kenya		Tanzania		Uganda		Rwanda	
Variable	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
C	-0.06	0.506	-0.263	0.552	-2.209	0.007	-0.6	0.341
D (EG (-1))	-0.395	0.300	0.045	0.802	-0.227	0.132	-0.274	0.172
D (PD (-1))	0.014	0.57	-0.091	0.232	0.275	0.009	0.03	0.014
D(PD)	0.008	0.977	-0.123	0.081	0.201	0.003	0.003	0.81
R-squared	0.238		0.223		0.223		0.282	
DW	2.323		2.37		2.254		2.341	
F-statistics	7.168	0.000	6.33	0.001	5.655	0.002	4.326	0.011

Source: Research Data, 2020.

From Table 5.2, Economic growth (-1) had no significant effect in all the E A C Countries namely Kenya, Rwanda, Uganda and Tanzania. Public debt (-1) had significant and positive effect on economic growth in Uganda and Rwanda ($\alpha_{23} = 0.275; \rho = 0.009$) and ($\alpha_{24} = 0.030; \rho = 0.014$) respectively. This suggests that a unit increase in the lagged values of public debts significantly increases economic growth in Uganda and Rwanda by 0.275 and 0.030 respectively. However, public debt is positive and significant in affecting economic growth in Uganda only ($\alpha_{33} = 0.201; \rho = 0.003$). This implies that a unit rise in the current value of public debt significantly leads to 0.201 increments in levels of current economic growth.

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Cross - sectional dependence among the residuals was also conducted to confirm whether the units in the same cross - section were correlated. Table 5.3 summarizes residual cross section dependence test.

Table 5.3: Residual Cross-Section Dependence Test

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	20.99402	6	0.0018
Pesaran scaled LM	3.173700		0.0015
Pesaran CD	2.408035		0.0160

Source: Research Data, 2020.

From the outcome in Table 5.3, Pesaran, Scaled LM, Pesaran CD and Breusch-Pagan LM were significant meaning that we accept null hypothesis of homoscedasticity. Meaning that there is homogeneity among the variables from the different countries.

5.3 Effect of output volatility in moderating the association between Public Debt and Economic Growth

Objective number two was to investigate the moderating effect of output volatility on the relationship between public debt and economic growth in East African Community. The study predicts that output volatility moderates the relationship between public debt and economic growth in East African Community. Auto regressive distribution lag model was deployed to analyzed the data. The following null hypothesis was tested.

Hypothesis 2: there is no significant moderating effect of output volatility on the relationship between public debt and economic growth in East Africa Community.

This study investigated the moderating effect of output volatility on the association between public debt and economic growth in EAC. The study deployed Judd and Kenny (1981) and Barron and Kenny (1986) to determine moderating effect of output volatility on the relationship between public debt and economic growth. The investigation was carried out from three perspectives. These perspectives involved auto regressing output volatility on economic growth, regressing public debt on Output volatility and lastly

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regressing public debt, output volatility and economic growth. Tables 5.4; 5.5 and 5.6 respectively present the output of analysis.

5.3.1 Effect of Output Volatility on Economic Growth

The regression analysis on the association between output volatility and economic growth is presented in Table 5.4. EG (-1) represent economic growth (lagged), OV – output volatility (current), OV (-1) – output volatility (lagged) and C – intercept.

Table 5.4: Summary of the effect of output volatility on economic growth

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.140	0.232	-0.604	0.547
D (EG (-1))	-0.389	0.058	-6.750	0.000
D(OV)	0.010	0.116	0.083	0.934
D (OV (-1))	0.161	0.114	1.409	0.160
R-squared	0.202	Mean dependent var		-0.186
Adjusted R-squared	0.191	S.D. dependent var		3.797
S.E. of regression	3.416	Akaike info criterion		5.313
Sum squared resid	2496.712	Schwarz criterion		5.375
Log likelihood	-575.096	Hannan-Quinn criter.		5.338
F-statistic	18.050	Durbin-Watson stat		2.176
Prob(F-statistic)	0.000			

Source: Research Data, 2020.

From Table 5.4, there is no significant influence of output volatility (current) and output volatility (-1) on economic growth. However, the outcome indicated that the lagged/past economic growth negatively and significantly influences the current economic growth ($\alpha_1 = -0.389; \rho = 0.000$). This means that the economic growth (lagged) significantly reduced the current economic growth within the East African Community by -0.389. the outcome are in contrast with the finding of Kodama (2014), Doborsisicas, Kulikoo and Randreat (2012) which noted inverse relationship between output volatility and economic growth.

From the results, the R- square is 0.202 which implies that the combined effect of the current and the previous values of output volatility as well as the lagged economic growth explained 20.2% variations in the current economic growth. The adjusted R square is 0.191 indicating that 19.1% change in economic growth are significantly explained by economic growth (-1) and current and previous output volatility.

The F-statistic $(18.050; \rho = 0.000)$ was significant. This implies that the model was correctly specified and is therefore acceptable. The Durbin- Watson statistics settled around 2 meaning that there is no problem of autocorrelation.

Based on the country- specific analysis, the ARDL model on the association between output volatility and economic growth results are captured in Table 5.5. EG (-1) represent economic growth (lagged), OV – output volatility (current), OV (-1) – output volatility (lagged) and C is the intercept.

Table 5.5 Aanalysis of the ARDL model on the association between output volatility and economic growth

Variable	Kenya		Tanzania		Uganda		Rwanda	
	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
C	-0.005	0.988	0.059	0.842	0.193	0.727	-0.16	0.851
D (EG (1) (-1))	-0.384	0.000	-0.412	0.001	-0.344	0.004	-0.427	0.023
D(OV)	-0.214	0.314	0.223	0.345	0.018	0.938	0.318	0.390
D (OV (-1))	-0.022	0.919	0.08	0.738	0.267	0.221	0.459	0.202
R-squared	0.256		0.193		0.180		0.229	
DW	2.274		2.253		2.152		2.378	
F-stat	7.798	0.000	5.107	0.003	4.77	0.005	3.067	0.042

Source: Research Data, 2020.

From Table 5.5 shows that the association between output volatility (current) and output volatility (-1) on economic growth was not significant either in Kenya, Tanzania, Uganda or Rwanda. However, the past economic growth was still negative and significant in influencing the current economic growth in all the EAC countries. This implied that a unit increase in the amount of the past/lagged economic growth significantly reduced the amount of the current economic growth by -0.384; -0.412; -0.344 and -0.427 in Kenya, Tanzania, Uganda and Rwanda respectively.

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R- square results were 0.256; 0.193; 0.180 and 0.229 in Kenya, Tanzania, Uganda and Rwanda respectively. This implies that the combined effect of the current and the previous values of output volatility as well as the lagged economic growth explained 25.6%; 19.3%; 18.0% and 22.9% variations in the levels of current economic growth in Kenya, Tanzania, Uganda and Rwanda respectively. The F-statistic was significant in all the countries' estimates. This implies that the model was correctly specified hence was acceptable. The Durbin- Watson statistics also settled around 2 meaning that there was no problem of autocorrelation.

5.3.2 The influence of Public Debt on Output Volatility

This section presents the analysis of influence of public debt on output volatility in the East African Community. From the table, OV (-1) represents output volatility (lagged), PD – public debt (current), PD (-1) – public debt (lagged), and C is the intercept.

Table 5.6: Effect of public debt on output volatility

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.0329	0.129	0.254	0.800
D (OV (1) (-1))	-0.6662	0.047	-14.123	0.000
D (PD (1)	0.0205	0.007	3.152	0.002
D (PD (1) (-1))	0.0117	0.007	1.793	0.074
R-squared	0.5311	Mean dependent var		0.069
Adjusted R-squared	0.5244	S.D. dependent var		2.735
S.E. of regression	1.8859	Akaike info criterion		4.125
Sum squared resid	743.3278	Schwarz criterion		4.188
Log likelihood	-435.3424	Hannan-Quinn criter.		4.151
F-statistic	78.9233	Durbin-Watson stat		2.156
Prob(F-statistic)	0.0000			

Source: Research Data, 2020.

Table 5.6 reveals that lagged output volatility was negative but significant in influencing the current output volatility ($\alpha_1 = -0.6662; \rho = 0.000$). This explains that a unit increase in the lagged output volatility negatively influences the current output volatility by -0.6662. However, the current public debt positively and significantly influences the

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current output volatility ($\alpha_2 = 0.0205; \rho = 0.002$). This means that a unit rise in the current public debt, output volatility increases significantly by 0.0205. the result confirms the finding of Schun (2012), Pescator, Damarcos and John (2014) and Hoeller (2012) which indicated that public debt and output volatility are positively correlated.

R square is 0.5311 implying that the combined effect of both lagged and current public debt and lagged output volatility jointly explain 53.11 changes in output volatility. Adjusted R square is 0.5244 implies that the combined effect of output volatility (-1) and both current and past public debt significantly explains 52.44% change in output volatility. The model is also acceptable since the F-statistics is significant ($78.9233; \rho = 0.000$) and there exist no problem of auto correlation since Durbin- Watson statistics also oscillates around 2.

Table 5.7 highlights the analysis of country specific ARDL of public debt on output volatility. From the table, OV (-1) represent output volatility (lagged), PD – public debt (current), PD (-1) – public debt (lagged) and C is the intercept.

Table 5.7: Analysis of ARDL model on the association between public debt and output volatility

	Kenya		Tanzania		Uganda		Rwanda	
Variable	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
C	0.059	0.774	-0.022	0.880	-0.015	0.963	-0.125	0.753
D (OV (-1))	-0.654	0.000	-0.617	0.000	-0.739	0.000	-0.764	0.000
D(PD)	0.006	0.724	-0.082	0.153	0.024	0.017	0.023	0.016
D (PD (-1))	0.021	0.199	-0.127	0.024	0.014	0.160	0.015	0.128
R-squared	0.449		0.425		0.653		0.706	
DW	2.515		2.519		2.581		2.108	
F-stat	18.507	0.000	15.8	0.000	37.067	0.000	24.791	0.000

Source: Research Data, 2020.

Given Table 5.7 output volatility (-1) is negative and significant in influencing current output volatility in Kenya, Tanzania, Uganda and Rwanda ($\alpha_{11} = -0.654; \rho = 0.000$); ($\alpha_{12} = -0.617; \rho = 0.000$), ($\alpha_{13} = -0.739; \rho = 0.000$) and ($\alpha_{14} = -0.764; \rho = 0.000$) respectively. This means that a unit increases in the past/lagged amounts of output

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volatility (current) significantly but negatively affects the current amounts of output volatility by -0.654; -0.617; -0.739 and -0.764 in Kenya, Tanzania Uganda and Rwanda respectively.

The effect of public debt is positive and significant in influencing output volatility in Uganda and Rwanda ($\alpha_{33} = 0.024; \rho = 0.017$) and ($\alpha_{34} = 0.023; \rho = 0.016$) while public debt (-1) is positive and significant in influencing output volatility in Tanzania ($\alpha_{22} = -0.127; \rho = 0.024$). This implies that a unit rise in the current public debt significantly raises the current output volatility in Uganda and in Rwanda by 0.024 and 0.023 respectively. To the contrary, the past public debt significantly decreases the current output volatility, in Tanzania, by -0.127.

The R- square results of 0.449; 0.425; 0.653 and 0.706 in Kenya, Tanzania, Uganda and Rwanda respectively indicates that the combined effect of the current and previous values of public debt as well as the lagged output volatility explained 44.9%; 42.5%; 65.3% and 70.6% variations in the levels of current output volatility in Kenya, Tanzania, Uganda and Rwanda respectively.

The F-statistic was significant in all the countries' estimates. This implies that the model was acceptable (there is a significant goodness of fit) thus it was acceptable. The Durbin-Watson statistics also settled around 2 meaning that there was no problem of autocorrelation.

5.3.3 Effect of Output Volatility and Public Debt on Economic Growth

Table 5.8 provides analysis of influence of output volatility and public debt on economic growth. EG (-1) represent economic growth (lagged), PD – public debt (current) PD (-1) – public debt (lagged), OV – output volatility (current), OV (-1) – output volatility (lagged) and C is the intercept.

Table 5.8: The influence of output volatility and public debt on economic growth.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.165	0.231	-0.713	0.477
D (EG (-1))	-0.373	0.059	-6.302	0.000
D (PD (1)	0.039	0.012	3.251	0.001
D (PD (-1))	0.012	0.012	1.009	0.314
D (OV (1)	-0.076	0.125	-0.609	0.544
D (OV (-1))	0.152	0.122	1.245	0.215
R-squared	0.244	Mean dependent var		-0.198
Adjusted R-squared	0.225	S.D. dependent var		3.827
S.E. of regression	3.368	Akaike info criterion		5.295
Sum squared resid	2348.723	Schwarz criterion		5.389
Log likelihood	-557.870	Hannan-Quinn criter.		5.333
F-statistic	13.328	Durbin-Watson stat		2.162
Prob(F-statistic)	0.000			

Source: Research Data, 2020.

From Table 5.8 above, results indicated that the lagged economic growth had a negative and significant influence on the current economic growth ($\alpha_1 = -0.373; \rho = 0.000$) this implies that a unit increase in the lagged economic growth, and current economic growth reduces by 0.373. The results also indicate that public debt ($\alpha_2 = 0.039; \rho = 0.001$) exerts significant positive influence on economic growth. This implied that a unit rise in public debt leads to 0.039 increment in economic growth. The result was in agreement with the finding of Rahma (2019), Park (2015) and Baian and Iuian (2015) which argued that there is positive relationship between public debt and economic growth.

The R-square is 0.244 implying that the combined effect of public debt (both lagged and current) and output volatility (both lagged and current) explained 24.4% variations in economic growth. Adjusted R square is 0.225 indicating that both public debt (lagged and current) and output volatility (lagged and current) and the lagged economic growth significantly explains 22.5% variation in economic growth. This model does not suffer from autocorrelation since the Durbin Watson statistic is around 2. The F-statistic is also significant ($13.328; \rho = 0.000$). This implies that the model is correctly specified.

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Table 5.9 summarizes country specific ARDL analysis on the effects of public debt and output volatility on economic growth. In the table, EG (-1) represents economic growth (lagged), PD (-1) – public debt (lagged), PD – public debt (current), OV – output volatility (current), OV (-1) – output volatility (lagged) and C is the intercept.

Table 5.9: ARDL model on influence of public debt and output volatility on economic growth

	Kenya		Tanzania		Uganda		Rwanda	
Variable	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
C	-0.003	0.994	0.043	0.878	0.27	0.63	-0.166	0.837
D (EG (-1))	-0.385	0.000	-0.427	0.000	-0.301	0.017	-0.307	0.121
D (PD (-1))	0.018	0.546	-0.14	0.215	0.056	0.003	0.044	0.034
D(PD)	0.019	0.519	-0.182	0.106	0.013	0.508	-0.007	0.756
D(OV)	-0.232	0.288	0.111	0.649	-0.16	0.500	0.12	0.759
D (OV (-1))	0.015	0.946	0.045	0.857	0.24	0.302	0.638	0.135
R-squared	0.261		0.227		0.312		0.360	
DW	2.279		2.358		2.06		2.408	
F-stat	4.672	0.001	3.649	0.006	5.174	0.001	3.268	0.018

Source: Research Data. 2020

Given Table 5.9, economic growth (-1) is negative and significant in influencing current economic growth in Kenya, Tanzania, and Uganda ($\alpha_{11} = -0.385; \rho = 0.000$); ($\alpha_{12} = -0.427; \rho = 0.000$) and ($\alpha_{13} = -0.301; \rho = 0.017$) respectively. This meant that a unit increase in the past/lagged economic growth significantly but negatively affected the current economic growth by 0.385; 0.427and 0.301 in Kenya, Tanzania and Uganda respectively.

The effect of public debt (-1) is positive and significant in influencing economic growth in Uganda and Rwanda ($\alpha_{33} = 0.056; \rho = 0.003$) and ($\alpha_{34} = 0.044; \rho = 0.034$) respectively. This meant that a unit increase in the lagged public debt significantly increases the current economic growth in Uganda and Rwanda by 0.056 and 0.044 respectively.

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The R- square results reveal 0.261; 0.227; 0.312 and 0.360 in Kenya, Tanzania, Uganda and Rwanda respectively. This indicates that the combined effect of the current and previous values of public debt as well as the current and lagged output volatility together with the lagged economic growth explained 26.1%; 22.7%; 31.2% and 36.0% variations in the levels of current economic growth in Kenya, Tanzania, Uganda and Rwanda respectively.

The F-statistic was significant in all the countries' estimates. This implies that the model was correctly specified (there is a significant goodness of fit) hence the model is acceptable. The Durbin- Watson statistics also settled around 2 meaning that serial correlation was within the limit. Table 5.10 provides tests for residual cross section

Hypothesis test (H0) 2: On the effect of output volatility in moderating the association between public debt and economic growth, regression analysis of economic growth on output volatility indicates β_2 was not significant (p – value = 0.934, p > 0.05). On the second analysis of output volatility on public debt found β_2 to be significant (p – value = 0.002, p < 0.05). Finally, the joint effect of economic growth, public debt and output volatility indicates β_2 was not significant p = 0.544 (p > 0.05). Based on the analysis, we fail to reject the null hypothesis that there was no significant moderating influence of output volatility on the association between public debt and economic growth in the East African Community.

Table 5.10: Residual Cross Section Dependence Test

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	2.644521	6	0.8520
Pesaran scaled LM	-2.123344		0.0337
Pesaran CD	1.164601		0.2442

Source: Research Data, 2020.

From Table 5.10, Pesaran Scaled LM, Pesaran CD and Breusch-Pagan LM were insignificant meaning that there was no homogeneity among the variables from the different countries. However, heteroscedasticity can only present a major problem when it

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is very severe given the robust nature of ordinary least square regression model (Berenson, 2017).

5.4. The effect of financial deepening in mediating the association between public debt and economic growth

Objective number three was to establish the effect of financial deepening in mediating the relationship between public debt and economic growth in East African Community. The study predicts that financial deepening mediates the relationship between public debt and economic growth in East African Community. The analysis was carried out through auto regressive distribution lag model. The following null hypothesis was tested.

Hypothesis number 3: there is no significant mediating effect of financial deepening on the relationship between public debt and economic growth in East African Community.

This objective was analyzed from three perspectives namely, the influence of financial deepening on growth of the economy, the second analysis sought to establish the influence of public debt on financial deepening and lastly the mediating role of financial deepening on the association between public debt and economic growth. The outcome of these perspectives was captured as presented in subsequent sections.

5.4.1. Effect of Financial Deepening on Economic Growth

Table 5.11 provides analysis of the influence of financial deepening on economic growth. In the table, EG (-1) represent economic growth (lagged), FD – financial deepening (current), FD (-1) – financial deepening (lagged) and C is the intercept.

Table 5.11: Analysis of the influence of financial deepening on economic growth

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.075	0.236	-0.317	0.752
D (EG (-1))	-0.391	0.052	-7.534	0.000
D(FD)	27.020	5.711	4.731	0.000
D (FD (-1))	16.935	6.171	2.744	0.007
R-squared	0.287	Mean dependent var		-0.169
Adjusted R-squared	0.277	S.D. dependent var		3.993
S.E. of regression	3.395	Akaike info criterion		5.302
Sum squared resid	2340.352	Schwarz criterion		5.366
Log likelihood	-544.743	Hannan-Quinn criter.		5.328
F-statistic	27.298	Durbin-Watson stat		2.395
Prob(F-statistic)	0.000			

Source: Research Data, 2020.

From Table 5.11, results indicated that economic growth (-1) is significant but negatively influences current economic growth ($\alpha_1 = -0.391; \rho = 0.000$). This implies that, for every unit increase in lagged economic growth, the current economic growth significantly reduces by -0.391. However, both current and lagged financial deepening exerts a positive and significant influence on economic growth ($\alpha_2 = 27.020; \rho = 0.000$) and ($\alpha_3 = 16.935; \rho = 0.007$) respectively. This indicates that a unit rise in both current and lagged level of financial deepening gives rise to 27.020 and 16.935 increment in the level of current economic growth respectively. The result was supported by Goyal, et.al (2012), Iyonoyi (2013), Chang and Wu (2012) and Rashti, Aragh and Shayester (2014) which noted positive relationship between financial deepening and economic growth.

R-square is 0.287 which implies that the combined influence of financial deepening (both lagged and current) and the lagged economic growth explains 28.7% variations in economic growth. The R square adjusted was 0.277 which implies that the combined effect of financial deepening (both lagged and current) and the lagged economic growth significantly explains 27.7% variation in economic growth. There is therefore no autocorrelation since the Durbin Watson statistic is around 2. The F-statistic is also significant ($27.298; \rho = 0.000$). This implies that there was goodness of fit in the model.

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Table 5.12 summarize country specific ARDL model of effect of financial deepening on economic growth. EG (-1) represents economic growth (lagged), FD (-1) – financial deepening (lagged). FD – financial deepening (current) and C is the intercept.

Table 5.12: ARDL model of the effect of financial deepening on economic growth.

Variable	Kenya Coefficient	Prob.	Tanzania Coefficient	Prob.	Uganda Coefficient	Prob.	Rwanda Coefficient	Prob.
C	-0.076	0.821	0.04	0.884	-0.041	0.955	-0.067	0.386
D (EG (-1))	-0.417	0.000	-0.465	0.000	-0.320	0.019	-0.340	0.141
D (FD (-1))	24.082	0.000	31.126	0.014	30.81	0.059	21.881	0.585
D (FD)	10.408	0.155	24.487	0.054	31.586	0.066	14.887	0.015
R-squared	0.365		0.263		0.181		0.250	
DW	2.415		2.238		2.357		2.522	
F-stat	13.245	0.000	8.092	0.000	3.615	0.019	3.671	0.022

Source: Field Data 2020.

Table 5.12 illustrates that economic growth (-1) was significant in influencing economic growth in all countries except in Rwanda. This implied that a unit positive change in the previous economic growth reduced the current economic growth by -0.417; -0.465; -0.320 in Kenya; Tanzania and Uganda respectively. Financial deepening (-1) was positives and significant in influencing economic growth in Kenya and in Tanzania ($\alpha_{21} = 24.082; \rho = 0.000$) and ($\alpha_{22} = 31.126; \rho = 0.014$) respectively. This implies that as the previous financial deepening increases by a unit, economic growth in Kenya and Tanzania increases significantly by 24.083 and 31.126 respectively. Similarly, financial deepening was significant and positive in influencing economic growth in Tanzania and Rwanda. This meant that for every unit rise in the level of the current financial deepening, there was a significantly increase in the current economic growth by 24.487 and 14.887 in Tanzania and in Rwanda respectively.

The R- square results of 0.365; 0.263; 0.181 and 0.250 in Kenya, Tanzania, Uganda and Rwanda respectively, indicate that the combined influence of the current and previous financial deepening as well as the lagged economic growth together explained 36.5%; 26.3%; 18.1% and 25.0% variations in the levels of current economic growth in Kenya, Tanzania, Uganda and Rwanda respectively. The F-statistic was significant in all the

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countries' estimates. This implied that the model is acceptable. The Durbin- Watson statistics also settled around 2. This means that there was no problem of autocorrelation.

5.4.2. The Influence of Public Debt on Financial Deepening

Table 5.13 below summarizes the influence of public debt on financial deepening in EAC. FD (-1) represents financial deepening (lagged), PD – public debt (current), PD (-1) public debt (lagged) and C is intercept.

Table 5.13: Effect of public debt on financial deepening

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000	0.003	-0.046	0.963
D (FD (-1))	-0.622	0.062	-10.071	0.000
D(PD)	0.000	0.000	1.111	0.268
D (PD (-1))	0.000	0.000	1.001	0.318
R-squared	0.337	Mean dependent var		0.000
Adjusted R-squared	0.327	S.D. dependent var		0.051
S.E. of regression	0.042	Akaike info criterion		-3.492
Sum squared resid	0.350	Schwarz criterion		-3.427
Log likelihood	360.207	Hannan-Quinn criter.		-3.466
F-statistic	33.906	Durbin-Watson stat		2.375
Prob(F-statistic)	0.000			

Source: Field Data 2020.

From Table 5.13, results indicated that lagged financial deepening had a negative and significant influence on current financial deepening. This implied that, for every increase in the previous financial deepening; the current financial deepening significantly reduces by -0.622. Public debt (current) and public debt (-1) were insignificant in influencing financial deepening. The result was inconsistent with the finding of Mun and Ismael (2013), Ayadi, Arbak, Neceus and Groen (2015) which argued negative association between public debt and financial deepening. The R-square is 0.337 implying that both lagged and current public debt and lagged financial deepening jointly explain 33.7% variations in financial deepening. The R square adjusted was 0.327 which imply that the combined effect of both public debt (lagged and current) and lagged financial deepening

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significantly explain 32.7% variation in financial deepening. This model also does not suffer from autocorrelation since the Durbin Watson statistic is around 2. The F-statistic is also significant $(33.906; p = 0.000)$. which implies that the model is correctly specified.

Table 5.14 below indicates the ARDL on the effects of public debt on financial deepening is county specific. FD (-1) represent financial deepening (lagged), PD – public debt (current), PD (-1) – public debt (current) and C is the intercept.

Table 5.14 ARDL model, the effect of public debt on financial deepening

	Kenya		Tanzania		Uganda		Rwanda	
Variable	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
C	0.0012	0.845	0.0002	0.938	0.0009	0.894	-0.002	0.839
D (FD (-1))	-0.5768	0.000	-0.577	0.000	-0.7045	0.000	-0.6496	0.000
D (PD (-1))	0.0003	0.580	-0.001	0.272	0.0002	0.288	0.0001	0.568
D(PD)	0.0004	0.475	-0.003	0.008	0.0002	0.285	0.0001	0.610
R-squared	0.284		0.435		0.444		0.417	
DW	2.331		2.272		2.532		2.512	
F-stat	9.126	0.000	16.968	0.000	12.518	0.000	7.874	0.000

Source: Field Data 2020.

Table 5.14illustrates that financial deepening (-1) still negative and significantly affecting current financial deepening in Kenya, Tanzania, Uganda and Rwanda. A unit increase in the past financial deepening (-1) results into a decline in the current financial deepening by -0.5768; -0.577; -0.7045 and -0.6496 in Kenya, Tanzania, Uganda and Rwanda respectively. However, public debt was negative and significant in influencing financial deepening in Tanzania and a unit increase in the current public debt significantly reduced the current financial deepening in Tanzania by -0.003. In Kenya, Uganda and Rwanda, public debt was insignificant in influencing financial deepening.

The R- square results of 0.284; 0.435; 0.444 and 0.417 in Kenya, Tanzania, Uganda and Rwanda respectively, show that the combined influence of the current and the previous public debt as well as the lagged financial deepening together explained 28.4%; 43.5%; 44.4% and 41.7% variations in the levels of current financial deepening in Kenya, Tanzania, Uganda and Rwanda respectively. The F-statistic was significant in all the countries' estimates. This implied that the model was acceptable.

5.4.3. The Influence of Financial Deepening and Public Debt on Economic Growth

The analysis presents the influence of public debt and financial deepening on economic growth in EAC. EG (-1) represents economic growth (lagged), FD – financial deepening (current), FD (-1) – financial deepening (lagged), PD – public debt (current), PD (-1) – public debt (lagged) and C is the intercept.

Table 5.15: Influence of public debt and financial deepening on economic growth.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.159	0.226	-0.705	0.482
D(EG1(-1))	-0.376	0.052	-7.188	0.000
D(FD)	24.932	5.447	4.577	0.000
D (FD (-1))	15.136	5.908	2.562	0.011
D(PD)	0.031	0.011	2.732	0.007
D (PD (-1))	0.012	0.011	1.125	0.262
R-squared	0.314	Mean dependent var		-0.231
Adjusted R-squared	0.296	S.D. dependent var		3.838
S.E. of regression	3.129	Akaike info criterion		5.206
Sum squared resid	2052.789	Schwarz criterion		5.303
Log likelihood	-524.965	Hannan-Quinn criter.		5.245
F-statistic	18.088	Durbin-Watson stat		2.263
Prob(F-statistic)	0.000			

Source: Field data 2020.

From Table 5.15, results indicated that, despite the significant negative effect of economic growth (-1) on economic growth, financial deepening (current), financial deepening (-1) and public debt positively and significantly influenced economic growth. This indicates that a unit rise in the levels of current financial deepening and public debt as well as the past financial deepening significantly increased economic growth significantly by 24.932; 0.031 and 15.136 respectively. This confirmed the findings of Goyal et. Al (2011), Iyonoyi (2013) and Rahma (2019) which indicated that public debt and financial deepening positively influence economic growth.

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The R-square is 0.314 implying that both current and lagged public debt and financial deepening (both lagged and current) explains 31.4% variations in economic growth. The adjusted R square is 0.296 this implies that the combined effect of financial deepening (lagged and current), public debt (lagged and current) and lagged economic growth significantly explains 29.6% variation in economic growth. Durbin Watson statistic is around 2 which implies that model does not suffer from autocorrelation. Similarly, F-statistic is also significant $(18.088; \rho = 0.000)$. This implies that there was no problem with the model.

Country specific role of financial deepening and public debt on economic growth are presented in Table 5.16. EG (-1) which represents economic growth (lagged), FD – financial deepening (current), FD (-1) – financial deepening (lagged), PD – public debt (current), PD (-1) – public debt (lagged and C is the intercept.

Table 5.16. ARDL model: The effect of financial deepening and public debt on economic growth.

	Kenya		Tanzania		Uganda		Rwanda	
Variable	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
C	-0.0749	0.826	0.024	0.927	0.3079	0.643	-0.0936	0.907
D (EG (-1))	-0.4127	0.000	-0.438	0.000	-0.3316	0.015	-0.3035	0.031
D(FD)	24.006	0.001	24.137	0.061	25.0798	0.097	20.1818	0.174
D (FD (-1))	9.63	0.204	18.031	0.145	26.3753	0.099	12.0915	0.406
D(PD)	0.01	0.707	-0.126	0.223	0.041	0.028	0.032	0.077
D (PD (-1))	-0.001	0.978	-0.133	0.222	0.017	0.377	0.011	0.536
R-squared	0.368		0.267		0.305		0.325	
DW	2.418	2.418	2.36		2.431		2.415	
F-stat	7.795	0.000	4.67	0.001	3.926	0.005	2.979	0.026

Source: Field Data 2020.

Table 5.16 shows that economic growth (-1) was still negative and significantly affected economic growth in Kenya, Tanzania, Uganda and Rwanda. A unit increase in the past economic growth (-1) results into a decline in the current economic growth by -0.4127; -0.438; -0.3316 and -0.3035 in Kenya, Tanzania, Uganda and Rwanda respectively. However, financial deepening was significant and positive in influencing growth of the economy in Kenya. A unit rise in the current financial deepening significantly increased

the current economic growth in Kenya by 24.006. Public debt was significant in influencing economic growth in Uganda and a unit rise in public debt led to a significant increment of 0.041 in economic growth.

The R- square results of 0.368; 0.267; 0.305 and 0.325 in Kenya, Tanzania, Uganda and Rwanda respectively, show that the combined influence of the current and the previous financial deepening, current and lagged public debt and lagged economic growth together explained 36.8%; 26.7%; 30.5% and 32.5% variations in the economic growth in Kenya, Tanzania, Uganda and Rwanda respectively. The F-statistic was significant in all the countries' estimates. This implied that the model was acceptable.

The mediating effect of financial deepening on the relationship between public debt and economic growth was conducted through Judd and Kenny (1981) and Barron and Kenny (1986). Testing of hypothesis three reveals that, the regression analysis of economic growth on financial deepening indicates β_3 is significant with p – value = 0.000. The result of the second analysis on regressing financial deepening and public debt provide β_1 was insignificant, p -value = 0.268 (p > 0.05). Finally, on joint effect of regressing economic growth on public debt and financial deepening indicates β_1 to be significant with p – value = 0.007 (p <0.005) but β_3 = 0.000 (smaller) though significant, p – value 0.000 (p <0.05). from the analysis, we accept the null hypotheses that there was no significant mediating effect of financial deepening on the association between public debt and economic growth in East African community.

Table 5.17 The Wald Test of significance

Test Statistic	Value	df	Probability
F-statistic	2283.013	(6, 211)	0.0000
Chi-square	13698.08	6	0.0000

Source: Research Data, 2020.

Table 5.17, indicates that the probability of the chi- square was significant (p=0.000). Consequently, the variables were not equal to zero meaning that they were important hence their inclusion as determinants of economic growth.

Table 5.18: Residual Cross-Section Dependence Test

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	14.46929	6	0.0248
Pesaran scaled LM	1.290174		0.1970
Pesaran CD	-0.063725		0.9492

Source: Field Data 2020.

Table 5.18 provides that Pesaran CD and Pesaran Scaled LM were insignificant meaning that there is no homogeneity among the variables from the different countries. However, given the robust nature of ordinary least square regression model, the presence of heteroscedasticity may not present a major problem unless it is very severe (Berenson, 2017).

5.5. The joint effect among public debt output volatility, financial deepening and economic growth

Objective number four was to explore the joint effect among public debt, output volatility, financial deepening and economic growth in East African Community. The study predicts significant joint effect among public debt, output volatility, financial deepening and economic growth in East African Community. Auto regressive distribution lag model was used to analyzed the data. The following null hypothesis was tested.

Hypothesis 4: there is no significant joint effect among public debt, output volatility, financial deepening and economic growth in East African Community.

The analysis of the joint effects among public debt, output volatility, financial deepening and economic growth in EAC are presented in table 5.19. EG (-1) which represent economic growth (lagged). FD – financial deepening (current), FD (-1) – financial deepening (lagged) OV – output volatility (current), OV (-1) – output volatility (lagged), PD – public debt (current), PD (-1) – public debt (lagged) and C - intercept.

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Table 5.19: The joint effect among public debt, output volatility, financial deepening and economic growth

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.169	0.225	-0.750	0.454
D(EG1(-1))	-0.392	0.059	-6.624	0.000
D (FD (1)	24.247	5.487	4.419	0.000
D (FD (1(-1))	16.831	5.970	2.819	0.005
D (OV (1)	-0.092	0.126	-0.727	0.468
D (OV (1(-1))	0.139	0.123	1.136	0.257
D (PD (1)	0.035	0.011	3.063	0.003
D (PD (1(-1))	0.009	0.011	0.747	0.456
R-squared	0.329	Mean dependent var		-0.201
Adjusted R-squared	0.305	S.D. dependent var		3.822
S.E. of regression	3.186	Akaike info criterion		5.195
Sum squared resid	1959.317	Schwarz criterion		5.326
Log likelihood	-514.050	Hannan-Quinn criter.		5.248
F-statistic	13.549	Durbin-Watson stat		2.278
Prob(F-statistic)	0.000			

Source: Field Data 2020.

Table 5.19 illustrates the combined effect of both lagged and current values of financial deepening, output volatility and public debt and the lagged economic growth which indicated that the lagged economic growth, lagged financial deepening as well as the current financial deepening and current public debt had a significant influence on economic growth (current). A unit rise in economic growth (lagged) resulted into the current economic growth significantly reducing by 0.392; a unit rise in financial deepening (current) resulted in significant increase of the current economic growth by 24.247; a unit rise in the lagged financial deepening led to significant increase of the current economic growth by 16.831. while the current public debt resulted into a significant rise of the current growth in economy by 0.035. the result is consistent with the finding of Chang and Wu (2012), Rashi, Araghi and Shayeste (2014).

The R-square is 0.329 which implies that the combined influence of public debt (both lagged and current) and financial deepening (both lagged and current), output volatility

(both lagged and current) as well as the lagged economic growth combined, explains 32.9% variations in the current economic growth. Adjusted R square is 0.305 implying that the combined effect of financial deepening (both lagged and current), output volatility (both lagged and current), public debt (both lagged and current) and lagged economic growth significantly explains 30.5% variation in economic growth. Durbin Watson statistic was 2.278 which implied that the model does not suffer from serial correlation. Similarly, F-statistic value of $(13.549; \rho = 0.000)$ also implies that the model is correctly specified.

The association between public debt, financial deepening, output volatility and economic growth, country specific are presented in Table 5.20. EG (-1) represents Economic growth (lagged), FD – financial deepening (current), FD (-1) – financial deepening (lagged), OV – output volatility, OV (-1) output volatility (lagged), PD – public debt (current), PD (-1) – public debt (lagged) and C is the intercept.

Table 5.20: The joint effect among economic growth, financial deepening, output volatility and public debt

	Kenya		Tanzania		Uganda		Rwanda	
Variable	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
C	-0.064	0.854	0.050	0.856	0.404	0.508	-0.153	0.851
D (EG (-1))	-0.405	0.000	-0.435	0.000	-0.314	0.022	-0.324	0.126
D(FD)	22.844	0.002	24.178	0.074	23.803	0.087	14.441	0.336
D (FD (-1))	8.961	0.261	19.221	0.145	35.225	0.021	15.007	0.321
D(OV)	-0.171	0.408	0.046	0.849	-0.299	0.275	0.06	0.884
D (OV (-1))	0.047	0.806	-0.012	0.922	0.236	0.365	0.572	0.19
D (PD (-1))	0.031	0.649	-0.116	0.300	0.056	0.003	0.042	0.046
D(PD)	0.006	0.842	-0.128	0.270	0.003	0.864	-0.007	0.76
R-squared	0.37	-0.308	0.271		0.443		0.389	
DW	2.396		2.361		2.089		2.496	
F-stat	5.396	0.000	3.185	0.006	4.88	0.000	2.454	0.044

Source: Research Data, 2020.

Table 5.20 illustrates that, even with the joint influence of the current and the lagged financial deepening; current and the lagged output volatility and the current and the lagged public debt, lagged economic growth is still negative yet significant in affecting

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the current economic growth in Kenya, Tanzania and Uganda and a unit increase in the lagged economic growth resulted into the current economic growth reducing by -0.405; -0.435 and -0.314 in Kenya, Tanzania and Uganda respectively.

The current financial deepening was positive and significant in influencing the current economic growth in Kenya. A unit increase in the current financial deepening resulted in the current economic growth in Kenya, rising by 22.844. The lagged financial deepening had a positive and significant effect on the current economic growth in Uganda. A unit increase in the lagged financial deepening led to a significant increment of 35.225 in current economic growth. Similarly, lagged public debt was also positive and significant in influencing current economic growth. A unit increase in the lagged public debt significantly increased economic growth by 0.056 in Uganda.

R square are 0.37, 0.271, 0.443 and 0.389 for Kenya, Tanzania, Uganda and Rwanda implying that financial deepening (both lagged and current), output volatility (both lagged and current), public debt (both lagged and current) and lagged economic growth explains 37%, 27.1%, 44.3% and 38.9% variation in economic growth in Kenya, Tanzania, Uganda and Rwanda respectively. Durbin-Watson statistics is 2.396, 2.361, 2.089 and 2.496 for Kenya, Tanzania, Uganda and Rwanda respectively. This shows that the model does not suffer from autocorrelation. F statistics was significant with 5.396, p = 0.000, 3.185, p = 0.006, 4.88, p = 0.000 and 2.454, p = 0.044 for Kenya, Tanzania, Uganda and Rwanda respectively. This indicates that it is correctly specified.

Testing hypothesis H0 4: The joint effect among public debt, output volatility, financial deepening and economic growth reveals that the lagged economic growth, both current and lagged financial deepening and public debt (current) had a significant effect on the current economic growth with p – value 0.000, 0.000, 0.005 and 0.003 respectively. Therefore, we reject the null hypothesis, thus there was significant joint effect among financial deepening, public debt and economic growth in the EAC.

The Wald Test was used to test significance of the variables that were incorporated in the study. Table 5.21 presents Wald Test of significance.

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Table 5.21: Wald Test of significance

Test Statistic	Value	df	Probability
F-statistic	246.5659	(8, 205)	0.0000
Chi-square	1972.527	8	0.0000

Source: Research Data, 2020.

From the results in Table 5.21, the probability of the chi- square was significant (p=0.000). As such, the variables were not equal to zero meaning that they were important hence their inclusion as determinants of economic growth. Equally, cross sectional dependence among the residuals was also conducted to confirm whether the units in the same cross section are correlated.

Table 5.22: Residual Cross-Section Dependence Test

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	12.52964	6	0.0511
Pesaran scaled LM	0.730244		0.4652
Pesaran CD	2.518159		0.0118

Source: Field Data 2020

From the results of Table 5.22, Pesaran Scaled LM and Breusch-Pagan LM were insignificant, this means that there is no homogeneity among the variables from the different countries. However, the violation of homoscedasticity assumption can only cause major problems when it is quite severe given the robust nature of ordinary least square regression model (Berenson, 2017).

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Table 5.23 below provide summary of study objective, null hypothesis and the decision on whether to fail to reject or reject null hypothesis.

Table 5.23: Summary of Result of Hypothesis Testing

S/No.	Study Objectives	Ho Hypotheses (Null Hypotheses)	Fail to Reject/Reject Null Hypothesis
1	To establish the relationship between public debt and economic growth in EAC	There was no significant effect on the relationship between public debt and economic growth in EAC	Reject null hypothesis
2	To assess the effect of output volatility on the relationship between public debt and economic growth in EAC	There was no significant moderating effect of output volatility on the relationship between public debt and economic growth in EAC	Fail to reject null hypothesis
3	To ascertain the effect of financial deepening on the relationship between public debt and economic growth in EAC	There was no significant mediating effect of financial deepening on the relationship between public debt and economic growth in EAC	Fail to reject null hypothesis
4	To determine the joint effect among public debt, output volatility, financial deepening and economic growth in EAC	There was no significant joint effect among public debt, output volatility, financial deepening and economic growth in EAC	Reject the null hypothesis

Source: Author, 2020

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Figure 5.1: Conceptual Model with Confirmed Relationship

The figure below provides conceptual framework with confirmed relationship based on the outcome of data analysis.
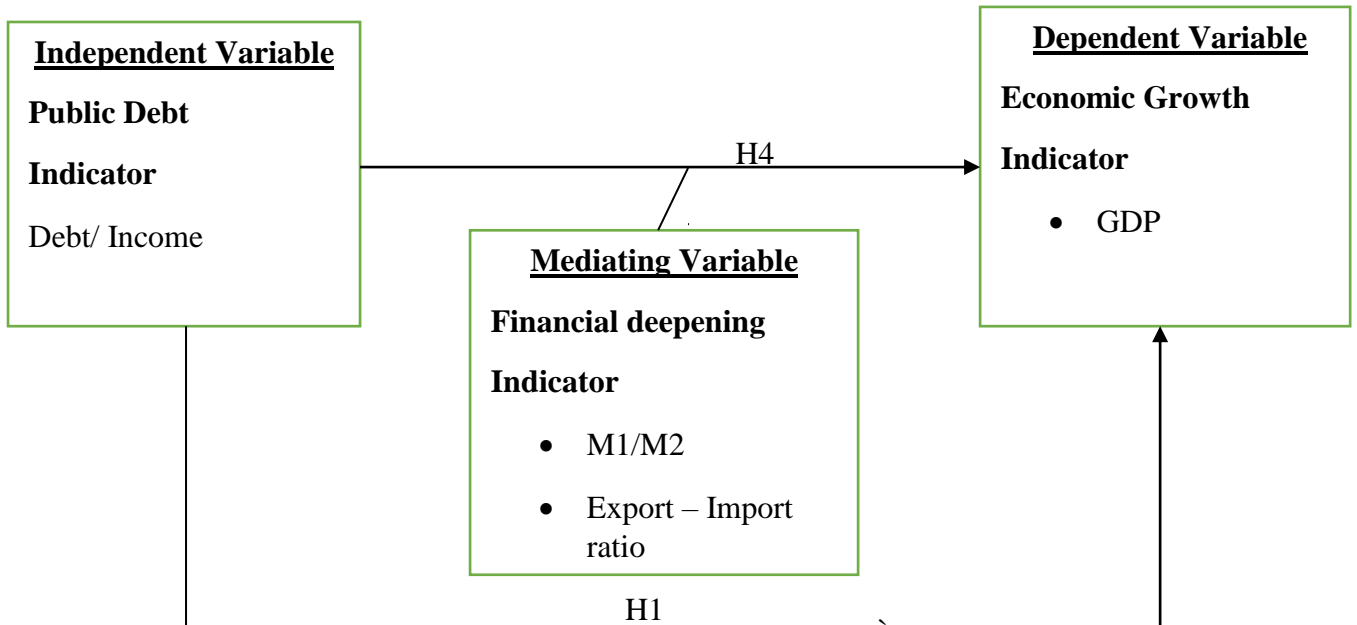
Source: Author, 2020

In conclusion, the analysis sought to establish the relationship among public debt, output volatility, financial deepening and economic growth in EAC. Analysis was carried out according to objectives of the study. In objective one, it was observed that public debt positively and significantly associated with economic growth in EAC. This indicates that, as the public debt (current) increases by one-unit, economic growth increases by 3.4%. However, the results of objective two indicates that, output volatility does not significantly moderate the association between public debt and economic growth in the East African Community.

The findings of objective three provide that financial deepening does not significantly mediate the association between public debt and economic growth in the East African Community. The joint effects among public debt, output volatility, financial deepening and economic growth in the East African Community, the investigation found that both the current and lagged values of financial deepening as well as current public debt are

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significant in determining the level of economic growth within the East African Community.

5.6 Discussion of Research Findings

The findings of the enquiries relating to the study hypotheses were presented in section 5.5. in this section, we are going to discuss the meaning of the results, how they fit into existing knowledge and presentation of deduced insight.

5.6.1 Relationship Between Public Debt and Economic Growth in EAC.

The first objective was to determine the relationship between public debt and economic growth in East African Community. The summary of results relating to testing of hypothesis are shown in table 5.1. The result indicate that public debt is positive and significant in affecting economic growth in East African Community. The result is consistent with the prediction of debt overhang theory by Myers (1977). Myers (1977) suggest that debt is good for the economy up to a point where additional debt affect investment. He refers debt overhang as a burden so large that an entity cannot take additional debt to finance future projects, since earning from projects would go towards debt servicing. Therefore, debt overhang may distress investment and growth.

The findings are similar to the results presented by Park (2015), Rahma (2019, Natwi and Erickson (2016), Bilan and Iuian (2015) and Checherita and Rother (2010) which also observed positive and significant relationship between public debt and economic growth. However, the outcome was inconsistent with the results presented by Ahiborn and Schweicert (2016), Zouhair and Fatuma (2014, Immole and Ehikioma (2012, where the researchers suggested negative and significant relationship between public debt and economic growth. For the country specific analysis, where we analyzed Kenya, Tanzania, Uganda and Rwanda individually, the results indicate that public debt is positive and significant in affecting economic growth in Uganda only, but insignificant in Kenya, Tanzania and Rwanda. This confirms the preposition of Natwi and Erickson (2016) and Checherita and Rother (2010).

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5.6.2 Moderating Effect of Output Volatility on the Relationship Between Public Debt and Economic Growth in EAC

The second objective was to investigate the moderating effect of output volatility on the relationship between public debt and economic growth in EAC. The study deployed Judd and Kenny (1981) and Barron and Kenny (1986) hierarchical approach to determine the moderating influence. The summary of outcome of testing hypothesis relating to study objective are presented in table 5.4, 5.6 and 5.8. the result indicates that there is no moderating effect of output volatility on the relationship between public debt and economic growth in EAC. The interaction of output volatility on the relationship between public debt and economic growth in EAC does not go a long way with the prediction of business cycle theory. Burn and Mitchell (1947) argued that business cycle has two features, the first is the movement among economic variables which takes possible leads and lags in timing, and the second element is the definition of business cycle which treats expansion separately from contraction. The study earlier predicts that the possible leads and lags, and expansion and contraction of output volatility may generate moderating influence on the relationship between public debt and economic growth in EAC. However, the prediction did not come to pass in that there is no moderating effect of output volatility on the relationship between public debt and economic growth.

In table 5.4, output volatility was regressed on economic growth. The result suggest that lagged economic growth is negative and significant in influencing the current economic growth in EAC. However, both current and lagged output volatility is insignificant in influencing economic growth in EAC. The results are in contrast with the findings of Kodama (2014), Dobosinsicas, Kulikoo and Randreat (2012) which observed an inverse association between output volatility and economic growth. In the country perspective analysis, table 5.5 present the analysis of data from individual countries separately, the results indicate that the relationship between current and lagged output volatility on economic growth was not significant either in Kenya, Tanzania, Uganda or Rwanda. However, lagged economic growth was negative and significant in influencing current economic growth in EAC countries. The findings were not consistent with the results of Kodama (2014), Dobosinsicas, Kulikoo and Randreat (2012 which suggested that output volatility exerts negative influence on economic growth.

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The regression of public debt on output volatility was carried out in table 5.6. the result provides that lagged output volatility negatively and significantly influences the current output volatility. Subsequently, current public debt is positive and significant in affecting output volatility. However, lagged public debt is insignificant in affecting output volatility in EAC. the regional perspective result is thus consistent with the finding of Schun (2012), Pescator, Damarcos and John (2014) and Hoeller (2012). The result therefore indicate that public debt and output volatility are positively related. On country specific analysis, the results are presented in table 5.7. it indicates that lagged output volatility is negative and significant in influencing current output volatility in Kenya, Tanzania, Uganda and Rwanda. However, the effect of public debt is positive and significant in influencing output volatility in Uganda and Rwanda. The result was supported by Schun (2012), Pescator, Damarco and John (2014) and Hoeller (2012) who highlight positive association between public debt and output volatility. On the contrary, lagged public debt significantly decrease current output volatility in Tanzania.

Table 5.8 present regression analysis of output volatility and public debt on economic growth in EAC. the results indicate that lagged economic growth had negative and significant influence on the current economic growth. In addition, current public debt exerts significant positive influence on economic growth. However, lagged public debt and current and lagged output volatility is insignificant in affecting economic growth in EAC. the outcome was in agreement with Rahma (2019), Park (2015), and Bilan and Iuian (2015 which argued that public debt positively influence economic growth.

However, country specific analysis was carried out in table 5.9, where the results indicate that lagged public debt is positive and significant in affecting economic growth Uganda and Rwanda. The findings conform with the results of Rahma (2019), Natwi and Erickson (2016) and Park (2015) which also observed positive association between public debt and economic growth.

5.6.3 Mediating Effect of Financial Deepening on the Relationship Between Public Debt and Economic Growth in EAC

The third study objective was to explore the mediating influence of financial deepening on the relationship between public debt and economic growth in EAC. Judd and Kenny (1981) and Barron and Kenny (1986) was used to determine the mediating effect of financial deepening on the relationship between public debt and economic growth in

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EAC. Summary of results of testing of hypothesis were presented in table 5.11, 5.13 and 5.15. The results suggest that, there is no mediating effect of financial deepening on the relationship between public debt and economic growth in EAC. The results of the mediatory role of financial deepening are not in agreement with the findings of Nyamweya, Ochieng, Ondigo & Magutu (2020) who observed that financial deepening mediates growth in the economy.

The outcome deviates from the prediction of liquidity preference theory by Keyne (1935). The theory advances motivational demand for money. Money is the most liquid asset and the quicker financial asset can be converted into cash, the more liquid it is. The theory helps us to understand the importance of money in facilitating economic activities. Based on its facilitating role, we assumed that deepening of financial asset may have mediating effects on the relationship between public debt and economic growth in EAC. However, empirical evidence indicates that, there is no mediating effect of financial deepening on the relationship between public debt and economic growth in EAC.

On regional perspective, the regression analysis of financial deepening on economic growth was carried out in table 5.11. the results suggest that, lagged economic growth is significant but negatively affect current economic growth. However, both current and lagged financial deepening exerts positive and significant influence on economic growth. The results were supported by Goyal et.al (2011), Iyonoyi (2013), Chang and Wu (2012) and Rashti, Aragh and Shayeste (2014) which noted that financial deepening exerts a positive influence on the level of economic growth.

However, the country specific analysis in table 5.12 provide that lagged economic growth was significant and negative in influencing economic growth in all countries except Rwanda. On the other hand, lagged financial deepening was positive and significant in influencing economic growth in Tanzania and Rwanda. The outcome was in agreement with the findings of Chang and Wu (2012) and Rashte, Araghi and Shayeste (2014).

In table 5.13, regression analysis of public debt on financial deepening was conducted. The results indicate that, lagged financial deepening had a negative and significant influence on current financial deepening. However, current and lagged public debt were insignificant in influencing financial deepening in EAC. The results is inconsistent with

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the findings of Mun and Ismail (2015), Attyligit and Akkey (2013), Ayadi, Arbak, Naceus and Groen (2015) and Ilgun (2016) which argued that there is a negative association between public debt and financial deepening. Country specific analysis was analyzed in table 5.14. the results from the table provide that lagged financial deepening still negative and significantly affect current financial deepening in Kenya, Tanzania, Uganda and Rwanda. However, public debt was negative and significant in influencing financial deepening in Tanzania. The findings were in agreement with Attyligit and Akkey (2013), Mun and Ismail (2015), Ayadi, Arbak, Naceus and Groen (2015) and ILgun (2016) which noted that public debt negatively influence financial deepening. In Kenya, Uganda and Rwanda, public debt was insignificant in influencing financial deepening.

The last analysis on this objective on regional perspective was carried out in table 5.15. the table analyses the effect of public debt and financial deepening on economic growth. The results indicate that despite significant negative effect of lagged economic growth on current economic growth, both current and lagged financial deepening and public debt positively and significantly influenced economic growth. This confirms the findings of Goyal et. al. (2011), Iyonoyi (2013), Rahma (2019) and Bilan and Iuian (2015). However, country specific analysis is presented in table 5.16. the results indicate that lagged economic growth was still significant and negatively affect economic growth in Kenya, Tanzania, Uganda and Rwanda. Similarly, financial deepening was significant and positive in influencing economic growth in Kenya. The outcome was supported by Goyal et.al (2013), Chung and Wu (2012) and Rashti, Aragh and Shayeste (2014). Public debt was significant in influencing economic growth in Uganda. The finding was also consistent with the study conducted by Rahma (2019), Natwi and Erickson (2016) and Park (2015).

5.6.4 Joint Effect Among Public Debt, Output Volatility, Financial Deepening and Economic Growth in EAC.

The fourth study objective was to stablish the joint effect among public debt, output volatility, financial deepening and economic growth in East African Community. The summary of results of testing hypothesis relating to the study objective were presented in table 5.19. The table provide regional analysis of the joint effect among public debt, output volatility, financial deepening and economic growth in EAC. The results indicate

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that lagged economic growth, lagged financial deepening as well as the current financial deepening and current public debt had significant influence on the current economic growth. The outcome is consistent with the finding of Chang and Wu (2012), Rashti, Araghi and Shayeste (2014). The finding supports economic growth model by Solow (1956) where long run economic growth is explained by capital accumulation and increase in production largely driven by investment progress.

The country specific analysis was carried out in table 5.20 where it was found that even with the joint influence of the current and lagged financial deepening, current and lagged output volatility and the current and lagged public debt, lagged economic growth is still negative yet significant in affecting the current economic growth in Kenta, Tanzania and Uganda. The current financial deepening was positive and significant in influencing current economic growth in Kenya. On the other hand, the lagged financial deepening had a positive and significant effect on the current economic growth in Uganda. The outcome was consistent with the finding of Chang and Wu (2012) and Rashti, Araghi and Shayeste (2014). However, lagged public debt was also positive and significant in influencing current economic growth. The result was supported by the findings of Park (2015), Natwi and Erickson (2016) and Rahma (2019).

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CHAPTER SIX: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

The section summarizes major findings of the study, conclusions made based on the outcome, limitation of the study and recommendations for further research. The main objective of the study was to explore the influence among public debt, output volatility, financial deepening and economic growth in EAC.

6.2 Summary of Findings

The study sought to establish the association among public debt, output volatility, financial deepening and economic growth in the East African Community, with specific objectives of establishing the relationship between public debt and economic growth, to find out the influence of output volatility in moderating the association between public debt and economic growth, to explore the mediating effect of financial deepening on the connection between public debt and economic growth and finally, to establish the nexus among public debt, output volatility, financial deepening and economic growth in EAC.

On the effect of public debt on economic growth in the East African Community, the study found that public debt positively and significantly influences economic growth in the East African Community. This means that, when public debt increases by one-unit, economic growth would also increase.

On objective two, the result of effect of the output volatility in moderating the association between public debt and economic growth in the East African Community, statistical evidence indicates that there was an insignificant influence of output volatility in moderating the association between public debt and economic growth in the East African Community. This means that the association between public debt and economic growth may not be increased or decreased by output volatility in the East Africa Community

Based on objective three, on whether the association between public debt and economic growth can be mediated by financial deepening, the empirical evidence found that financial deepening has an insignificant mediating influence on the connection between public debt and economic growth in the East African Community. This means that the

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association between public debt and economic growth may not be explained or accounted for by financial deepening in the East African Community.

The joint effects among public debt, financial deepening, output volatility and economic growth in the East African Community, results revealed that, the levels of economic growth in EAC are significantly determined by both current and lagged values of financial deepening as well as the current level of public debt.

6.3 Conclusion

The results of objective one indicates that, public debt positively and significantly influences economic growth in the East African Community. The results are consistent with the prediction of debt overhang theory by Myers (1977). In practice, this finding helps the government recognize the contribution made by public debt in economic growth. This can only materialize when the government invests public debt in productive sector of the economy. Therefore, in line with the finding, debt is good for the economy but only if invested in the productive sector.

On objective two, the study concludes that the association between public debt and economic growth may not be moderated significantly by output volatility in the East African community States. The interaction of output volatility on the relationship between public debt and economic growth in EAC does not go along way with the prediction of business cycle theory by Burn and Mitchell (1947). The outcome is significant in knowledge building in that the government should not pay attention to output volatility because it has an insignificant influence on economic growth.

Results on objective three indicate that the association between public debt and economic growth may not be mediated significantly by financial deepening in EAC. However, this outcome deviates from the prediction of liquidity preference theory by Keyne (1935). This outcome contributes towards developing knowledge about the mediating influence of financial deepening on the connection between public debt and economic growth. The government needs to recognize that the association between public debt and economic growth may not be explained by financial deepening.

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On joint effects among public debt, financial deepening, output volatility and economic growth in EAC, the study conclude that, as opposed to output volatility, financial deepening as well as the current levels of public debt are critical in influencing economic growth within the East African community. The findings support economic growth model by Slow (1956). The result of this objective helps in theory building. It can facilitate the development of theory that helps explain and predict the relationship among public debt, financial deepening, output volatility and economic growth in EAC. Further, the government needs to borrow and allow financial resources to flow freely in the economy to enhance economic growth.

6.4 Contribution and Recommendations

The study examines the relationship among public debt, financial deepening, output volatility and economic growth in EAC. Following the findings, the research suggests to parliament, central bank, national treasury and government agencies in the East Africa Community the following recommendations.

6.4.1 Theory Building

The study contributes towards theory building. The findings confirm the preposition of two out of four theories reviewed in the literature. The theories reviewed are economic growth theory by Slow (1956), debt overhang theory by Myers (1977), business cycle theory by Burn and Mitchell (1947) and liquidity preference theory by Kyne (1935). However, empirical evidence confirmed debt overhang and economic growth theories.

The first objective of the study was to determine the relationship between public debt and economic growth in EAC. The study predicted that public debt positively influences economic growth in EAC. This was confirmed by empirical evidence which indicate that public debt positively and significantly affects economic growth. The finding was corroborated by Rahma (2019). The result was consistent with the prediction of debt overhang theory by Myers (1977). Myers (1977) argued that the relation between public debt and economic growth was positive up to a point where additional debt affect investment. He refers debt overhang as a burden so large that an entity cannot take additional debt to finance future project, since earning from projects would go towards debt servicing. Therefore, debt overhang may distress investment and growth.

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The findings on the joint effect among public debt, output volatility, financial deepening and economic growth in EAC also contributed towards theory development. The study predicted a significant joint effect among public debt, output volatility, financial deepening and economic growth in EAC. However, Empirical evidence reveals that lagged economic growth, lagged and current financial deepening as well as the current public debt had a significant influence on the current economic growth in EAC. The finding was supported by Chang and Wu (2012), Rashti, Arghi and Shaveste (2014). Consequently, the outcome supports economic growth model by Solow (1956) where long run economic growth is explained by capital accumulation and increase production largely driven by investment progress.

6.4.2 Knowledge

The knowledge of public debt, output volatility, financial deepening and economic growth helps us understand if integration of the East African Community is feasible. It is imperative to note that the economic systems within the East African Community need to foster financial deepening and public debt if economic integration is to be realized. Greater emphasis should be paid to financial deepening as well as the current levels of public debt if the East African community is to realize meaningful changes in their economic growth.

It is important to note that, currently, there is concern over the rising public debt within East African Region. Therefore, understanding public debt will go along way in facilitating a prudent debt management which is sustainable and stable. This may mitigate debt overhang situation where debt burden is so large that an entity cannot take additional debt to finance future project with positive net present value.

6.4.3 Policy

Given the fact that public debt is positive and significant in influencing economic growth in EAC, and bearing in mind the effect of debt overhang theory, EAC member states should develop policies on the threshold of debt each member states should borrow. This process involved determining the level of debt beyond which any increase of debt may negatively influence economic growth. It would be therefore the responsibility of individual member states to engage in productive borrowing to ensure sustainability of

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government debt through controlled borrowing and regular servicing of debt from the proceeds of investments.

The policy makers such as cabinet secretaries, principal secretaries and board directors of EAC member states should focus on debt sustainability. This was effectively explained by debt overhang theory that there is a limit which the public debt becomes unsustainable and a burden to the tax payers. Since public debt and economic growth correlate positively and significantly, the study suggests that EAC member states need to mainstream borrowing policy in their respective states. The policy should outline the level of borrowing and the priority sector of investment which can yield positive return to the economy.

6.4.4 Practice
As management practice, the East African Community should not lay a lot of emphasis on output volatility. This is because it is insignificant in influencing economic growth among the East African Community states, whether separately or jointly. This is supported by the finding that the association between public debt and economic growth may not be significantly influenced by output volatility.

On the other hand, greater attention should be paid to public debt and financial deepening. Empirical evidence indicates that the level of economic growth in EAC are significantly determined by both current and lagged values of public debt and financial deepening. Therefore, for EAC to develop and integrate, emphasis should be paid to financial deepening and public debt, this will improve the level of economic growth in the region.

6.5 Limitations of the Study
The investigation was conducted in the East African Community. The member countries that constitute the East African Community are Tanzania, Uganda, Rwanda, Kenya, South Sudan and Burundi. However, paucity of data about South Sudan and Burundi led to the dropping of the two countries from the population. We also experienced few data gaps, but these may not significantly affect the results.

Auto regressive distribution lag model plays a principal role in analyzing economic data. Changes in variables that affect the economy may have a contagion effect on other

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macroeconomic variables beyond time. Changes in economic variables do not reflect immediately but over a period of time. However, the limitation of the model is that high level of correlation among explanatory variables indicates the possibility of multicollinearity which may invalidate the outcome of ordinary least square regression model. When the lag length is long, especially in a small sample, the ARDL model may prove to be problematic.

6.6. Suggestions for further research

In order to mitigate the paucity of quarterly data, the study recommends that researchers should consider annual data in time series analysis. Secondly, there are other factors that influence economic growth but were not considered in the study such as consumption volatility, poverty index and the ease of doing business. Other researchers need to consider this area to establish how they relate to economic growth.

The understanding of the strength and direction on how public debt influences economic growth in the East African Community can be improved by introducing moderating and mediating variables. Other researchers can continue to determine other factors which may affect the association between economic growth and public debt in the East African Community.

Comparative study on how output volatility affects the association between public debt and economic growth, and how financial deepening affects the connection between public debt and economic growth would also be informative. Therefore, an alternative model should be established to explore whether the association between public debt and economic growth would be affected by output volatility and financial deepening in EAC.

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REFERENCES

Africa Development Bank Report (2021). Africa Economic Outlook. From Debt Resolution to Growth: The Road Ahead for Africa. *Africa Development Bank Group.*

Africa Development Bank (2019). East Africa Outlook. Macroeconomic Developments and Prosperity: political Economy of regional integration. *Africa Development Bank group.*

Amola, A. U. and Odhiambo, M.N. (2020). Public Debt and Inflation. *Folia Oeconomica Stetinensia, Vol. 20, Issue 1, pp 9 – 24.*

Antonakakis, N. & Badinger, I. (2012). Output Volatility, Economic Growth and Cross – Country Spillover: New evidence for G7 Countries. *Department of economic, No.141, Vienna University of economics and Business*. US.

Ahlborn, M. & Schweickert, R. (2016). Public Debt and Economic Growth: Economic System Matters. *Centre for European Governance and Economic Development Research,* No. 281

Appeit, K. (2016). Keyne Theory of Interest rates: a critical approach. *Club of Economics in Miskoke, TMP*. Vol. 12, No. 1, pp. 1 – 8.

Adom, P. (2016). The DDT Effects: The Case of Economic Growth, Public Debt and Democracy Relationship. *Munich Personal RePE – Archive*, Vol 75022, pp 1 – 35.

Aghion, P. & Banerjee, K. (2005). Volatility and Growth. *Oxford University Press. No.* 11349.

Aghion, P., Abhijik, B. & Thomas, P. (1999). Dualism and Macroeconomic Volatility. *The quarterly journal of Economics, 114(4): 1359 – 1397.*

Africa Development Bank (2019). East Africa Economic Outlook; Macroeconomic and Prospect. *Africa Development Bank*. ISBN 978 – 9938.

Ardic, O.P & Doma, H.E. (2006). Financial Sector Deepening and Economic Growth. Evidence from Turkey. *Bagozici University, Department of Economic.* Vol. 12, pp 1 – 25.

Arshad, K.M & Sajawal, K (2007). Financial Sector restructuring in Pakistan. *Pakistan Institute of Development Economics, Islamabad.* http://mpra.ub.uni – muenchen.de/4141/MPRA Paper No.4140. posted07, November 2007/03:41.

`

Altayligit Y. B. & Akkay, R. C. (2013). The Effect of Domestic Debt on Financial Development: A Case Study of Turkey Economy. *Journal of Economic and Finance, pp 5 – 64.*

Adu, G., Marbua, G. and Mansa, T. (2013). Financial Development and Economic growth in Ghana: Do the Neasure of Financial Development Matters? *Review of Development Finance.* Vol. 3, pp 192 – 203.

Acemoghlu, D., Simon, J., James, R. & Yunyong, T. (2003). Institutional Causes, Macroeconomic Symptoms, Crises and Growth. *Journal of Monetary Economics.* Vol. 50(1), pp 49 – 123.

Ayadi,R., Arbak, E., Naceur, S., & Groen, W, (2015) determinant of Financial deepening Across Mediterranean, Economic and Social Development of the Southern Mediterranean. *Sringer International Publishing. Pp 159 – 181.*

Adenole, Y. K. and Biodum, K. M. (2020). The Impact of Financial deepening on Economic Growth of Nigeria. *Journal of Yahiay and Kolapo*, Vol. 21, No. 1, pp 135 –   154.

Asiedu, M., Effah, N.A., Joel, T. N. and Nkwantabisa, A. O. (2021). Stock Market Development, Financial deepening and Economic growth in Africa. *Journal of Financial Risks Management.* Vol. 8, pp 1 – 24.

Aliero, H. M. and Abubakar, S. (2021). Domestic Public Debt and Financial development Nexus in Nigeria. Evidence from Cointegration and Asymmetric Causality Test. *International Journal of Research in social Science*, 4 (2), pp 1 – 16.

Aliero, H. M., Pantama, Y. U. and Abubakar, S. (2019). The Impact of Domestic Public Debt and Institutional quality on Economic Development in Nigeria. *Lapai Journal of Economics,* 3 (1), 41 – 51.

Azzimonti, M., Francisca, E. and Quadrini, V. (2012). Financial Globalization and *Raising Public Debt. Federal Bank of Philadelphia*, No. 11 – 03.

Apuke, O. D. (2017). Quantitative Research Methods A Synopsis Approach. Arabian *Journal of Business and Management Review* (Kuweit Chapter). Vol 6(10), pp 40 – 47.

Bezooijeni, F.S. & Bikker J.A. (2017). Financial Structure and Macro - economic Volatility. A   Panel   Data Analysis. *Tjalling C. Koopmans Research Institute*, *Utrecht University*,   *School of Economics*.

Barseghyan, L. & Riccardo, D. (2010). Institutional Causes of Output Volatility. *Federal Reserve Bank. St Louis Review*, Vol. 92 (3), pp. 205 – 223.

`

Byier, B., Vanhenkelom, J., & Kingombe, C. (2015). *A Five Lenses Framework for Analyzing The Political Economy in Regional integration.* Discussion Paper 178. Maastricht ECDPM.

Baron, R.M & Kenny, D.R. (1986). The Moderator – Mediator Variable distinction in Social Psychological Research: Conceptual, Strategy and Statistical Consideration. *Journal of Personality and Social Psychology*, Vol. 51, No. 6, pp. 1173 – 1182.

Bilan, I. & Iulian, I. (2015). Public Debt and Economic Growth. A Two-Sided Story. *International Journal of Economic Science,* Vol. 2. Pp 24 – 39. DOI: 1020472/ES: 2015.4.2.003.

Burns, A.F & Michell, W.C. (1947). Measuring Business Cycles. *Journal of Political Economy,* Vol. 55, pp. 281 – 298. The University of Chicago Press.

Bank of Tanzania (2019). *Economic Bulletin Publication for the Quarter Ending March 2019*, Vol. LI, No. 1.

Burriel, P., Checherita, C. and Jacquinot, M. (2020). Economic Consequence of high Public Debt: evidence from Three large scale DSGE Model. *European Central Bank. No. 2450.*

Bainomogisha, A. & Rwengaba, S. (2016). The Promise and Efficacy of the East Africa Community. *ACODE Policy Paper* Series No.1, Kampala.

Berenson, M.L. (2017). Comparing Tests of Homoscedasticity in Simple Linear Regression. *JSM Math. Stat. (1): 1017.*

Blanchard, O. (2019). Public Debt and Low Interest Rates. *American Economic Review, Vol. 109, No. 4, pp 1197 – 1229.*

Babu, J.O., Kiprop, S., Kalio, A. M. and Gisore, M. (2014). External Debt and Economic Growth in the East Africa Community. *African Journal of Business Management Vol. 8(21), pp 1011 – 1018.*

Berg, A. and Ostry, J. (2017). Inequality and Unsustainable Growth: Two sided of the Same Coin. *IMF Economic Review*, 65 (4), pp 792 – 815.

Berg, A., Ostry, j., Tsangarides, C. and Yakhshilikov, Y. (2018). Redistribution, Inequality and Growth: New Evidence. *Journal of economic Growth*, Vol. 23 (3), pp 259 – 305.

Breusch, T. S. and Pagan, R. A. (1979). A Simple Test for Heteroskedasticity and Random Coefficient Variation. *Econometrica*, 47(5): 1287 – 1294.

Cede, V., Chiriacescu, B., Harasztosi, P., Lalinsky, T. & Merkull, J. (2016). Export

`

Characteristic and Output Volatility: Comparing Firm – Level evidence for CEE Countries. *National Bank of Slovakia* 3(1), 2016

Cesar, C. & Hebbel, K. (2008). Openness and Growth Volatility. *Central Bank of Chile Vol. 16 No. 483.*

Checherita, C. & Rother, P. (2010). The Impact of High and Growing Government Debt On Economic Growth. An Empirical Investigation for the Euro Area. *European Central Bank Report, Series No.* 1237

Cook, N.R & Ware, J.N. (1983). Design and Analysis Method for Longitudinal Research. *Ann. Rev. Public Health,* 1983, Vol. 4, pp 1 – 23.

Carmen, L. (2011). Economic Growth and Human Wellbeing. Retrieved from http://www.shaping tommorrowworld.org/Lawrence-growth-welleing-jhtmc.

Chang, S.C and Wu, C. H (2012). The relationship between financial Deepening and Economic growth in Taiwan. *Business, Economic, Financial science and Managemen*t, pp 205 - 210

Chun, Y. H., Shaoqin, H., Hao, S. and Jun, W. (2017). Financial deepening and Innovation Efficiency: The Role of Political Institutions. ADB No. 694. Tokyo: *Asian Development Bank*

Damar, H. E. & Ardigo, O. P. (2006). Financial Sector Deepening and Economic Growth: Evidence from Turkey. *Munich Personal RePEC Archive. Bongozici University Paper,* No. 4077.

Chakraborty, S. (2018). Financial Deepening. *Journal of Economic Theory and Practice*. Vol. 5, pp 1 – 30.

Calderon, C. and Fuentes, J.R (2013). Government Debt and Economic Growth. *Inter-American Development Bank*: Fiscal and Municipal Management.

Carvana, E., Roman,M., Sanchez, H. and Solli, P. (2015). Longitudinal Studies. *Journal of Thoracic Diseases, 7 (11).*

Denk, S. & Zoilan, J. (2012). Non – Keynesian Effects of Fiscal Consolidation: An Analysis with an Estimation DSGE Model for the Hungarian Economy. *OECD, No. 945*,

Drost, E.A. (2007). Validity and Reliability in Social Science research. *Educational Research Perspective,* Vol.38, No.1. pp 105 – 124.

Dobosinskas, A. Kulikov, D & Randnear, M (2012). The Impact of Volatility on Economic Growth. *Besti Pank, EUROSUSTEEM, series* 1/12

`

Dabla, N. E. & Srivisa, N. (2013). Revisiting the link between Financial and Macroeconomic Volatility. *International Monetary Fund 13/29*

Ductor, L. and Leon, D. L. (2021). Fluctuation in Global Output Volatility. *Journal of International Money and Finance*, Vol. 120, pp 1 – 15.

Ekberg, J & Wyman, D. (2015). Financial Deepening in Indonesia: Funding Infrastructural, Development Catalyst and Economic Growth. *Manderi Institute, Bobby Hermanus,* 2(1) Indonesia.

Elke, V., & Craig, M. (2019*).* Understanding East Africa Community. Informal Adaption in Regional Trade and Transport Cooperation. *European Centre for Development, Policy and Management*. www.ecdpm.kvk.41077447.

East Africa Community (2011). Deepening and Accelerating Integration. *EAC Development Strategy Report* 2011/2012 – 2015/2016.

Emekan, N. & Aham, K. (2016). Autoregressive Distributed Lag (ADL). Cointergration technique: Application and Interpretation. *Journal of Statistical and Economic,* Vol. 5, No. 4, pp 63 – 91. ISSN 1792 – 6602.

Easterly, W., Islam, R. & Stiglitz, J. (2001). Shaken and Stirred: Explaining Growth *Volatility. Annual World Bank Conference*.

Emran, M. and Farazi, S. (2009). Lazy Bank? Government Borrowing and Private Credit in developing Countries. *The George Washington University. Institute of International Economic Policy.*

Erdal, B. (2018). The Relationship Between Financial Deepening and Economic Growth in the Long – Run and Causality Between Them: Empirical Evidence from Turkey, *Bahar, et.al lut. Eco. Res*, Vol. 9 pp 13 – 23.

Financial Sector Regulator (2011). Kenya Financial Sector Stability Report. *FSRF in Collaboration with Ministry of Finance and Ministry of Co- Operative Development and Marketing.*

Ersoy, I. (2012). Government Debt verses Financial Depth Dilemma in Developing Countries. The Case of Turkey. *Acta Economics*, 62 (3), 345 – 362.

Filipp, O. (2010). Is Debt Overhang Causing Firms to Under Invest? *Federal Reserve Bank of Cleveland. Economic Commentary*, 1010 – 7

Ferreira, G.S. (2002). The Impact of Financial System Development on Business Volatility: Cross – Country Evidence. *Journal of Macroeconomic*. 24(2): 233 – 253.

Forslund, K, Lima, L. and Panizza, O. (2011). The Determinant of Composition of Public Debt in Developing and Emerging Market Countries. *Review of Development Finance,* 1 (3 – 4), pp 207 – 222.

Goyal, R., Marsh, C., Raman, N., Wang, S. & Ahmed, S. (2011). Financial Deepening and International Monetary Stability. *Strategy, Policy and Review Department, IMF,* SDN /11/16.

Gomez, P., M., & Sosvila, R., S. (2017). Public Debt and economic Growth: Further Evidence for Euro Area. *Institute of Applied Economic,* Vol.15, pp 1 – 41

Guscina, A. & Jeanne, M. (2006). Government Debt in Emerging Market countries. A new Data Set. *International Monetary fund.* No. 6 – 98.

Gigineishvili, N., Mauro, P and Wang, K. (2014). How Solid is Economic Growth in East Africa Community? *IMF/ 14/ 150.* Africa Department.

Ghildiyal, V., Pokhriyal, A.K. and Mohan, A. (2015). Financial Deepening and Economic Growth in Indian perspective. ARDL Bound Testing Approach to Cointegration. *Asian Development Review,* 3(3), 49 – 60.

Gezer, N. A. (2018). The Relationship Between Financial Deepening and Economic Growth: Bootstrap Causality Approach for the selected Upper Middle-Income countries. *Theoretical and Applied Economics,* Vol. XXV, No. 1, pp 95 – 112.

Hofer, I. & Saris, W. (2015). Operationalization of Social Science Concept by Intuition, Stability and Methodology. *Department of Political science, Cultural Faculty, University of Amsterdam.* 38 Klaver, Academic Publisher. Netherland

Hunt, S. (2005). For truth and realism in Management Research. *Journal of Management Inquiry,* Vol. 20, No 10, pp 1 – 12.

Haller, A.P (2012). The Concept of economic Growth and Development: Challenges of Crisis and of Knowledge. *Transdisciplinary Cognitive* Vol. 15, Issue 1/2012. Pp. 66 – 71.

Hicks, J. (1939). A Value and Capital Growth Model. *Review of Economic Studies*, 26(3), pp 159 – 173.

Hennessy, C. A. (2004). Tobin Q, Debt Overhang and Investment. *Journal of Finance*, Vol. 59. No. 4, pp 1717 – 1742.

Hilton, S. K. (2021). Public Debt and Economic Growth: Contemporary Evidence from A Developing Economy. *Asian Journal of Economics and Banking*, Vol. 5, No. 2, pp 173 – 193.

`

Ho, H. and Kawal, M. (2018). Quality and Quantity Measure of Financial Development. Implication for Macro Economic Performance. Policy Research Institute. Ministry of Finance, Japan. *Public Policy Review*, Vol. 14, No. 5, pp 803 – 834.

IMF (2015). Rethinking financial deepening: Stability and Growth in Emerging Market. *International Monetary Fund,* SDN/15/08.

IMF (2016). First Reviews under the Twenty – Four Month Stand - By Arrangement and The Arrangement under Stand – By Credit Facility and Request for Waiver of Application, Rephasing of Disbursement and Modification of Performance Criterion – Debt Sustainability Analysis Update. *International Monetary Fund, December*, 23rd, 2016.

IMF (2012). Enhancing Financial Sector Surveillance in Low – Income Countries: Financial Deepening and Macro – Economic Stability. *International Monetary Fund Report, April, 16th, 2012.*

IMF (2017). Promoting Inclusive Growth. *International Monetary Fund Annual Report 2017.*

Iseringhausen, M. and Vierke, H. (2018). What Drives Output Volatility? The Role of Demographics and Government Size Revisited. *European Commission.* Discussion Paper 075, Issue 2443 – 8022.

Iyoboyi, M. (2013). Bank and Non – Bank Financial Deepening and Economic Growth: The Nigerian Experience (1981 – 2010). *Economic Notes by Bank Monte dei Pusch di Siena SPA,* Vol. 42, No. 3, pp. 247 – 271.

Imimole, B. & Ehikioya, I. L. (2012). The Impact of Public debt: An Emerging economy. Evidence from Nigeria (1980 – 2009). *International Journal of Innovative Research and Development*. ISSN: 22778 – 0211, Vol. 1, Issue 8, pp. 242 – 262.

INTOSAI (2010). Debt indicators. *INTOSAI General Secretariat – PECHNUNGSHOF*, A – 1033, Vienna, Austria.

Institute for Applied Economics (2017*).* Economics Forecast and Industry Outlook. *Los Angeles County Economic Development Corporation,* 444, S. Flower Street, 37 Floor. Los Angeles.

IIgun, M. (2016). Financial Deepening and Domestic Debt in Emerging Economies. A panel Cointergration *Analysis. Journal of Finance and Economic. Vol. 6 pp 284 – 296.*

Judd, C. & Kenny, D. (1981). Process Analysis: Estimating mediation in Treatment Evaluation. *Journal of Evaluation review* 1981a, 5: 602 – 619.

`

Johnson, M. P. (2014). Secondary Data Analysis: A Method of Which the Time Has Come. *Qualitative and Quantitative Method in Libraries (QQML)* 3: 619 – 626.

Jean, I. (2002). Why the Link between Volatility and Growth is both positive and Negative. London Business School and CEPR. *European Summer Symposium in International Macroeconomics Held in Tarragona June, 2002.*

Jalil, A., Abu, W. N., Shahbaz, M. (2010). Financial Development and Growth: Evidence from Northern Cyprus. *International Research Journal of Finance and Economics, Issue 8, pp 57 – 62.*

Jambo, W. (2021). Inclusive Growth in Sub – Sharan Africa: Do Financial Depth and Inclusion Matters? *African Economic Research Consortium*. AERC Paper 455.

Jalloh,T. and Tarawahe, B. (2021). External Debt and Economic Growth Nexus in the ECOWAS: A Threshold Analysis. *International Journal of Business and Economic Research*, 1095): 178 – 186.

Kamenchu, J. (2018). Effect of Financial Deepening on Economic Growth in EAC. *UON Portal – Vol 2, No. 1. Journal.uonbi.ac.ke/index.php/adfj/article/new/1817.*

Kenya Bankers Association (KBA) (2017). Influence of Bank Lending to the Government on Private Sector credit in Kenya. *KBA Centre for Research on Financial Market and Policy,* Series 18.

Kose, M.A., Prasad, E.S., and Terrones, M.E. (2005). Growth and Volatility in an Era of Globalization. *IMF Vol. 52 Special Issue*.

Keyne, J. M. (1935). The General Theory of Employment, Interest and Money. *http://ekext.library. Adelaide.edu.au/k/k44g/k44.zip*

Kiyotaki, N. (2011). A Perspective on Modern Business Cycle Theory. *Economic Quarterly*, Vol. 97, No. 3, pp 195 – 208.

Kodama, M. (2014). Does Growth Affect Volatility? An Empirical Study on Developing Countries. *Applied Economics* 21(4), pp 257 – 260.

Kumar M. & Woo, J. (2010). Public debt and Economic Growth (No. 10/174). *International Monetary Fund.*

Kutivadze, M. (2011). Public Debt and Financial Deepening. *University of Milano 2011 - 2013*

Kiriga, B., Chemnyongoi, H. and Wachira, P. (2020). Optimization of Public Debt and Its Impact on Kenyan Economy Growth. *The Kenya Institute for Public Policy, Research and Analysis. DP/245/2020.*

`

Kwoba, P.L. and Kosimbei, G (2015). Public debt and Economic Growth in East African Community. *Economic and Finance Review*. Vol. 4(5), pp 31 – 39.

Keho, Y. (2016). Revisiting the Financial Development and Poverty Reduction Nexus for Sub – Saharan African Countries: Evidence from Causality Test in The Time and Frequency Domain. *International Journal of Economics and Finance*. Issue 6 (4), pp 1906 – 1910.

Keho, Y. (2018). Economic growth of ECOWAS Countries and The Validity of Kaldors First Law. *Journal of Global Economics*, Vol. 6 Issue 2, pp 1 – 6.

Lukassz, P. (2014). Review of Theories and Model of Growth. *Comparative Economic Research*, Vol, 17, No, 1, pp 45 – 60.

.Mwaniki, G. W. (2016). Effect of Public debt on Gross Domestic Product in Kenya. *Journal of Economic and Finance* ISSN 2321 – 5925, Vol. 7, Issue 6, Ver. 1, pp 59 -72.

Mirdala, R., Surcekova, A. & Semana, K. (2015). Relationship Between Financial Integration, Financial Liberalization and Macroeconomic Volatility. *Munich Personal RePEC Archive Paper* No. 66143: UTC.

Marlyse, L. N. B. (2015). Effects of Financial Deepening on Economic Growth in Kenya. *International Journal of Business and Commerce* Vol. 4, No. 7, pp. 1 – 50.

Mwanna, I. & Chinwudu, C. (2016). The Effect of Financial Deepening on Economic Growth in Nigeria (1985 – 2014). *Journal of Economic and Finance*. ISSN; 2321 – 5932, Vol. 7, Issue 4, pp. 11 – 28.

Myers, S. (1977). The Determinants of Corporate Borrowing. *Journal of Financial Economics,* Vol 5 (2), pp 147 – 175.

Musibau, H. o., Mahmood, S., Ismail, S., Shamsuddin, Z. and Rashid, N. (2018). Does External Debt Causes Economic Growth? An Experience from ECOWAS Member Countries. *International Journal in Business and Social Science*, Vol. 8(11), pp 1256 – 1264.

Mike, M. (2009). Bailout is a Windfall to Banks, If Not Borrowers. *New York Times*. New   York Times 2009 – 01 – 2020.

Mcfie, J. (2018), Kenyans National Debt, Are We Heading Towards Bankruptcy? *Journal of the Institute of Certified Public Accountant of Kenya*. March – April Issue, pp 14 – 16.

Mutiso, C. (2018). Debt Trap: can Kenya Avoid Its Jaw? *Journal of the Institute   of Certified Public Accountant of Kenya*. March – April Issue, pp 18 – 19.

`

Mordecal, B.D & Mathews, A. (2016). The Impact of Public Debt on Economic
Development in Nigeria. *Asian Research Journal of Arts and Social Science*, Vol.
(V), pp 1 – 16.

Mwega, M. F. (2014). Financial Regulation in Kenya: Balancing Inclusive Growth with
Financial Stability. *DFID – ESRC*, 3(2), pp 1 – 42.

Manueli, R.E. (1986). Modern Business Cycle Analysis: A guide to the Prescott –
Summer. *Quarterly Review. Federal Reserve Bank*, Vol. 10, No. 4, ISSN: 0271 –
5287.

Muhoza, B. K. (2019). Financial Intermediation and Economic Growth in East Africa
Community: A Financial Index Approach. *Africa Journal of Economic Review*,
Vol. VII, Issue 2, pp 165 – 182.

Mun, M. & Ismail, N. (2015). Domestic Public debt and financial Deepening in Malaysia.
International Journal of social science research 3 (2), pp 1 – 9.

Misali, R., Osoro, J. and Odongo, M. (2021). Does Financial Innovation Enhance
Financial Deepening and Growth in Kenya? *Kenya Bankers Association*. Centre
for Research on Financial Markets and Policy No. 49.

Mladen, M. (2015). Economic Growth and Development. *Journal of Process
Management – New Technology International,* Vol. 3, No. 1, pp 55 – 62.

Maleka, M., Biyase, M. and Zwane, T. (2019). General Government Debt and Growth in
SADC Countries. *Journal of Demography and Social Economy*. ISSN 2072 –
9480, no. 3(37), pp 99 – 112.

Manjunathan,N. (2019). Descriptice Research. *JETIR,* vol. 6, Issue, 6.

Nantwi, V. O. & Erickson, C. (2016). Public Debt and Economic Growth in Ghana.
African Development Review No. 1, pp. 110 – 126.

Ndieupa, H. N., (2018). How Does Public Debt Affect Growth? Further Evidence from
CEMAC ZONO. *Asian research Journal of Art s & Social Science*, 5(1). Page 1 – 8.

Nyamweya, J.M., Ochieng, D.E., Ondigo, H. and Magutu, P.O. (2020). Is There Any
Mediating Effects of Financial Deepening on the Relationship between Economic
Growth and Poverty Level in East Africa community Countries*? International
Journal of Finance and Accounting. Vol. 6. Issue 4, pp 57 – 64.*

Nkoro, E. & Uko, A. K. (2016). Autoregressive Distributed Lag (ARDL) Cointegration
Technique: Application and Interpretation. *Journal of Statistical and Economic
Methods, Vol, 5, No. 4, pp 63 – 91. ISSN: 1792 – 6602.*

`

Noreen, A, and Mageid, M. T. (2018). Financial Development and Output Volatility. A cross – sectional Panel Data Analysis. *The Lahore Journal of Economics*, 23:1, pp 97 – 141.

Nassaji, H. (2016). Qualitative and Descriptive Research. Data Type Versus Data Analysis. *Language Teaching Research,* Vol. 19(2), 129 – 132.

Ozdemir, D. (2017). A post – Keynesian Criticism of Solow Growth Model. *Journal of Economic, Business and Management*, Vol. 5, No. 3, pp 133 – 137.

O'Mally, J. A. (2012). Instrumental Variable Specification and Assumption for Longitudinal   Analysis of Mental Health, Cost Offset. *Health Services and Outcome Research Methodology,* 12(4), pp 254 – 272.

Owen, L. (1995). Corporate Debt Overhang and Macroeconomic Expectation. *American Economic Review* 85: 5.

Ondo, A. (2017). Public Debt and Financial Stability: The Case of Economic Community and Monetary Union of Central Africa (ECMCCA). *Journal of Economic and International Finance, Vol. 9(9), pp 89 – 94.*

Onwumere, J., Ibe, F. G, Ozob, F. O & Mounanms, O. (2012). The Impact of Financial Deepening on Economic Growth: Evidence from Nigeria*: Research Journal of Finance and Accounting. Vol. 3, No. 10.*

Onoriode, B. o. and Coris, J. O. (2013). Financial deepening and Economic growth in Nigeria, 1986 – 2011: An Empirical Investigation. *Journal of Economics and Development Studies,* Vol. 1(1), pp 24 – 42.

Ogbebor, T. and Okungbowa, O. G. (2019). Does Financial Deepening Causes Growh? Evidence from the Economic Community of West Africa States (ECOWAS). *Multi – Disciplinary Journal of Research and Development Perspective*. Vol. 8, No. 2. Pp 1 – 21.

Ojo, J. F. and Aiyebutaju, M. O. (2015). On The Performance of Autoregressive Moving Average Polynomial Distributed Lag Model. *Ife Journal of Science*, Vol. 17, No. 2, pp 247 – 254.

Park, J.H. (2015). Financial Development, Fiscal Policy and Macroeconomic Volatility. *PHD   Thesis. University of York, School of Economics.*

Prasad, S., Rogoff, K., Wei, J., & Kose, M. A., (2007). Financial Globalization, Growth And Volatility in Developing Countries. *National Bureau of Economic Research,* pp 457 – 516.

Portuguese Public Finance Council (2013). Public Debt. *Notebook by the Portuguese*

`

Public Finance Council No. 1120B

Pescalori, A., Damiano, S., & John, S. (2014) Debt and Growth. Is There a Magic Threshold? *International Monetary Fund No. 14134*.

Reinhart, C. M., and Rogoff, K. S. (2010). Growth in a Time of Debt. *American Economic Review;* Paper Proceeding 100: pp 573 – 578.

Panizza, U. and Presbitero, F. (2013). Public debt and Economic Growth In Advance Economies: A Survey. *Swiss Society of Economic Statistics*, Vol. 144(2). Pp 175 – 204.

Pesara, H, M. (2004). General Diagnostic Tests for Cross - Section Dependence in Panels. *University of Cambridge*, USC and IZA Bonn, DP No. 1240.

Pesaran, H. M. (2015). Testing Weak Cross-Sectional Dependence in Large Panels. *University of Cambridge*, Department of Economics. Trinity College, pp 1089 – 1117.

Ramely, G. & Ramey, V. (1995*).* Cross – Country Evidence on the Linkage Between Volatility and Growth. *American Review* Vol. 85, No. 5, pp 1138 – 1151.

Rahi, S. (2017). Research Design and Methods: A Review of research Paradigm, Issues and Instrument developmen*t. International Journal of economics and Management Science,* Vol. 6, Issue 2, pp. 2 – 5.

Rahman, N. (2019*).* How Public Debt Affect Economic Growth? *Journal of Cogent Business and Management.* Vol 6, Issue 1, pp 24 – 38.

Rashi, N.A, Araghi, E.S and Shayeste, M. (2014). The Relationship Between Financial Deepening and Economic Growth. Evidence from Financial Crisis. *Asian Economic and Financial Review,* 4(7): 930 – 940.

Rachel, L. and Summer, L. (2019). Secular Stagnation and the Future of Economic Stabilization. *National Bureau of Economic Research*.

Raimunda, J. Z., Echeimberg, J. O. and Leone, C. (2018). Research Methodology Topic: Cross – Sectional Studies. *Journal of Humanities and Development*, 28(3), pp 356 – 360.

Samparadja, H., Suryada, W. & Kartasaakita, B. (2016). The influence of Inductive – Deductive Approach Based on Modified Definition of Algebra: Structure Learning Towards Student Proofing Ability Viewed Based on College Entrance Track. *International Journal of Education and Research* Vol. 2, No. 7, pp 239 – 248.

`

Sindani. M. (2013). The Impact of Financial Sector deepening on Economic Growth. *International Academic Journal of Information Science and Project Management.* Vol. 1, Issue 1, pp 141 – 64.

Solow, M.R. (1956). A contribution to the Theory of Economic Growth. *The Quarterly Journal of Economics,* Vol. 70, No. 1, pp 65 – 94.

Shetta, S. and Kamaley, A. (2014). Does Budget Deficit Crowd – Out Private Credit from the Banking Sector? The Case of Egypt. *Topics in Middle Eastern and Africa Economics,* 16 (2), 251 – 279.

Sweta, C., Sayena, C. & Yabara, M. (2012). The East Africa Community: Prospect for Sustainable Growth. *IMF, Africa Department*, 12/272.

Smith, B. (2004). Beyond Concept: ontology as reality Representation. *Department of Philosophy, University of Buffalo.* NY 14260, USA.

Sutherland, D. & Hoeller (2012). Debt and Macroeconomic Stability: *An overview of the Literature and Some Empirical (No. 1003). OECD Publication.*

Schurin. M. (2012). Government Debt and Macroeconomic Volatility. *Mimeo*

Sekaran, U. (2006). Research Methods for Business. A Skill – Bilding Approach. Fourth Edition. John Wiley and Sons. New Delhi.

Taylor, P. & Medina, M. (2013*).* Educational Research Paradigms from positivism to Multipara Diametric. *Journal for Meaning Center Education:* http//www.meaningcenteredorg/journal/volume–1/educational.research.paradigm-from positivism-to-multiparadiametric/

The National Treasury (2016). Consolidating Economic Gain in an Environment of Subdued Global Demand*. Budget Policy Statement, Republic of Kenya.*

Ukaid Report (2018). Sources of economic Growth: *Trade and analytical Paper, Topic 6 of 18: Department of International development,*

UNCTAD (2009). Compendium on Debt Sustainability and Development. *United Nation Publication:* UNCTAD/GDS/DDF/2008/1, Geneva.

UNCTAD (2018) East Africa Regional Integration: Trade and Gender Implication. *United Nation Publication Issue* UNCTAD/DITC/2017/2.

United Nations Report (2020). World Economic Situation and Prospect. *United Nations*, New York.

Uganda Bureau of Statistics (2018). Key Economic Indicators. *112th Issue Quarter Two* 2018/2019 (Oct – Dec 2018)

Wakeford. J. (2016). An Overview of the Kenyan Economy. *Quantum Global research*

`

Lab.November 2016.

Were, M. (2001). The Impact of External Debt on Economic Growth in Kenya. *World Institute for Development Economic Research.* United Nations University. 2001/116

Wagner, W. (2010). Diversification at Financial Institution and System Crises. *Journal of Financial Intermediation, 19(3): 373 – 386.*

World Bank (2019). The World Bank Annual Report: Ending Poverty, Investing in Opportunity. *Washington DC: CC B4 – NT – ND – 3*.

Wanjala, K. and Gogo, P. (2020). The Effect of Financial Deepening on economic growth in East Africa Community. *Finance and Economic Review*. Vol. 2(2), pp 55 – 73.

Wang, X. and Cheng, Z. (2020). Cross – Sectional Studies: Strength and weaknesses and Recommendation. *Chest Journal,* Vol 158, issue 1, pp 565 – 571.

Zouhaier, H. & Fatma, M. (2014). Debt and Economic Growth. *International journal of Economic and Finance,* Vol. 4, No. 2, pp 440 – 448.

Zambakar, C. (2019). South Sudan Entry in to East Africa Community; Prospect and Challenge*s. Africa Policy Journal*, Vol 8, pp 27 – 29.

Zahonogo, P. (2017). Financial Development and Poverty in Developing Countries. Evidence from Sub – Saharan Africa. *International Journal of Economic sand Finance.* Vol. 9(1). Pp 211 – 220.

SECONDARY DATA COLLECTION FORM
Section I   Data Collection Form for Public Debt

Year Quarter	Kenya Public Debt	Tanzania Public debt	Uganda Public Debt	Rwanda Public Debt	Burundi Public Debt	Total A	Kenya Income	Tanzania Income	Uganda Income	Rwanda Income	Burundi Income	Total B	Grand Total Debt/Income
	(USD)	(USD)	(USD)	(USD)	(USD)	(USD)	(USD)	(USD)	(USD)	(USD)	(USD)	(USD)	A/B (USD)
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Section II Data Collection Form for output Volatility

Year Quarter	Kenya Growth Rate	Tanzania Growth Rate	Uganda Growth Rate	Rwanda Growth Rate	Burundi Growth Rate	Total Growth Rate	Average Growth Rate	Standard Deviation of Growth Rate
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Section III Data Collection Form for Financial Deepening.

Year Quarter	Kenya	Tanzania	Uganda	Rwanda	Burundi	Total	Kenya	Tanzania	Uganda	Rwanda	Burundi	Total	Grand Total
	M1	M1	M1	M1	M1	M1	M2	M2	M2	M2	M2	M2	M1/M2
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Section IV   Data Collection Form for Real GDP

Year Quarter	Kenya Real GDP USD	Tanzania Real GDP USD	Uganda Real GDP USD	Rwanda Real GDP USD	Burundi Real GDP USD	Total Real GDP USD
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2019 1						
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