

DOES FINANCIAL DEEPENING MEDIATE THE RELATIONSHIP BETWEEN PUBLIC DEBT AND ECONOMIC GROWTH IN EAST AFRICAN COMMUNITY?

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Abstract

Considering the rising levels of public debt and economic growth among East African Community (EAC) member states and the role of financial deepening in accelerating economic activities, the study sought to explore the mediating role of financial deepening in the relationship between public debt and economic growth in East Africa Community. The study deployed Judd and Kenny and Barron and Kenny approaches to test the mediating effect of financial deepening on the relationship between public debt and economic growth. The model uses hierarchical approach to determine the mediating influence on the variables. Longitudinal research design was used and quarterly time series data was gathered from 2002 to 2020. The population of the study consists of six countries in EAC that is Kenya, Tanzania, Uganda, Burundi, Rwanda and South Sudan. The analysis was done through autoregressive distribution lag model. It was found that there was no significant mediating effect of financial deepening on the relationship between public debt and economic growth in East African Community. The findings imply that the government of EAC member states should appreciate that the association between public debt and economic growth may not be explained or accounted for by financial deepening. This finding presents contemporary outcome to supplement existing literature on the role of financial deepening in mediating economic growth in East Africa Community. The study also used variables and empirical models which prior studies could not sufficiently cover in developing countries perspective. Therefore, the study affirms that, there was no significant mediating effect of financial deepening on the relationship between public debt and economic growth in East Africa Community.

Key Words: Financial Deepening, Mediate, Public Debt, Economic Growth.

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1.1 Introduction

Financial deepening is the composition of access, efficiency and depth of organization to deliver financial services involving lending, investment and management of money and asset (IMF, 2015). Most empirical literature approximate financial deepening by the ration of private credit to GDP and M1 as a ration of M2 (IMF, 2015). However, deep market allows investors to invest in variety of investment because increase in transaction volume and risk management can enhance capacity to intermediate cash flow without large swing in asset prices (Goyal, Marsh, Raman, Wang and Ahmed, 2011). Whereas financial deepening enhances resilient of countries to shock and boost economic performance, it can also mobilize savings, facilitate diversification, sharing of risks and promote information sharing (IMF, 2012). However, the relationship between public debt and financial deepening has not been resolved by the scholars. Whereas some scholars argued that there is positive association between public debt and financial deepening (Kutivade, 2011 and Gusana and Jeane, 2006), others observed negative relationship between financial deepening and public debt (Attyligit and Akkey, 2013 and Mun and Ismail, 2015). Therefore, the study sought to explore the mediating effect of financial deepening on the association between public debt and economic growth in EAC.

EAC is a regional economic block comprising 6 countries in East Africa. The countries include 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 is 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)

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 Ogbemor 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)

2.1 Literature Review

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 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 Attylgit 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 autoregressive distribution lag model was deployed as analytical tool. The results 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 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 Igun (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.

Considerable literatures have focused their attention on the influence of financial deepening on economic growth. 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 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 analyse 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 economic 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 Adu, Marbua and Mensah (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 seems 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.

3.1 Methodology

The mediating effect of financial deepening on the relationship between public debt and economic growth was built on Judd and Kenny (1981) and Barron and Kenny (1986) model. The model uses stepwise approach to determine the mediating effect among the variables. The study deployed longitudinal research design. The longitudinal research design offers increased precision of treatment of constructs by eliminating inter-individual variations. It can also examine individual changing response over time (Cook and Ware, 1983). The population of the study consists of six countries that form the EAC. These include Uganda, Tanzania, Kenya, Burundi, Rwanda and South Sudan. Burundi and South Sudan were dropped from the population. This is because South Sudan joint EAC in April, 2016 (Zambakar, 2016) and Burundi had insufficient data which cannot sustain regression analysis. This implied that we could not generate meaningful analysis due to paucity of data.

The investigation used secondary data. Quarterly time series data was collected from 2002 to 2020 and analyzed through autoregressive distribution lag model. Data on public debt and financial deepening was gathered from the Central Banks of member states and gross domestic product from National Bureau of Statistic of individual member states. 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. Public debt was measured by a ratio of public debt to government income, output volatility by standard deviation of economic growth rate, financial deepening by a ratio of M1 to M2 and finally, economic growth by GDP.

3.2 Model Specification

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.

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

Regress EG_t on FD_t to proof β_3 is significant.

$$FD_t = \alpha_0 + \alpha_1 FD_{t-1} + \beta_1 PD_t + \beta_1 PD_{t-1} + e \dots\dots\dots (2)$$

Regress FD_t on PD_t to test β_1 is significant.

$$EG_t = \alpha_0 + \alpha_1 EG_{t-1} + \beta_1 PD_t + \beta_1 PD_{t-1} + \beta_3 FD_t + \beta_3 FD_{t-1} + e \dots\dots\dots (3)$$

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.

Table 1 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.

4.1 Results and Discussion

The table below presents the outcome of the relationship between public debt and economic growth.

Table 4.1: 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			

From Table 4.1 above, 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 results are supported by Goyal et.al (2011), Iyonoyi (2013), Chang and Wu (2012) and Rashti, Aragh and Shayeste (2014) who noted that financial deepening exerts a positive influence on the level of 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 up to 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 up to 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.

Table 4.2 below 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 4.2 below 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. This supports the finding of Chang and Wu (2012) and Rashte, Araghi, and Shayeste (2014).

Table 4.2: ARDL model of the effect of Financial Deepening on Economic Growth

Variable	Kenya		Tanzania		Uganda		Rwanda	
	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.	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

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 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.

The results on the influence of financial deepening on economic growth was in contrast with the findings of Damar & Ardigo (2006) whose results indicate that financial deepening exerts negative influence on growth in the economy. However, the analytical outcome was supported by the findings of Goyal, et al. (2011), Iyoboyi (2013) which observed that financial deepening exerts a positive influence on economic growth.

4.2 The Influence of Public Debt on Financial Deepening

Table 4.3 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 4.3: 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			

From Table 4.3 above, 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 is inconsistent with the findings of Mun and Ismail (2015), Attyligit and Akkey (2013), Ayadi, Arbak, Naceus and Groen (2015) and Ilgun (2016) who observed a 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 significantly explain 32.7% of 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 4.4 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 4.4. ARDL model, the effect of Public Debt on Financial Deepening

Variable	Kenya		Tanzania		Uganda		Rwanda	
	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

Table 4.4 illustrates 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. The finding is in agreement with that of Attyligit and Akkey (2013), Mun and Ismail (2015), Ayadi, Arbak, Naceus and Groen (2015) and Ilgun (2016) which indicate that public debt negatively influence financial deepening. 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.

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 4.5. 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			

From Table 4.5, 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 confirms the finding of Goyal et al. (2011), Iyonoyi (2013), Rahma (2019 and Bilan and Iuiian (2015).

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 imply 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 6. 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 4.6. ARDL model: The effect of financial deepening and public debt on economic growth.

Variable	Kenya		Tanzania		Uganda		Rwanda	
	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

Table 4.6 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. This supports the findings of Goyal et.al (2013), Chang and Wu (2012) and Rashti, Aragh and Shayeste (2014). 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 finding was consistent with the results of Rahma (2019), Natwi and Erickson (2016) and Park (2015).

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.

From this study, the results are in tandem with RIAE (2017) which also observed that public debt raises economic growth. However, this is only true with regard to the current public debt and not the lagged public debt. With regard to the current financial deepening, results are in tandem with Goyal et.al. (2011) and Iyonoyi, (2013) which also observed that financial deepening are positively associated with economic growth but negated Damar & Ardigo (2006) findings which indicate that financial deepening exerts a negative influence on economic growth.

Table 4.7. 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

Table 4.7 above, 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 4.8: 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

Table 4.8 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 severe (Berenson, 2017).

Testing of H_{03} 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 $\beta_3 = 0.000$ (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 the East African community.

The results of the mediatory role of financial deepening is not in agreement with the findings of Nyamweya, Ochieng, Ondigo & Magutu (2020) who observed that financial deepening mediates growth in the economy in EAC. 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 association between public debt and economic growth may not be explained or accounted for by financial deepening in the East African Community. This outcome contributes towards developing knowledge about the mediating influence of financial deepening on the connection between public debt and economic growth.

In conclusion, the study affirms that the association between public debt and economic growth may not be mediated significantly by financial deepening in East African Community. This implies that the government should not pay attention to financial deepening because it has an insignificant mediating influence on economic growth. The mediating effect of financial deepening on the relationship between public debt and economic growth helps us to understand whether integrating East African Community would be feasible. It is imperative to note that the economic systems within EAC need to foster financial deepening and public debt if economic integration is to be realized.

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 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. Other studies can use alternative analytical model to see whether the outcome is consistent.

References

- 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.
- Asiedu, M., Effah, N. A., Joel, T. N. and Nkwanlabisa, A. O. (2021). Stock Market Development, Financial Deepening and Economic Growth in Africa. *Journal of Financial Risks Management*, Vol. 8, pp 1 – 24.
- Adenole, Y. K. and Biodum, K. m. (2020). The Impact of Financial Deepening on Economic Growth of Nigeria. *Yahay and Kolapo*, Vol. 21, No. 1, pp 235 – 154.
- Aliero, H. M., Pantama, Y. U. and Abubakar, S. (2019). The Impact of Domestic Public Debt and Institutional Quality on Financial Development in Nigeria. *Lapai Journal of Economics*, 3(1), 41 – 51.

- 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.
- Ayadi,R., Arbak, E., Naceur, S., & Groen, W, (2015) determinant of Financial deepening Across Mediterranean, Economic and Social Development of the Southern Mediterranean. *Springer International Publishing. Pp 159 – 181.*
- Adu, G., Marbua, G. and Mensah, J. (2013). Financial Development and Economic Growth in Ghana: Does the Measure of Financial Development Matters? *Review of Development Finance*, Vol. 3, pp 192 – 203.
- Azzimonti, M., Fransisco, E. and Quadrini, V. (2012). Financial Globalization and Raising of Public Debt. *Federal Bank of Philadelphia*, No. 11 – 03.
- 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.
- Berenson, M.L. (2017). Comparing Tests of Homoscedasticity in Simple Linear Regression. *JSM Math. Stat. (1): 1017.*
- Chang, S.C and Wu, C. H (2012). The relationship between financial Deepening and Economic growth in Taiwan. *Business, Economic, Financial science and Management*, pp 205 - 210
- Cook, N.R & Ware, J.N. (1983). Design and Analysis Method for Longitudinal Research. *Ann. Rev. Public Health*, 1983, Vol. 4, pp 1 – 23.
- 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.
- 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.*
- Ersoy, I. (2012). Government Debt Verses Financial Depth Dilemma in Developing Countries. The case of Turkey. *Acta Economics*, 62 (3), 345 – 362.
- 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.* V9, 13 – 23.

- Forslund, K., Lima, L. and Panizza, U. (2011). The determination of Composition of Public Debt in Developing and Emerging Market Countries. *Review of Development Finance*, 1 (34), 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.
- Guscina, A. & Jeanne, M. (2006). Government Debt in Emerging Market countries. A new Data Set. *International Monetary fund*. No. 6 – 98.
- Ghildiyal, V., Pokhriyal, A. L and Mohan, A. (2015). Financial Deepening and Economic Growth in Indian Perspective: ARDL Bound Testing Approach to Cointegration. *Asian Development Policy Review*, 3(3), 49 – 60.
- Gezer, M. A. (2018). The Relationship between Financial Deepening and Economic Growth: Bootstrap Causality Approach for the Selected Upper Middle-Income Countries. *Theoretical and Applied Economics*, Volume XXV, No. 1, pp 95 – 112.
- IMF (2015). Rethinking financial deepening: Stability and Growth in Emerging Market. *International Monetary Fund*, SDN/15/08.
- IMF (2012). Enhancing Financial Sector Surveillance in Low – Income Countries: Financial Deepening and Macro – Economic Stability. *International Monetary Fund Report*, April, 16th, 2012.
- Iyoboyi, M. (2013). Bank and Non – Bank Financial Deepening and Economic Growth: The Nigerian Experience (1981 – 2010). *Economic Notes by Bank Monte dei*
- Ilgun, M. (2016). Financial Deepening and Domestic Debt in Emerging Economies. A panel Cointegration Analysis. *Journal of Finance and Economic*. Vol. 6 pp 284 –296.
- Judd, C. and Kenny, D. (1981). Process Analysis: Estimating mediation in Treatment
- Jombo, W. (2021). Inclusive Growth in Sub – Saharan Africa. Do Financial Depth and Inclusion Matter? *African Economic Research Consortium*. AERC Research Paper 455.
- 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.
- 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.
- Kutivadze, M. (2011). Public Debt and Financial Deepening. *University of Milano 2011 - 2013*

- 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.
- Mun, M. & Ismail, N. (2015). Domestic Public debt and financial Deepening in Malaysia. *International Journal of social science research* 3 (2), pp 1 – 9.
- 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.
- Ogbebor, T. O. and Okungbowa, o. G. (2019). Does Financial Deepening Cause Economic Growth? Evidence from the Economic Community of West African States (ECOWAS). *Multi – Disciplinary Journal of Research and Development Perspective*, Vol. 8, No. 2, pp 1 – 21.
- 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.
- Shetla, S. and Kamaly, A. (2014). Does the Budget Deficit Crowd – Out Private Credit from the Banking Sector? The Case of Egypt. *Topics in Middle Eastern and African Economies*, 16(2), 251 – 279.
- Zambakar, C. (2019). South Sudan Entry in to East Africa Community; Prospect and Challenges. *Africa Policy Journal*, Vol 8, pp 27 – 29.