Determinants of External Indebtedness in Heavily Indebted Poor Countries: An Empirical Evidence Using Panel - Corrected Standard Error Regression

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Abstract:

At the early stage of development, most developing and emerging countries borrow from abroad to finance their resource gap and domestic investment. Nevertheless, once the debt grows more prominent and unmanageable, it becomes a major macroeconomic problem. Regarding this, the countries which are classified as Heavily Indebted Poor Countries (HIPCs) suffering a lot because of their substantial external debt stock and these has been on researchers and policymaker's agenda in identifying the causes which leading them. However, the potential empirical studies of the determinants of external indebtedness with the latest methodology have received little attention in the case of HIPCs, and these has resulted in lack of knowledge and methodology in the available literature. Therefore, this study aimed to examine the determinants of external debt accumulation in HIPCs employing the recent estimation technique (Panel - Corrected Standard Error) for the period between 1990 to 2017.

The results show that debt service, imports, and growth rate of advanced countries significantly increase external debt while exports reduce it. Further, foreign direct investment and political stability significantly reduce the external debt of HIPCs, but these variables insignificant for HIPCs in SSA. The study recommends appropriate policies which improve the volume and revenue of exports, attract foreign direct investment, offer political stability, and also, those policies that reduce imports and become essential to overcome the external debt stock of HIPCs.

Keywords: determinants; external indebtedness; panel - corrected standard error; HIPCs.

JEL Classification: C32; E62.

Introduction

The countries aim to achieve rapid and sustainable economic growth. However, the economic problem of developing countries like Africa, Asia, and Latin America can be a composite of interrelated factors of both ~~an~~ internal and external nature and these factors become a cause for the HIPCs debt crisis. The Economists argue that the accumulation of foreign debt is a common phenomenon of developing countries at the early stage of economic development. However, if external debt becomes unsustainable, it will adversely affect the macroeconomy.

Starting from early 1970 up to now, the external debt accumulation of developing countries in general and HIPCs in particular increased. Sub-Saharan African (SSA) countries total external debt stock was US$60.02 billion in 1980, had jumped to US$110.64 billion in 1988 and US$172.98 billion in 1990. Further, their total external debt stock amounted to US$218.298 billion in 1995 (IMF, 2017). Between 1980 and 1995, the debt stock increased by US$158.278 billion or on the average annual rate of 10.55. Furthermore, the average debt stock from 1995 to 2005 was US$ 215.5 billion. Besides, on average, from 2006 to 2013, the external debt of SSA was US$ 285.6 billion. The overseas debt of SSA nations was increasing from time to time and reached US$ 385.5 billion during 2013 (IMF 2017).

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Similarly, the Latin America and Caribbean developing countries external debt increased continuously since 1970. It was only US$ 22.8 billion and reached at more than seven times during 1980. Besides, the magnitude increased until 1988 and 1989 and then starting from 1990 to 1999, the external debt raised and reached US$ 543.25 billion. However, it was reduced in 2000 to 2002. Except for 2005, the external debt increased for ten years between 2003 and 2014, and during 2014 it was US$ 1.3 trillion (IMF 2017).

Since the early 1970s, determinants of external indebtedness of developing countries has been an issue for researchers, academicians, and policymakers (Maghyereh and Hashemite 2003, Berensmann 2004, Menbere 2004, Bader 2006). Commonly, the causes of foreign debt classified into domestic (Sachs 1985, Osei 1995, Uzun et al. 2012, Berensmann 2019) and external (Cline 1985, Iyoha 2000, Easterly 2002, Berensmann 2019) factors and both of them are interrelated each other.

Most developing countries borrow from abroad to finance their resource gaps and domestic investment, thereby enhancing their economic growth and development (Umaru et al. 2013, Siddique et al. 2015). According to the neoclassical economic growth model, each state should achieve a steady-state level of capital. Thus, any investment injection could lead them to have accelerated economic growth. However, once the debt grows more prominent and unmanageable, it becomes a major macroeconomic destabilising factor and a severe bottleneck to the promotion of the economy. To keep countries away from the macroeconomic instability generated by the unsustainable external debt, identifying the primary causes of external indebtedness of HIPCs needs a precise empirical analysis.

Even though there is one empirical study using panel time-series data, Chiminya and Nicolaidou (2018), about determinants of external debt in the case of African countries, it did not focus specifically on HIPCs. From the HIPCs perspective, Menbere (2004) examined the determinants of external debt in HIPCs and developing countries whiles Mensah et al. (2017) have investigated for HIPCs in Africa. This implies that empirical studies on the determinants of external debt in African and HIPCs are a few (leads knowledge and literature gap). Further, previous studies did not consider the existence of serial correlation, heteroskedasticity and cross-sectional dependence among the error terms which leads spurious result. Besides, even though Menbere (2004) examined the determinants of external debt for HIPCs, it is outdated. As a result, this study filled the literature, methodology, and time gaps of previous studies by considering both HIPCs in Africa and non-Africa countries, take into account serial correlation, heteroskedasticity and cross-sectional dependence and by employing Panel - Corrected Standard Error estimation technique. Therefore, the main objective of this study is to examine the determinants of external indebtedness of (fifteen) HIPCs in general and HIPCs in SSA (twelve) using time series data running between 1990 to 2017.

1. Literature review

This section has theoretical and empirical literature about the topic. Specifically, the theoretical framework and literature that explain the causes of external debt of a given/group country/countries are discussed, besides, empirical findings which describe the causes of external indebtedness presented.

1.1. Theoretical framework and causes of external indebtedness

This section has theoretical and empirical literature about the topic mentioned. The theoretical framework that justifies the need for external borrowing developing links the increase in gross external debt (current account deficit - direct and long-term portfolio capital inflows) + (official reserve increases + other private capital outflows) (Dornbusch 1984, McFadden et al. 1985, and Menbere 2004). The model begins by summarizing the determinants of the current account (CA) balance, where CA is the difference between items that generate foreign exchange and those that require foreign exchange expenditure.

$$CA = X - M - ILF - OTP \qquad (1)$$

where: X = exports, M = imports, ILF = interest paid on loans from foreigners and $OTP =$ other net factor payments and transfers to foreigners.

We can write equation (2):

$$CA = \Delta NIR + \Delta BF - \Delta LF - FDI \qquad (2)$$

where: $\Delta NIR = change\ in\ international\ reserves,$

$\Delta BF = change\ in\ foreign\ bonds\ held\ domestically,$

$\Delta LF = change\ in\ loans\ from\ foreigners,$

$FDI = foreign\ direct\ investment$, and

$\Delta NIR = NIR - NIR_{-1}$ denotes a net addition to stock

Let NFL = new foreign loans and PLF = payments of foreign loan principal due. Then ΔLF = NFL - PLF and then, the demand for new foreign loans (NFL) would be:

$$NFL = PLF + ILF + \Delta NIR + \Delta BF - FDI + OTP - X + M \qquad (3)$$

debt service paid is a summation of interest and principal payments on foreign loans (ILF + PLP = DSP). Debt service paid can also be written as debt service due (including past arrears outstanding) less current arrears, DSP = DSD - A. Substituting these definitions in (3) yields:

$$NFL + A = DSD + \Delta NIR + \Delta BF - FDI + OTP - X + M \qquad (4)$$

According to Menbere (2004), the assumption here is that countries prefer to protect their reputation by rolling over their external debt rather than by arrears. This gives an equation for a one-period – ahead ex-ante demand for new loans, which satisfies:

$$NL^D = DSD^e + \Delta NIR^e + \Delta BF^e - FDI^e + OTP^e - X^e + M^e \qquad (5)$$

where: NL^D stands for new loan demanded, and the superscripts *e* stands for expectations.

Equation (5) implies that the demand for overseas borrowing a function of total debt service, the change in international reserves, the change in foreign bonds placed domestically, trade balance along with net factor payments and transfers to foreigners (which partly reflects Current account balance). Using this theoretical framework, Imimole *et al.* (2014) analyzed the determinants of external debt for the case of Nigeria. Besides to Dornbusch (1984), McFadden *et al.* (1985) and Menbere (2004) – the two-gap model which is prepared by Chenery and Strout (1966) and its elongated Bacha (1990) fiscal gap model is the well-known models how external debt accumulated. Hence, this study adopted the theoretical framework of Dornbusch (1984), McFadden *et al.* (1985), Menbere (2004) and Imimole *et al.* (2014) in analyzing determinants of external indebtedness of HIPCs.

As we discussed previously, the causes for the external indebtedness fall into two categories – the domestic factors and the external factors. Regarding this, poverty (savings-investment gap) is one of the domestic factors for external indebtedness of developing countries. According to growth economists, poverty has a leading role for external indebtedness of a country. The wide gap between savings and investment because of different factors especially during a depressed economy leads to the accumulation of foreign debt (Solomon *et al.* 1977; Menbere 2004). Besides, Ayadi and Ayadi (2008) and Uzun *et al.* (2012) argued that since developing countries saving is low relative to investment and investment is essential for growth, it is rational to look for external funds.

The foreign trade performance is another factor for external borrowing of developing countries. The import structure of developing countries focused on imports of capital goods which are vital for the further expansion of the tradable sector. Moreover, export earnings of developing countries are usually insufficient to generate enough foreign exchange for financing imports; external borrowing is the essential means of gaining access to the technology that is vital for the expansion of the export sector and rapid economic growth (Menbere 2004). Also, the worse trade balance of developing countries is one of the causes of external debt accumulation (Helkie and Howard 1990, Ng'eno 2000).

Further, because of wrong macroeconomic policies, extensive and repeated fiscal deficit and the current account deficit can accumulate external debt in developing countries (Ajayi 1991). Fischer and Easterly (1990) set four ways (printing money, running down foreign exchange reserves, borrowing abroad, and borrowing domestically) of financing the budget deficit. They argue that the budget deficit in developing countries aggravate the current account deficit and leads to external indebtedness.

Moreover, political economy models explain how countries get indebted (Chiminya and Nicolaidou 2018). Strategic considerations by politicians can produce inefficiently high public deficits and lead to debt accumulation (Snider 1990). The theory of strategic debt accumulation suggests that the current policymakers can restrain future policymakers spending by increasing debt levels. For many developing nations, irresponsible political leaders make countries indebted (Alesina and Tabellini 1990, Easterly 2002). Besides, governments accumulate more debt during transitions, thereby leaving the burden to the next government.

The oil price shocks, along with policies of developed countries and their banks, are the external factors for foreign borrowing. The increase in oil prices due to the Egypt-Israel war during 1973 and 1979 was one of the factors for the 1970s international debt crises. At that time the non-oil producing developing countries knocked by

macroeconomic imbalance. The fall in primary commodities terms of trade worsted the trade balance and made things complex. Because of the rise in oil price, the revenue of oil exporters increased and which is more than their demand. Hence, they deposited these "petrodollars" in the Eurodollar markets by OPEC (Organization of the Petroleum Exporting Countries) (Menbere 2004, Ali and Mustafa 2012). Figure 1 shows the evolution of the debt build-up in developing countries in the 1980s.

Figure 1. The recycling of the petrodollar scheme
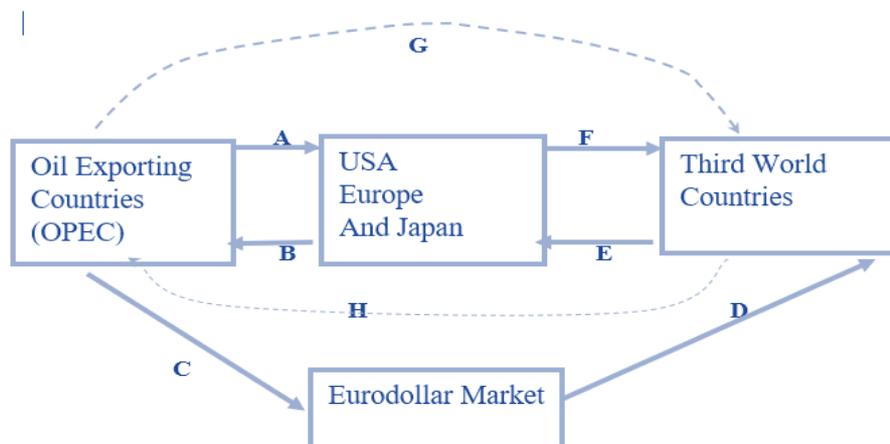
Note: A and G. Oil transfers; B, C, D, E, and H. Monetary transfers; and F. Transfer of Goods.
Source: Menbere (2004, 84)

According to Suma (2007) and Dymski (2011), the policies adopted by the developed countries and their banks are other factors for debt crisis during the 1970s and early 1980s. The rise in oil price, oil exporter countries deposited a large amount of petrodollar, which is above their economy, in the banks of developed countries. Contrary, developing countries needed funds for their economic development programs which these banks 'recycled' in the form of loans to developing countries.

1.2. Empirical literature

In this part, we presented the empirical findings (studies) related to the topic. These studies have different methodologies, time scope, case studies, and variables included in the study, along with their empirical results.

Table 1. Empirical literature

Source	Model Type Adopted	The scope and case study	The variables used (all except the first are independent variables)	Results
Ajayi (1991)	OLS (Ordinary Least Square)	From 1970 to 1988, Nigeria	External debt, TOT the growth rate of income of the industrialized country, foreign real interest rate, REER the fiscal position of the government, and linear time trend.	Deteriorating of the terms of trade, the rise in foreign real interest rates, a fall in the growth of industrial countries increase external debt. However, the reverse is true for improvement in the fiscal positions.
Mbire and Atingi (1997)	OLS	From 1970 to 1995, Uganda	External debt, TOT, debt service ratio, the growth rate of income of the industrialised country, foreign real interest rate, REER, fiscal deficit, and linear time trend	An increase in the foreign interest rate, appreciation in the real effective exchange rate, deterioration of the fiscal position, worsening of the terms of trade significantly worsens the debt to export ratio.
Menbere (2004)	Random and Fixed effects	From 1982 to 1999, For 60 developing countries	Total external debt, exports, total debt service, capital flight, TOT, imports, GDP, the growth rate of GDP, and population.	Poverty (saving gap), income instability, debt service payment and capital flight are the leading causes of external borrowing.
Greenidge *et al.* (2010)	Dynamic OLS	From 1987 to 2005, For 12 Caribbean Community	External public debt, government expenditure, current deviation of real output, the real cost of foreign	An increase in the output gap, the decline in government spending, a rise in the real effective exchange rate leads to

Source	Model Type Adopted	The scope and case study	The variables used (all except the first are independent variables)	Results
			borrowing, domestic export, and REER	a reduction in the stock of external debt, but the higher the difference between actual and expected government expenditure, and depreciation of currency leads to more accumulation of foreign debt.
Sulley (2010)	OLS	From 1975 to 2008, Tanzania	External debt to GDP, budget deficit, trade deficit, domestic saving, interest payment, and real exchange rate.	Domestic factors such as budget deficit and low domestic saving have a significant share in explaining external debt compared to external factors such as trade deficit, real exchange rate, and interest payment even though all are the causes of foreign debt.
Awan *et al.* (2011)	Johansen Cointegration	From 1972 to 2008, Pakistan	External debt in monetary term, nominal exchange rate, fiscal deficit, and TOT.	The fiscal deficit has no significant impact on external debt. However, three channels of uni-directional causality were found running from fiscal deficit to foreign debt, terms of trade to exchange rate and fiscal deficit to terms of trade.
Bittencourt (2015)	Pooled OLS, Fixed Effects, difference-GMM and system-GMM estimators	From 1970 to 2007, For nine Young Democracies of South America	External debt to GDP ratio, growth, openness, liquid liability, inflation rate, population, urbanization, government share to GDP, and income inequality.	Economic growth, Trade openness, liquid liability, and inflation reduces the debt burden. However, income inequality increases the external debt.
Awan *et al.* (2014)	ARDL	From 1976 to 2010, Pakistan	External debt in monetary term, fiscal deficit, trade openness, terms of trade, foreign aid, and the nominal exchange rate	The budget deficit, nominal exchange rate, and trade openness increase the debt burden.
Imimole *et al.* (2014)	Error correction and the Johansen cointegration test	From 1986 to 2010, Nigeria	External debt to GDP, terms of trade, the ratio of external debt services to export, openness, budget deficit as a percentage of GDP, GDP, FDI, and exchange rate.	The debt service and exchange rate significantly increase external debt, while GDP reduces it.
Al-Fawwaz (2016)	ARDL	From 1990 to 2014, Jordan	External debt, deficit, trade openness, the term of trade, exchange rate, and, domestic product per capita.	Terms of trade lead to indebted in the long run. However, GDP per capita has a negative impact.
Adamu and Rasiah (2016)	ARDL	From 1970 to 2013, Nigeria	External debt to GDP ratio, oil price, official exchange rate debt service to export ratio, gross domestic savings and the fiscal deficit to GDP ratio	Oil price, exchange rate debt service, gross domestic saving and fiscal deficit are causes for external debt accumulation.
Mensah *et al.* (2017)	Accounting and panel VAR	From 1980 to 2010, 24 African countries	External debt, investment, consumption, taxation, domestic debt, Inflation, and GDP growth rate.	In the long run, external debt growth rates respond positively to changes in government investment spending, consumption spending, and domestic borrowings while in the medium term, external debt growth rates respond negatively to a change in tax revenue,

Source	Model Type Adopted	The scope and case study	The variables used (all except the first are independent variables)	Results
				inflation, and output growth rates.
Chiminya and Nicolaidou (2018)	Pooled OLS and fixed effects	From 1975 to 2012, 36 Sub Saharan Africa countries	External debt, GDP growth rates, trade openness, real interest rate, a dummy of HIPCs initiatives, inflation, the share of government to GDP, total reserves to external debt, gross capital formation, and other political factors.	Political factors – democratic governments accumulate more debt than autocratic, while, countries which parliamentary system accumulate more debt than presidential. However, constrained executives' governments tend to accumulate less debt than unconstrained and countries with more open and competitive electoral systems are likely to accumulate less debt. Further, other factors like GDP growth rates, trade openness, a dummy of HIPCs initiatives reduce external debt while real interest rate and gross capital formation increase external debt.
Beyene and Kotosz (2019)	Johansen Co-Integration	From 1981 to 2012, Ethiopia	External debt, current account balance, budget deficit, capital flight, total debt service, Interest rate, and terms of trade.	Current account deficit, fiscal deficit, capital flight, debt service and the interest rate contributed for external indebtedness. However, appreciation of the terms of trade is significantly reduced external debt.
Bayo *et al.* (2020)	Fully Modified OLS	From 1981 to 2018, Nigeria	External debt, official exchange rate, external debt service, trade openness, Insecurity level	Insecurity level and exchange rate significantly increase external debt while debt service and trade openness reduce it.

Source: Constructed by the authors

The results of most of the studies in the determinants of external debt have some similarities, even though their time scope, case studies and methodologies are different. However, only a few works like Menbere (2004), Greenidge *et al.* (2010), and Bittencourt (2015) Mensah *et al.* (2017), Chiminya and Nicolaidou (2018) used the panel data along with different methodologies. Also, only Menbere (2004), Mensah *et al.* (2017), and Chiminya and Nicolaidou (2018) examined for the case of HIPCs and African countries. Menbere (2004) analyzed for HIPCs and developing countries using static models of fixed and random effects 15 years ago. However, Mensah *et al.* (2017) and Chiminya and Nicolaidou (2018) are the latest studies even though the first one focused only on African HIPCs while the latter focused on sub-Saharan African countries. Generally, all studies did not consider the existence of serial correlation, heteroskedasticity and cross-sectional dependence among the error terms in their estimation with static models.

2. Methodology of the study

This section contains the data type, sources, and data analysis of the study. Furthermore, it shows how the model is specified and its estimation technique.

2.1. Data type, source, and data analysis

This study uses panel time-series data. All, excepting polity 2, data were collected from the World Development Indicator (WDI) (see Table 2). Further, this study used empirical (econometrics) approach to identify the causes of indebtedness for two country groups – the HIPC[3]s and HIPCs in SSA[4] for the period between 1990 to 2017.

Table 2. Definitions, measurement and sources

Variables	Definition	Source
ED	External debt as a percentage of GDP	WDI database
DSR	Debt service as a % of Gross national income.	WDI database
IMP	Import of goods and services % of GDP	WDI database
EXP	Export of goods and services % of GDP	WDI database
FDI	Foreign direct investment as a % GDP	WDI database
POP	Population growth rate (%)	WDI database
GDPGR	GDP growth rate (annual %)	WDI database
INF	Inflation, GDP deflator (annual %)	WDI database
POLITY2	Political Stability is measured as the country's elections competitiveness and openness, the nature of political involvement in general, and the degree of checks on administrative authority. The estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, ranging from -10 to +10.	Polity 2 data series from the Polity IV database
GRMAC	Growth rate of major advanced countries (%)	WDI database

Source: Constructed by the authors

2.1. Model specification and estimation technique

Like other empirical studies, the analytical framework for this study includes both domestic and external causes of the foreign debt variables. Therefore, based on the theoretical framework described so far, the study uses the following model:

$$ED_{it} = \alpha + \beta X_{it} + \varepsilon_t \tag{6}$$

where: ED is external debt stock to GDP ratio at period *t*; X_{it} is a vector of explanatory variables included in the model at period *t*; ε_t is the error terms at period *t*.

Besides, variables in the vector X identified based on theoretical and empirical evidence in the literature. It captures both internal and external factors which cause indebtedness directly or indirectly. Hence, *X* can be specified as:

$$X_{it} = f(DSR, IMP, EXP, FDI, POP, GDPGR, INF, POLITY2, GRMAC) \tag{7}$$

Finally, the model we used is:

$$ED_{it} = \beta_0 + \beta_1 DSR_{it} + \beta_2 IMP_{it} + \beta_3 EXP_{it} + \beta_4 FDI_{it} + \beta_5 POP_{it} + \beta_6 GDPGR_{it} + \beta_7 INF_{it} + \beta_8 POLITY2_{it} + \beta_9 GRMAC_{it} + \varepsilon_{it} \tag{8}$$

where: β_0 is an intercept term, and (+) β_1, (+) β_2, (-) β_3, (-) β_4, (+) β_5, (-) β_6, (-/+) β_7, (-) β_8 and (-/+) β_9 are the estimated long-run coefficients. The signs in the parenthesis are the expected hypothesized signs of the variables.

2.2. Estimation techniques and procedures

Due to the existence of cross-sectional dependence in the errors in our model (see Table 6), this study estimated the two empirical models (for HIPCs and HIPCs in SSA) using the Panel - Corrected Standard Error (PCSE) regression. According to Pesaran (2006), occurrences such as recessions, economic or financial crises potentially affect all countries, even though it might start from one or two countries. These occurrences inevitably introduce some cross-sectional interdependencies across the cross-sectional unit, their regressors and the error terms. Unfortunately, the traditional panel data estimation methods such as the Fixed Effects, Random Effects, Mean Group estimations, Pooled Mean Group, and GMM estimators mistakenly ignored these possible inter-

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[3] Benin, Burundi, Cameroon, Central African Republic, Mauritania, Mozambique, Niger, Rwanda, Senegal, Sierra Leone, Tanzania, Togo, Honduras, Bolivia, Nicaragua.

[4] Benin, Burundi, Cameroon, Central African Republic, Mauritania, Mozambique, Niger, Rwanda, Senegal, Sierra Leone, Tanzania, Togo.

dependences among the cross-sectional unit and their regressors. Hence, erroneously neglecting the cross-sectional dependence among regressors and across countries when it is present in the data, can lead to misleading inferences to (Pesaran 2007).

To avoid this trap of biased estimates and ensure the validity of the results, this study adopts the two-stage modified Ordinary Least Squares (OLS) estimator commonly known as the PCSE estimator. This estimation technique, according to Hoechle (2007), is more robust in correcting the cross-sectional dependence, serial correlation and heteroskedasticity in the datasets when the number of the cross-sectional units is smaller to the time series. In the estimation, the PCSE estimator implicitly assumes that the error terms are autocorrelated within the panel and heteroskedastic across the panel with the autocorrelation parameter assuming to be fixed across panels or vary for each panel (Ampah and Kiss 2019).

The first stage involves testing the time-series properties of the data with respect to cross-sectional dependence among the cross-sectional units. This is done using the Pesaran (2004) CD test (see Table 6). Once cross-sectional dependence is detected, this study used the cross-sectional augmented Pesaran *et al.* (2007) unit root test called CIPS to address the stationarity properties of the data. The choice of the CIPS test is based on the fact that the first generational panel unit test like the Levin *et al.* (2002), the Pesaran *et al.* (1999), Maddala and Wu (1999), and Im *et al.* (2003) and the Fisher-Type Chi-square panel unit root tests erroneously overlooked the issue of cross-sectional dependence.

3. Results and discussions

Econometric results, interpretations along with the theoretical and empirical support of the study are offered in this section. More specifically, the descriptive statistics, the cross-sectional dependence test, unit root test, and the estimated determinants of external indebtedness are presented.

3.1. Descriptive statistics of the variables

The descriptive statistics of the variables in the models found in the Table 3 and describes as – the mean values indicate the average value of the variables. The standard deviation expresses the distribution of the data from the mean value. Further, the table presents the minimum and maximum values of the variables and also we can derive the range (the difference between the maximum and the minimum value) of the variables, which shows the spread of data and it is an indicator of the level of variation in the variables used for the study. Due to the different number of countries in the models, the number of observations (420 or 336) also varies. For both models, the range of the dependent variables is between 10.2 to 279 implies that the variation is not high since the variable is external debt. Similarly, the debt service variable has a mean of 3.44 and 2.74 for HIPCs and HIPCS in SSA, respectively, and the range between 0.06 to 47 for HIPCs and 0.06 to 20 for HIPCs in SSA (see Table 3 for other variables).

Table 3. Descriptive statistics of the variables

Variables	Obs	Mean	Std. Dev.	Min	Max
ED	420(336)	57.88(55.63)	41.46(37.77)	10.23(10.23)	278.97(278.97)
DSR	420(336)	3.44(2.74)	3.42(2.42)	0.061(0.06)	47.1(19.9)
IMP	420(336)	37.34(34.71)	15.46(14.06)	12.53(12.53)	84.76(84.76)
EXP	420(336)	24.15(21.34)	12.24(10.18)	4.68(4.68)	59(56.13)
FDI	420(336)	3.46(3.25)	5.5(5.97)	-2.49(-2.13)	41.8(41.8)
POP	420(336)	2.48(2.61)	1.17(1.25)	-6.76(-6.76)	8.11(8.11)
GDPGR	420(336)	3.79(3.78)	5.79(6.39)	-50.24(-50.24)	35.22(35.22)
INF	420(336)	31.9(9.10)	328.87(14.42)	-9.15(-9.15)	5016.1(128.76)
POLITY2	420(336)	1.87(0.46)	5.23(4.89)	-8(-8)	9(9)
GRMAC	420(336)	1.7(1.70)	1.40(1.40)	-4.2(-4.2)	3.75(3.75)

Note: the values in the bracket are for HIPCs in SSA; however, the other values are for HIPCs
Source: Computed by the authors using Stata15.

3.2. Serial correlation, Heteroskedasticity and Cross-Sectional Dependence, Unit root, and Cointegration Tests

Panel-data models are probably to include cross-sectional dependence in the errors, which may arise from frequent shocks, unobserved components, spatial dependence and idiosyncratic pairwise dependence. Neglecting cross-section dependence can lead to biased estimates and spurious inference. Hence, in this study, we conducted a cross-sectional dependence test using Pesaran (2004) (see Table 4). The result confirms that there is a cross-sectional dependence in both models of HIPCs and HIPCs in SSA. However, there is no cross-sectional

dependence for the case of HIPCs in non-SSA (see Table 4). As a result, this study only focuses on HIPCs and HIPCs in SSA countries.

Table 4. Serial correlation, heteroskedasticity and cross-sectional dependence

Serial correlation and heteroscedasticity tests						
Tests	HIPCs		HIPCs in SSA		HIPCs in non-SSA	
	F statistics (chi2)	Prob	F statistics (chi2)	Prob	F statistics (chi2)	Prob
Serial correlation: Wooldridge test for autocorrelation	210.179	0.000***	626.352	0.000***	116.909	0.000***
Heteroskedasticity: Modified Wald test for GroupWise Heteroskedasticity	1559.62	0.000***	429.01	0.000***	1451.6	0.000***
Cross-Sectional Dependence test						
Tests	HIPCs		HIPCs in SSA		HIPCs in non-SSA	
Pesaran's test of cross-sectional independence	10.028		7.999		-1.282	
The average absolute value of the off-diagonal elements	0.313		0.286		0.157	
Probability	0.0000*		0.0000*		0.2000	

Note: * ⇒ presence of cross-sectional dependence; *** ⇒ presence of serial correlation and heteroscedasticity
Source: Computed by the authors using Stata 15

Following the cross-sectional dependency test, we checked the stationarity of the variables in the model. Depending on the result of cross-sectional dependence test, the panel unit root test can be classified as first-generation and second-generation panel unit root test. The first-generation panel unit root tests (Im *et al.* 2003, Maddala and Wu 1999, Choi 2001) works when there is no cross-sectional dependence while the second-generation test (Pesaran 2007 – CIPS) can be used to test the panel unit root when there is cross-sectional dependence. Using the first-generation panel unit root test in case of cross-sectional dependence in errors resulting in the null hypothesis of nonstationary being quickly rejected (Pesaran 2007, Eberhardt and Presbitero 2015). Therefore, due to the existence of cross-sectional dependence in our models, this study uses the 'CIPS' test of Pesaran (2007) (see Table 5). Since all the variables are highly statistically significant at first difference, we notice that all measures are integrated of order one I (1). Thus, we might expect there is a long-run connection between these variables together, see Table 5).

Table 5. Pesaran (2007) Unit Root Test

Variables	CIPS (intercepts only)				Critical values		
	HIPCs		HIPCs in SSA				
	Levels Statistic	1st diff. Statistic	Levels Statistic	1st diff. Statistic	10 %	5 %	1 %
ED	-2.086	- 4.691***	-2.458***	-4.781***			
DSR	-2.678***	-5.731***	-2.935***	-5.207***			
IMP	-2.528***	-4.843***	-2.539***	-4.877***			
EXP	-1.665	-4.618***	-1.635	-4.735***			
FDI	-3.293***	-5.544***	-3.433***	-5.662***	-2.14	-2.25	-2.45
POP	-1.910	-3.533***	-3.239***	-3.705***			
GDPGR	-4.584***	-3.533***	-4.681***	-6.175***			
INF	-3.968 ***	-5.897***	-4.548***	-6.190***			
POLITY2	-2.661***	-2.663***	-3.012***	-5.503***			
GRMAC	2.610***	2.610***	2.610***	2.610***			

Note: ***⇒ significant (stationary) at 1% level.
Source: Computed by the authors using Stata 15

The most common cointegration tests when there is cross-sectional dependence are Westerlund (2007), Westerlund and Edgerton (2007), and McCoskey and Kao (1998). Both the Westerlund (2007) error-correction panel cointegration test and Westerlund and Edgerton (2007) test could be used both in existence and non-existence of cross-sectional dependence. These tests allow autocorrelation to differ from cross-section to another cross-section. In these tests, the bootstrap method is used in the existence of cross-sectional independence, while McCoskey and Kao (1998) are used in the non-existence of it. However, the Westerlund (2007) and Westerlund

and Edgerton (2007) cointegration tests are not working if the number of variables is more than six. Therefore, since the variables in our model are many, this study used the McCoskey and Kao (1998) cointegration test. Table 8 shows that there is a long-run relationship among the variables in both models of HIPCs and HIPCs in SSA at 5% level of significance.

Table 6. Panel cointegration test, McCoskey and Kao (1998)

	HIPC		HIPCs in SSA	
	Statistic	p-value	Statistic	p-value
Modified Dickey-Fuller t	-2.1792	0.0147**	-3.9264	0.0000***
Dickey-Fuller t	-1.8534	0.0319**	-2.8336	0.0023***
Augmented Dickey-Fuller t	-3.6145	0.0002***	-2.2659	0.0117**
Unadjusted modified Dickey-Fuller t	-3.0198	0.0013***	-4.3243	0.0000***
Unadjusted Dickey-Fuller t	-2.2408	0.0125**	-2.9673	0.0015***

Note: **, *** ⇒significant at 5% and 1% level, respectively.
Source: Computed by the authors using Stata 15

3.3. Panel - Corrected Standard Error Estimation results

Due to the existence of cross-sectional dependence, this study estimated only for HIPCs and HIPCS in SSA countries (see Table 9). The result shows that debt services, imports and growth of major advanced countries significantly increase the external debt accumulation of HIPCs and HIPCs in SSA. A one percentage point increase in debt servicing leads to the rise of external debt of HIPCs and HIPCs in SSA by 5% and 6%, respectively. This is because the debt service payment incites further demand for external borrowing, especially when the debt service is announced suddenly. This result is similar to Menbere (2004), Adamu and Rasiah (2016), Beyene and Kotosz (2019). Our study is different from Menbere (2004) it is latest in time and methodology. For example, the current HIPCs are not similar to 15 years ago. Further, the methodologies (fixed and random effects) of Menbere (2004) cannot consider the dynamic nature of the variables with unobserved heterogeneity (for more details, see Hill et al. 2019). However, our study considered the dynamic nature of the variable. Unlike Menbere (2004), our study also considered the existence of serial correlation, heteroskedasticity and cross-sectional dependence among the error terms. Similarly, this study is different from Adamu and Rasiah (2016), Beyene and Kotosz (2019) in which it examined for a group of countries rather than one country case. Also, the result of this study coincides with the sign of our hypothesis and the theoretical framework.

Equally, the one percentage point rises in imports increases the indebtedness of HIPCs and HIPCs in SSA by 1.6% and 1.4%, respectively. When imports of goods and services increases, HIPCs lack foreign exchange and reserves to undertake different development. As a result, the countries forced to borrow from foreign even at worth terms and condition of the loan. This result also coincides with Menbere (2004). Also, a percentage point increase in the growth rate of major advanced countries increases the external debt stock of HIPCs and HIPCs in SSA countries by 3.3% and 2.5%, respectively. This condition, for instance, happened during 2007/8 global financial crisis– when most developed counties knocked by financial crises, their economy reduced and hence the external debt of HIPCs also declined – implies when the economy of major advanced countries increases, they can borrow money to demanders, and the external debt accumulation of HIPCs rises. Previous studies like Ajayi (1991) and Mbire and Atingi (1997) also included the growth rate of industrialized countries as independent variable even though its contribution is negative and insignificant which makes our result different from the previous findings. Further, this study is the latest and included many countries relative to Ajayi (1991) and Mbire and Atingi (1997).

However, a one percentage point increase in exports of good and service reduces the indebtedness of HIPCs and HIPCs in SSA by 2% and 1.5%, respectively. When exports of HIPCs increases, they will have enough foreign exchange to fill the existing resource gap and hence their demand for external debt will reduce. Furthermore, this result is in line with our hypothesis, the sign of the theoretical framework and with the work of Greenidge *et al*. (2010) in the case of 12 Caribbean community. Further, the foreign direct investment and political stability significantly reduce the external debt of HIPCs but not HIPCs in SSA. A one percentage point rise in foreign direct investment and political stability reduces the external debt of HIPCs by 1% and 0.6%, respectively. The foreign direct investment can reduce the resource gap, especially the saving-investment gap of countries and hence their demand for overseas borrowing will reduce. Likewise, when countries have political stability, their overall economy will increase and then their resource gap decline, and finally, the external debt accumulation of countries will be reduced. Also, when countries have a stable political environment, the lenders expect (a guarantee) that borrowers can repay their liability quickly and also due to stable political environment, the foreign direct investment will increase and hence all these can reduce the external debt accumulation. However, surprisingly, both foreign direct

investment and political stability are insignificant in reducing the external debt accumulation of HIPCs of SSA. This implies that the inflow of (the incumbent) foreign direct investment is not enough to reduce the external debt. Besides, due to the existence of frequent political instability in SSA, the countries use the resources for unproductive purpose and hence the external indebtedness of the countries could not be reduced. However, a one percentage point increment of inflation increases the external debt of HIPCs in SSA by 0.7 percentage point.

Table 7. Estimated determinants of external indebtedness in HIPS and HIPCs in SSA

Variables	HIPC		HIPCs in SSA	
	Coefficient	Std. Err	Coefficient	Std. Err
DSR	4.933***	0.832	6.089***	0.972
IMP	1.663***	0.216	1.481***	0.215
EXP	-2.027***	0.240	-1.561***	0.203
FDI	-1.044*	0.585	-0.855	0.539
POP	-0.303	1.330	1.878	1.212
GDPGR	0.100	0.299	0.071	0.264
INF	0.013	0.010	0.727***	0.140
POLITY2	-0.635*	0.269	-0.418	0.312
GRMAC	3.309**	1.526	2.546*	2.547
CONSTANT	26.857	5.74	7.644	6.764

Note: *, **, *** ⇒significant at 10 %, 5% and 1% level, respectively
Source: Computed by the authors using Stata 15

Conclusions

Borrowing from abroad is a common characteristic of the developing and emerging countries at the early stage of development. However, unmanageable and unsustainable external debt accumulation can adversely affect the macroeconomic variables and can be a bottleneck for the economy. Therefore, the central focus of this study was to examine the determinants of external indebtedness in the case of HIPCs using two models – HIPCs and HIPCs in SSA using panel time-series data ranging between 1990 to 2017.

This study partially filled the literature, methodological, and time gaps of previous studies by considering both HIPCs in Africa and non-Africa countries, take into account serial correlation, heteroskedasticity and cross-sectional dependence and by employing Panel - Corrected Standard Error estimation technique. For both models, the debt service, imports, and growth rate of major advanced countries increase significantly the external debt. However, exports reduce external debt. Further, the foreign direct investments and the political stability significantly reduce the external debt of HIPCs, but these variables are insignificant in reducing the external debt for HIPCs in SSA.

Hence, this study recommends increasing the export volume and revenue through export diversification, simplify regulation related to exports, providing the short and long-term credits to the exporters. Similarly, attracting foreign direct investment by reducing the restrictions on foreign direct investment, providing open, transparent and dependable conditions for all kind of firms which assure basic and quality infrastructures, reforming domestic financial markets, and also political stability of countries, increasing FDI. Finally, reducing luxury imports by increasing tax on them and the import substitutions are essential to reduce the external debt stock of HIPCs.

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References

[1] Adamu, I.M. and Rasiah, R. 2016. On the determinants of external debt in Nigeria. *African Development Review,* 28(3): 291–303. DOI: https://doi.org/10.1111/1467-8268.12206

[2] Ajayi, S.I. 1991. *Macroeconomic approach to external debt: A case of Nigeria.* African Economic Research Consortium Research Paper No. 8, Nairobi: English press Limited.

[3] Alesina, A., and Tabellini, G. 1990. A positive theory of fiscal deficits and government debt. *The Review of Economic Studies*, 57(3): 403–414. DOI: https://doi.org/10.2307/2298021

[4] Al-Fawwaz, T.M. 2016. Determinants of external debt: A case of Jordan. *International Business Research*, 9(7): 116–123. DOI: http://dx.doi.org/10.5539/ibr.v9n7p116

[5] Ali, R., and Mustafa, U. 2012. External debt accumulation and its impact on economic growth in Pakistan. *The Pakistan Development Review*, 51(4): 79–95. Available at: https://www.jstor.org/stable/23734739

[6] Ampah, I.K., and Kiss, G.D. 2019. Economic policy implications of external debt and capital flight in sub-Saharan Africa's heavily indebted poor countries. *Society and Economy*, 41(4): 523–542. DOI: https://doi.org/10.1556/204.2019.41.4.8

[7] Awan, A., Asghar, N., and Rehman, H. 2011. The impact of exchange rate, fiscal deficit, and terms of trade. A case of Pakistan, *Austrian Journal of Business and Management Research*, 1(3): 10–24. Available at: http://www.ajbmr.com/articlepdf/ajbmrv01n0302.pdf

[8] Awan, R.U., Anjum, A., and Rehim, S. 2014. An econometric analysis of determinants of external debt. A case of Pakistan. *British Journal of Economics, Management & Trade*, 5(4): 382–391. DOI: https://doi.org/10.9734/BJEMT/2015/8837

[9] Ayadi, F., and Ayadi, O.F. 2008. The impact of external debt on economic growth: A comparative study of Nigeria and South Africa. *Journal of Sustainable Development in Africa*, 10(3): 234 – 264.

[10] Bacha, E.L. 1990. A Three-Gap model of foreign transfers and the GDP growth rate in developing countries. *Journal of Development Economics,* 32(2): 279–296. DOI: https://doi.org/10.1016/0304-3878(90)90039-E

[11] Bader, M. 2006. *The effect of the twin deficits on foreign debt: A case of Jordan*. Hashemite University, Jordan. Available at: https://eis.hu.edu.jo/Deanshipfiles/pub100592324.pdf

[12] Bayo, F., Kolawole, B.G., Falade, A.O.O, Ayeomoni, I.O. 2020. Determinants of external debt in Nigeria: Insecurity as the prevalent issue. *International Journal of Management Studies and Social Science Research*, 2(2): 1–8.

[13] Berensmann, K. 2004. New ways of achieving debt sustainability beyond the enhanced HIPC initiative. *Intereconomics*, 39(6): 321–330. DOI: https://doi.org/10.1007/BF03031718

[14] Berensmann, K. 2019. *Why developing countries are facing a renewed debt crisis*. German Development Institute, The Current Column. Available at: https://www.die-gdi.de/en/the-current-column/article/why-developing-countries are-facing-a-renewed-debt-crisis-1/

[15] Beyene, S.D., and Kotosz, B. 2019. *The determinants of external indebtedness of Ethiopia*, Udvari B. and Voszka É. (eds), Proceedings of the 3rd Central European PhD Workshop on Economic Policy and Crisis Management, University of Szeged, Doctoral School in Economics, Szeged, 90 –107 pp.

[16] Bittencourt, M. 2015. Determinants of government and external debt. Evidence from the young democracies of South America. *Emerging Markets Finance and Trade*, 51(3): 463–472. DOI: https://doi.org/10.1080/1540496X.2015.1025667

[17] Chenery, H.B., and Strout, A. 1996. Foreign assistance and economic development. *American Economic Review*, 56: 679–733.

[18] Chiminya, A., Dunne, J.P., and Nikolaidou, E. 2018. *The determinants of external debt in sub Saharan Africa*. School of Economics Macroeconomic Discussion Paper Series 2018-02, School of Economics, University of Cape Town.

[19] Choi, I. 2001. Unit root tests for panel data. *Journal of International Money and Finance*, 20(2): 249–272. DOI: https://doi.org/10.1016/S0261-5606(00)00048-6

[20] Cline, W.R. 1985. International debt: Analysis, experience and prospects, *Journal of Development Planning:* 16.

[21] Dornbusch, R. 1984. External debt, budget deficits, and disequilibrium exchange rates, NBER Working Paper Series No. 1336, DOI: https://doi.org/10.3386/w1336

[22] Dymski, G.A. 2011. *The international debt crisis*. Chapters, in: Jonathan Michie (ed.), The Handbook of Globalisation, Second Edition, Chapter 6, Edward Elgar Publishing. ISBN: 978-1849803762, 584 pp.

[23] Easterly, W. 2002. How did heavily indebted poor countries become heavily indebted? Reviewing two decades of debt relief. *World Development*, 30(10): 1677–1696. DOI: https://doi.org/10.1016/S0305-750X(02)00073-6

[24] Eberhardt, M., Presbitero, A.F. 2015. Public debt and growth: Heterogeneity and non-linearity. *Journal of International Economics*, 97(1): 45–58. DOI: https://doi.org/10.1016/j.jinteco.2015.04.005

[25] Fischer, S., and Easterly, W. 1990. The economics of the government budget constraint. *The World Bank Research Observer*, 5(2): 127–142. DOI: https://doi.org/10.1093/wbro/5.2.127

[26] Greenidge, K., Drakes, L., and Cragwell, R. 2010. The external public debt. A case of the Caribbean community. *Journal of Policy Modelling*, 32(3): 418–431. DOI: https://doi.org/10.1016/j.jpolmod.2010.02.004

[27] Helkie, W.L., and Howard, D.H. 1990. External adjustment in selected developing countries. *Journal of Policy Modelling*, 16(4): 353–393. DOI: https://doi.org/10.1016/0161-8938(94)90034-5

[28] Hill, T.D., Davis, A.P., Roos, J.M., and French, M.T. 2019. Limitations of fixed-effects models for panel data. *Sociological Perspectives*: 1–13. DOI: https://doi.org/10.1177/0731121419863785

[29] Hoechle, D. 2007. Robust standard errors for panel regressions with cross-sectional dependence. *Stata Journal*, 7(3): 1–31. DOI: https://doi.org/10.1177/1536867X0700700301

[30] Im, K.S., Pesaran, M.H., and Shin, Y. 2003. Testing for unit roots in heterogeneous panels. *Journal of Econometrics,* 115(1): 53–74. DOI: https://doi.org/10.1016/S0304-4076(03)00092-7

[31] Imimole, B., Imoughele, L.E., and Okhuese, M.A. 2014. Determinants and sustainability of external debt in a deregulated economy: A cointegration analysis from Nigeria (1986-2010). *American International Journal of Contemporary Research,* 4(6): 201–214.

[32] Iyoha, M. 2000. *External debt and capital flights in Sub-Saharan Africa*. S.I. Ajayi, and M. Khan (ed). Washington, DC: IMF. ISBN: 9781557757913, 336 p.

[33] Levin, A., Lin, C.F., and Chu, C.S.J. 2002. Unit root tests in panel data: asymptotic and finite-sample properties. *Journal of Econometrics*, 108(1): 1–24. DOI: https://doi.org/10.1016/S0304-4076(01)00098-7

[34] Maddala, G.S., and Wu, S. 1999. A comparative study of unit root tests with panel data and a new simple test. *Oxford Bulletin of Economics and Statistics*, 61(1): 631–652. DOI: https://doi.org/10.1111/1468-0084.0610s1631

[35] Maghyereh, A., and Hashemite, U. 2003. External debt and economic growth in Jordan: The threshold effect, *Economia Internazionale/International Economics*, 56(3): 337–355.

[36] Mbire, B., and Atingi, M. 1997. *Growth and foreign debt. The Ugandan experience*, AERC Research Paper No. 66, Nairobi: African Economic Research Consortium.

[37] McCoskey, S., and Kao, C. 1998. A residual-based test of the null of cointegration in panel data. E*conometric Reviews*, 17(1): 57–84. DOI: https://doi.org/10.1080/07474939808800403

[38] Mcfadden, D., Eckaus, R., Feder, G., Hajivassiliou, V., and O'Connell, S. 1985. *Is there life after debt? An econometric analysis of the creditworthiness of developing countries*, in Smith, G.W., Cuddington, J.T., International Debt and the Developing Countries. Washington, A World Bank Symposium, 179–209 pp.

[39] Menbere, W.T. 2004. An empirical investigation into the determinants of external indebtedness: A case study of 60 developing countries. *Prague Economic Papers*, 3: 261–277.

[40] Mensah, D., Aboagye, A.Q.Q., Abor, J.Y., Kyereboah-Coleman, A. 2017. External debt among HIPCs in Africa: Accounting and panel VAR analysis of some determinant. *Journal of Economic Studies*, 44(3): 431 – 455. DOI: https://doi.org/10.1108/JES-05-2015-0080

[41] Ng'eno, N.K. 2000. *External debt and capital flight in Sub-Saharan Africa*, in Ajayi, S.I. and Khan, M.S (ed), The external debt problem of Kenya, Washington, D.C: IMF. Available at: https://www.imf.org/external/pubs/nft/2000/extdebt/

[42] Osei, B. 1995. *Ghana: The burden of debt service payment under structural adjustment*. AERC Research Paper No. 33. Nairobi: African Economic Research Consortium.

[43] Pesaran, M.H. 2004. *General diagnostic tests for cross-section dependence in panels*. IZA Discussion Paper No. 1240, University of Cambridge, UK.

[44] Pesaran, M.H. 2006. Estimation and inference in large heterogeneous panels with a multifactor error structure. *Econometrica*, 74(4): 967–1012. DOI: https://doi.org/10.1111/j.1468-0262.2006.00692.x

[45] Pesaran, M.H. 2007. A simple panel unit root test in the presence of cross-section dependence. *Journal of Applied Econometrics*, 22(2): 265–312. DOI: https://doi.org/10.1002/jae.951

[46] Pesaran, M.H., Shin, Y., and Smith, R.P. 1999. Pooled mean group estimation of dynamic heterogeneous panels. *Journal of the American Statistical Association*, 94(446): 621–634. DOI: https://doi.org/10.1080/01621459.1999.10474156

[47] Sachs, J. 1989. *The debt overhang of developing countries*: In G. Calvo, R. Findlay, P. Kouri, and J. Macedo (Ed.), Debt, stabilization and development: Essays in memory of Carlos Diaz Alejandro. Oxford: Basil Blackwell, ISBN: 978-0631156857, 462 pp.

[48] Siddique, A., Selvanathan, E. A., and Selvanathan, S. 2015. *The impact of external debt on economic growth: Empirical evidence from highly indebted poor countries.* Discussion Paper: 15(10), The University of Western Australia. Available at: https://pdfs.semanticscholar.org/dc5f/2e689df188a57ee1f16583ec2f8692e3bf47.pdf

[49] Snider, L.W.1990. The political performance of governments, external debt service, and domestic political violence. *International Political Science Review*, 11(4): 403–422. DOI: https://doi.org/10.1177/019251219001100401

[50] Solomon, R., Greenspan, A., Kareken, J.H., and Ohlin, G. 1977. A perspective on the debt of developing countries. *Brookings Papers on Economic Activity*, 1977(2): 479–510. DOI: https://doi.org/10.2307/2534408

[51] Sulley, P.E. 2010. *Macroeconomic determinants of accumulation of public external debt: The case of Tanzania*. Economics of Development (ECD). Available at: http://hdl.handle.net/2105/8647

[52] Suma, D.F. 2007. *The external debt crisis and its impact on economic growth and investment in Sub-Saharan Africa.* A regional econometric approach of ECOWAS countries, PhD diss, WU Vienna University of Economics and Business. Available at: https://epub.wu.ac.at/1944/

[53] Umaru, A., Hamidu, A., and Musa, S. 2013. External debt and domestic debt impact on the growth of the Nigerian economy. *International Journal of Educational Research*, 1(2): 70–85. Available at: https://mpra.ub.uni-muenchen.de/75122/

[54] Uzun, A., Karakoy, C., Kabadayi, B., and Emsen, O.S. 2012. The impacts of external debt on economic growth in transition economies. *Chinese Business Review*, 11(5): 491–499. Available at: https://pdfs.semantic scholar.org/6831/4136a879acff96ff0d8a4930251437b06789.pdf

[55] Westerlund, J. 2007. Testing for error correction in panel data. *Oxford Bulletin of Economics and Statistics*, 69(6): 709-748. DOI: https://doi.org/10.1111/j.1468-0084.2007.00477.x

[56] Westerlund, J., and Edgerton, D.L. 2007. A panel bootstrap cointegration test. *Economics Letters*, 97(3): 185–190. DOI: https://doi.org/10.1016/j.econlet.2007.03.003

*** IMF World Economic Outlook (WEO). 2017. Database, uploaded by Knoema.