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Towards Achieving the Sustainable Development Goals (SDGs): The Impact of Debts on Income Inequality in Africa

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Abstract

The Agenda for Sustainable Development provides a framework for the creation of a better and sustainable future for all. The Sustainable Development Goals (SDGs) focus on addressing global challenges, including income inequality. Among others, the SDGs also commit countries to work towards reducing income inequality and as such, lowering income inequality is one of the key issues in Africa. However, given the high levels of debt on the continent, reducing income inequality could be a challenge. Majority of the literature examines the link between debts and economic growth with little attention paid to the impact of debts on income inequality. Moreover, not much is known on whether the relationship between debt and income inequality is non–linear. This study therefore contributes to the existing research efforts by investigating the threshold effects of debts using data from 24 African countries by relying on the sample splitting and threshold estimation approach. The results reveal that, while debts generally dampen income inequality, unbridled debt accumulation above the estimated thresholds does not decrease income inequality, indicating that the income inequality–reducing impact holds at lower levels of debt–to–GDP ratio. This evidence is insensitive to different indicators of income inequality and debts. Findings from this study show how increasing indebtedness contributes to widening income inequality in Africa.

Keywords: Debts, inequality, threshold, Africa

1. Introduction

The Sustainable Development (SDGs) agenda, which was approved by global leaders on 25th September 2015 all aimed at addressing issues around social and economic deprivation including income inequalities. Prior to the outbreak of the coronavirus (COVID–19), most developing economies including African countries had made progress towards a path of achieving some of the goals of the 2030 Agenda on Development. However, the adverse impact of the COVID–19 in African has resulted in the erosion of most of the gains. The pandemic has caused a major and unprecedented impact on African economies with serious consequences on development (UNECA, 2020) leading to the implementation of various measures to contain the spread (see Ibrahim and Mukungu, 2021).

Fiscal space of the continent, which was shrinking prior to the pandemic, has worsened due to measures taken to mitigate against the virus. Prior to the outbreak of the virus, 10 countries in Africa had their debt–to–GDP ratios above the International Monetary Fund (IMF) threshold of 60%. Atta–Mensah and Ibrahim (2020) examine the trajectory of debt levels in Africa and find that, Africa's debt–to–GDP is increasingly approaching unsustainable levels, which threatens decades of progress made. Unfortunately, the debt position has worsened because African countries have had to borrow more to address the health challenges caused by the virus, putting pressures on their fiscal balance sheets. The slowdown in economic activities will also come with difficulties in servicing debts, which is estimated to stand at US$42.9 billion in 2021, causing a further rise in deficits. Africa's economic growth will contract by 3.8% in 2020 because of the pandemic (UNECA, 2020). Recent estimates by the African Development Bank (AfDB) show that additional 39 million Africans could dip into extreme poverty in 2020 and 2021 (AfDB, 2021). The increased poverty levels will also exacerbate existing income inequalities. With constrained fiscal space, several African countries have resorted to borrowing as additional development finance to support infrastructure spending.

The current levels of debt require that African countries examine their implications and the impact on socioeconomic

indicators of deprivation. The literature has a plethora of studies on how debt relates to poverty. For instance, Cheng et al., (2018) find that better restructuring conditions of the nominal debt relief improve countries' level of per capita GDP growth, lowers poverty and narrows income inequality.

While earlier studies (see Krueger, 1987) have found that debt positively influences countries' level of economic development because they are used to finance critical investments, other strand of the literature (see for instance Chowdhury, 2001; Lin and Sosin, 2001; Mahdavi, 2004; Fosu, 2007) notes that, debts inhibit economic growth because of the decline in physical capital accumulation as well as a fall in total factor productivity (Pattillo et al., 2004). Putting these conflicting evidences together leads to the emergence of the 'Debt Laffer Curve' which suggests that, debt increases economic growth only up to a point beyond which increases in debt stock dampens growth. The implication is that, the link between debts and economic growth is nonlinear with the precise effect conditioned on the level of debts. A number of studies support this evidence even though the exact inflection point is highly contentious (see Siddiqui and Malik, 2001). Mahdavi (2004) and Fosu (2007) independently observe that debt burden adversely affects economic growth, because countries reallocate public expenditures away from social spending to servicing their external debt. Furthermore, other studies (Pattillo et al., 2004; Chowdhury, 2001; Clements et al., 2003; Karagol, 2002) also find that debt accumulation and the associated debt servicing obligations dampens economic growth through reductions public investments.

By using data from some selected South Asian countries, Akram's (2016) linear regression results show that external debts do not have a significant effect on income inequality suggesting a neutral distribution effect of debts. More recently, Chatzouz (2020) examine the implications of public debt for wealth inequality using a stylized Diamond model. The author finds that while public debt distributes wealth more unequally, its impact is sever on wealth inequality. On the channels of manifestation, Chatzouz (2020) argues that the crowd–out of physical capital by public debt is the most important conduit through which public debt influences wealth inequality.

Indeed, the foregoing studies have largely examined how debts directly influence economic growth of countries. The argument is that, lower debt levels directly increase growth while decreasing income inequality indirectly given the income redistribution that follows the growth process. Sustained overall economic growth spurs demand for labor and hence wages leading to reduction in poverty. However, the extent of poverty reduction stemming from economic growth is conditioned on how the distribution of income changes with growth and on initial income inequalities (Tabassum and Majeed, 2008). Evidence abound that many developing economies such as those in South and East Asia achieved relatively higher economic growth with income inequality and poverty increasing at the same time suggesting that, increases in countries' economic growth does not necessarily lead to reduction in income inequality. Using aggregate and regional level data gleaned from 69 developing countries, Tabassum and Majeed (2008) observe that, inherent credit market imperfections observed in many low–income developing countries account for a strong negative linkage between growth and income inequality. This is because, the imperfect credit markets in such countries inhibit access to credit and for that matter, poor households forego investments in human capital development where higher returns can be realized. In this case, higher economic growth does not reduce inequality when credit market imperfections are imminent. Given the relatively lower financial intermediation, Tabassum and Majeed's (2008) findings have crucial lessons for Africa regarding the direct impact of debts on income distribution. Unfortunately, there is dearth of literature investigating debts–income inequality nexus in Africa.

While the existing studies on debts carry important implications for policy, they do not investigate the direct impact of debts on income inequality in Africa. In addition, less is known regarding whether the debts-income inequality nexus is nonlinear. The lack of readily available time series data on income inequality over a longer period has resulted in scanty empirical research efforts that seek to evaluate the distributional impacts of Africa's rising debt stock. Consequently, the dearth of studies comprehensively examining the relationship between debts and income inequality has limited policy making particularly in using debts as a tool for reducing income inequality. This study therefore fills this gap in the literature by not only examining the direct effects on debts on inequality but also investigates whether debts–income inequality link in Africa is threshold–specific. In this endeavour, we contribute significantly to the literature in so many ways. First, we provide a pioneering effort on the precise empirical effect of debts on income inequality in Africa. Second, by using the threshold estimation approach, the study is able to uncover that, the relationship between debts and income inequality is conditioned an estimated debt threshold levels that bifurcate the relationship. Third, we are able to reveal the precise debts threshold and how debts affect income inequality when countries are either below or above the threshold. This study therefore argues that the empirical relationship between countries' debt and income inequality is more complex than what the present simple relationships show.

By using data on 24 African countries, the results show that, while debts generally dampen income inequality, unbridled debt accumulation above the estimated thresholds does not reduce income inequality, suggesting that the income inequality–reducing effect holds at lower levels of debt–to–GDP ratio. This evidence is insensitive to the proxies of

income inequalities and measures of debts. A key implication is that, debts can be used to tackle income inequality when kept within the optimal level beyond which higher debts exacerbate income inequality.

The rest of the study is organized as follows. The next section presents the methodology and empirical strategy while Section 3 discusses the findings. Section 4 concludes the study with key implications for policy.

2. Methodology

2.1 Data

With regard to the data, we use three different measures of income inequality: (i) Gini coefficient which is based on households' income before taxes and entails the standardized incomes across countries before redistribution through the different tax system; (ii) the Palma ratio which focuses on changes in income at the bottom part of the distribution; (iii) the Atkinson index which measures inequality by determining which end of the distribution contributed most to the observed income inequality. All these income inequality indicators were taken Lahoti et al.,'s (2015) Global Consumption and Income Project Database (GCIP) of the UN. We also use two debts variables obtained from World Bank's fiscal space database: (i) General government gross debt which involves all accrued liabilities and other financial obligations that require payment or payments of interest (ii) External debt stock which is the component of the total government debt owed to foreign creditors. Both forms of debt which are measured as a percentage of GDP are useful proxies of fiscal space especially for developing countries. Our control variables are inflation, trade openness, human capital, population growth and real GDP per capita. These variables are also critical in influencing income inequality. All these data are obtained from World Development Indicators (WDI) of the World Bank except human capital which we sourced from Penn World Table (PWT) 9.0. This study uses data from 24 African countries spanning 2000–2014.[1] The choice of these countries are based on data availability. However, the time period for this study is based on data availability for income inequality variables as the data is only available until 2014.

2.2 Model and Estimation Method

To examine the effect of debts on income inequality, we posit an empirical model where income inequality is influenced by debts and other control variables as shown in equation (1) below:

$$INEQU_{it} = \alpha + \beta DEBT_{it} + \gamma CON_{it}' + \varepsilon_{it} \tag{1}$$

where $INEQU_i$ and $DEBT_i$ represents vectors of income inequality and debts; CON' is also a vector of conditioning variables; *i* and *t* are the country and time indices respectively while ε_i is a noise term.

Indeed, equation (1) represents a linear relationship which examines the impact of debts on income inequality and can estimated using the standard ordinary least squares (OLS). However, this approach does not capture potential nonlinear link between debts and income inequality in a way where the precise effect is contingent on whether or not a country operates below or above the debt threshold. Therefore, to account for the potential threshold of debts, we transform Equation (1) into a threshold regression model based on Hansen's (2000) sample splitting technique. Relative to the traditional linear regression model, the threshold regression model allows us to relax the assumption of linear relationship between debts and income inequality by revealing the level of debts at which the debts–income inequality nexus changes effect without imposing an exogenous nonlinear specification. The threshold regression model can be written as:

$$INEQU_i = \begin{cases} \beta_1 DEBT_i + \pi_1 CON_i' + \varepsilon_i & if\ DEBT \leq \gamma \\ \beta_2 DEBT_i + \pi_2 CON_i' + \varepsilon_i & if\ DEBT > \gamma \end{cases} \tag{2}$$

In equation (2), in addition to being the main regressor, $DEBT$ is also used as the threshold variable, while γ is the threshold parameter.

We define two regimes based on equation (2) above: regime 1, denoted as $DEBT \leq \gamma$ is a period where debt is less than or equal to the estimated threshold with β_1 measuring the impact of debt on income inequality when $DEBT \leq \gamma$. Regime 2, denoted as $DEBT > \gamma$ is a period where debt is above the estimated threshold with β_2 measuring the impact of debt on income inequality when $DEBT > \gamma$. Note that equation (2) collapses to equation (1) when $\gamma = 0$, demonstrating the dominance of equation (2) over equation (1).

Similar to recent studies (see Ibrahim, 2020; Ibrahim et al., 2021; Davies et al., 2021), we adopt Hansen's (2000) sample splitting and threshold regression estimation method to estimate equation (2). This approach makes use of the OLS estimator to uncover the threshold estimate (γ) in addition to the regression parameters (β and π). Indeed, γ is obtained relying on the concentration approach which minimizes the sum of the squared error (SSE).

[1] See Table 1A in the Appendix for the list of the countries

Hansen (1996; 2000) suggests the application of a likelihood ratio (LR) test to check for the statistical significance of γ as shown below:

$$LR_n(\gamma) = n\frac{SSE_n(\gamma) - SSE_n(\hat{\gamma})}{SSE_n(\hat{\gamma})} \quad (3)$$

We test for the presence of threshold under the null hypothesis of no threshold effect against the alternative hypothesis of threshold. Hansen (1996; 2000) proposes the use of a bootstrapping procedure which ensures asymptotic distribution of the LR test and corrects the *p*–values asymptotically. We obtain the confidence interval for the threshold γ using $\hat{\varphi} = \{\gamma: LR_n(\gamma) \leq C\}$, where C is the asymptotic confidence interval for γ.

3. Findings and Discussions

This section presents the empirical findings of the study where we begin with the summary statistics as shown in Table 1 below. From the Table, average government debts and external debts are respectively measured at 58.60% and 48.85% of GDP. Values of the income inequality proxies denote wider income inequality and uneven wealth distribution. We compute the coefficient of variation (CV) as the ratio of standard deviation to mean in order to examine the relative volatility of the variables. It is observed that external debts are most volatile relative to government debts while the Palma ratio is also the most volatile among the income inequality proxies. Among the control variables, inflation which averages 7.6% is the most volatile variable followed by real GDP per capita given their high CV.

Table 1. Descriptive statistics

	General government gross debt	External debt stock	Gini coefficient	Palma ratio	Atkinson index	Population growth	Human capital	Inflation	Trade openness	Real GDPPC
Mean	58.595	48.852	0.585	6.323	0.697	2.558	0.485	7.599	70.140	2,132.71
SD	46.077	41.949	0.037	1.567	0.055	0.829	0.122	9.713	27.464	2,547.63
CV	0.786	0.859	0.063	0.248	0.079	0.324	0.252	1.278	0.392	1.195
Minimum	5.513	3.584	0.488	3.015	0.509	0.160	0.252	–20.6272	29.483	273.850
Maximum	234.394	260.668	0.852	14.434	0.838	5.604	0.782	73.837	156.861	10,137.55

Notes: SD=Standard deviation; CV=Coefficient of variation.

Beyond these descriptive statistics, examining the threshold effects of debt on income inequality involves three steps: (i) testing for the existence of threshold; (ii) examining the linear effects of debts on income inequality; and (iii) examining the threshold effects of debts on inequality. Beginning with Gini coefficient as a measure of income inequality, we present findings on general government gross debts and Gini coefficient in Table 2.

Table 2. General government gross debt and Gini coefficient

	Threshold test	Global OLS [Without threshold]	With threshold	
			Regime 1 (GD ≤ 34.69%)	Regime 2 (GD > 34.69%)
LM test for no threshold	45.906	–	–	–
Bootstrap *p*–value	0.000	–	–	–
Threshold value (γ)	34.69%	–	–	–
95% Confidence interval (Γ)	[34.68%, 46.99%]	–	–	–
Constant		0.711711 (0.022832)	0.780929 (0.039327)	0.683580 (0.022844)
General government gross debt		–0.000052* (0.000028)	–0.001111* (0.000595)	0.000059** (0.000029)
Inflation		0.000237* (0.000134)	–0.000152 (0.000475)	0.000147 (0.000108)
Trade openness		–0.000138* (0.000082)	–0.000187 (.000264)	–0.000044 (0.000061)
Human capital		–0.212076*** (0.033521)	–0.194222*** (0.062133)	–0.198126*** (0.033955)
Population growth		–0.013122*** (0.003179)	–0.049203*** (0.007584)	–0.004820* (0.002641)
Real GDP per capita		–0.000010*** (1.6462e–06)	–0.000012*** (3.1719e–06)	–7.0062e–06*** (1.2512e–06)
R^2		0.45	0.54	0.27
Heteroskedasticity *p*–value		0.001		
Number of countries		24	3	21

Note: ***, ** and * denote significance at 1%, 5% and 10% respectively. Values in ( ) are the standard errors. Heteroskedasticity correction is used. Bootstrap *p*–values are computed with 1,000 bootstrap replications at trimming percentage of 15%.

As shown in Table 2, our test for threshold shows evidence of a threshold given the low *p*–value of 0.000 suggesting the rejection of no threshold. An examination of the threshold produces a value of 34.69% of GDP which lies within the confidence interval of 34.68% and 46.99%. The identification of this threshold value suggests that, the relationship between government debt and Gini coefficient is intrinsically non–linear where the precise effect of government debt is conditioned on whether a country's government debt is below or above the threshold of 34.69%. This naturally splits the sample into two: countries with debts stance of at most 34.69%, which we refer to regime 1 and those with debts above this threshold, which we call regime 2.

With regard to the impact of government debt on income inequality, our evidence shows that, without controlling for the threshold relationship and relying on the global ordinary least square (OLS) estimation, the effect of government debt on Gini coefficient is negative and marginally significant at 10% suggesting that increases in government debt lowers income inequality (see Table 2). However, the findings on the threshold effects reveal that government debt–income inequality nexus is far from being linear. The results clearly demonstrate that using OLS without controlling for threshold effects does not tell a complete picture of the relationship as we find existence of thresholds in debts–income inequality link. By controlling for the thresholds, the study finds that, government debt is negatively associated with income inequality for countries operating in regime 1 where their government debt level is at most 34.69%. As the coefficients can be interpreted as elasticities, a unit–percentage rise in government debt increases Gini coefficient by 0.0011%. Indeed, the additional resources from the debt accumulation maybe spent on social amenities and activities that fairly redistributes income aimed at lowering income inequality. This evidence suggests that debt accumulation is good for income inequality at lower levels of debt. However, once the debt threshold is exceeded and countries operate in regime 2, higher government debt increases income inequality even though the associated coefficient is economically small. In other words, government debt decreases income inequality at lower levels and at higher levels of debts, income inequality increases with government debts. Remarkably, countries' level of debt potentially influence income distribution in at least two ways: (i) taking on higher debt encourages the servicing of debt obligations in order to avoid the negative consequences of default (including downgrading of credit ratings), which lowers incentives for wage bargaining thus allowing governments and shareholder value oriented firms to exert downward pressure on wage growth (see Kim et al., 2017); and (ii) interest payments from indebted countries may result in higher taxes given governments' appetite for domestic resource mobilization to finance debts. In countries like those in Africa where tax systems are regressive, higher tax imposition tend to redistribute incomes away from the poor hence widening income inequality. Indeed, closely linked to this the possibility of crowing–out of social spending resulting from debt accumulation.

Figure 1 shows the individual countries in relation to government debt–income inequality link. Given the threshold of 34.69% for government debts and Gini coefficient nexus, we observe that, out of the 24 countries, 21 countries, representing 91%, are above this threshold. However, only three countries Benin, Nigeria and Botswana are below the threshold hence operating in the regime where government debts narrow income inequality. Given the homogenous threshold value (38.23%) regarding government debt and income inequality measured by Palma ratio and Atkinson index, the study finds that, out of the 24 countries, 16 (denoting 67% of the countries) are above the threshold with eight countries operating below the threshold. As presented in Table 3, the Palma ratio shows an increase in government general debts increases the income gap between the top 10% and the bottom 40% once countries' debt level exceeds the threshold value of 38.23%. Even though the coefficient in regime 2 is economically small, the results largely reveal that government gross debt have increased the concentration of income at the top at the expense of the lower and middle income earners given our sample evidence. This evidence is qualitatively similar to the impact of government on Atkinson index (see Table 4) which also concludes that, government debts above the threshold widens income inequality.

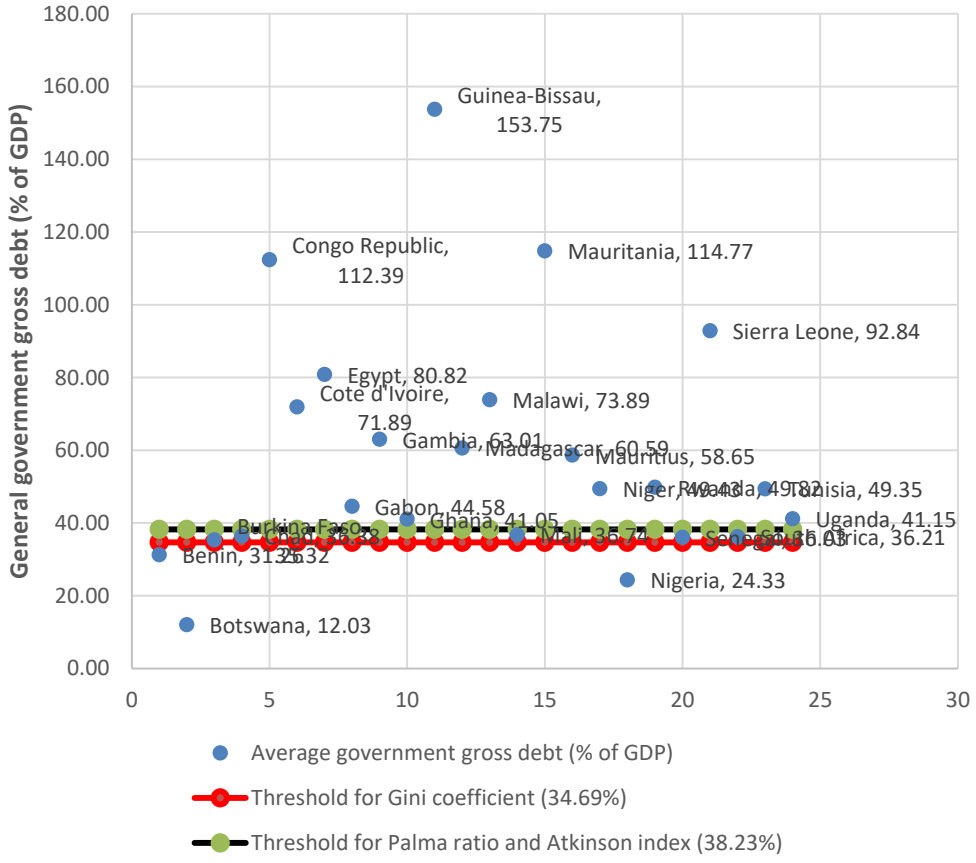

Figure 1. General government gross debt threshold levels and income inequality

Table 3. General government gross debt and Palma ratio

	Threshold test	Global OLS [Without threshold]	With threshold	
			Regime 1 (GD ≤ 38.23%)	Regime 2 (GD > 38.23%)
LM test for no threshold	78.669	–	–	–
Bootstrap *p*–value	0.000	–	–	–
Threshold value (γ)	38.23%	–	–	–
95% Confidence interval (Γ)	[35.55%, 38.27%]	–	–	–
Constant		11.466211 (0.855661)	14.447045 (1.068065)	9.561608 (0.790495)
General government gross debt		–0.004193*** (0.001262)	–0.004684 (0.013539)	0.002788** (0.001172)
Inflation		0.009439* (0.005625)	–0.023109 (0.017504)	0.004179 (0.004339)
Trade openness		–0.005046* (0.002993)	0.004798 (0.007564)	–0.001229 (0.002462)
Human capital		–8.554129*** (1.223620)	–6.573675*** (1.805126)	–6.912263*** (1.142486)
Population growth		–0.545654*** (0.136917)	–2.045807*** (0.200031)	–0.117358 (0.095427)
Real GDP per capita		–0.000439*** (0.000064)	–0.000439*** (0.000071)	–0.000222*** (0.000045)
R^2		0.23	0.67	0.26
Heteroskedasticity *p*–value		0.001		
Number of countries		24	8	16

Note: ***, ** and * denote significance at 1%, 5% and 10% respectively. GD = General government gross debt. Values in ( ) are the standard errors. Bootstrap *p*–values are computed with 1,000 bootstrap replications at trimming percentage of 15%.

Table 4. General government gross debt and Atkinson index

	Threshold test	Global OLS [Without threshold]	With threshold	
			Regime 1 (GD ≤ 38.23%)	Regime 2 (GD > 38.23%)
LM test for no threshold	80.157	–	–	–
Bootstrap *p*–value	0.000	–	–	–
Threshold value (γ)	38.23%	–	–	–
95% Confidence interval (Γ)	[35.55%, 44.79%]	–	–	–
Constant		0.853050 (0.026892)	0.886648 (0.036287)	0.817172 (0.026381)
General government gross debt		–0.000104** (0.000047)	–0.000223 (0.000484)	0.000119*** (0.000042)
Inflation		0.000201 (0.000218)	–0.001060 (0.000767)	0.000048 (0.000169)
Trade openness		0.000147 (0.000111)	0.000654** (0.000310)	0.000216** (0.000099)
Human capital		–0.309748*** (0.043358)	–0.159004** (0.072017)	–0.281476*** (0.042723)
Population growth		–0.015709*** (0.004513)	–0.058494*** (0.006138)	–0.003504 (0.003756)
Real GDP per capita		–0.000013*** (1.8342e–06)	–0.000011*** (2.0084e–06)	–6.9506e–06*** (1.5171e–06)
R^2		0.44	0.53	0.26
Heteroskedasticity *p*–value		0.011		
Number of countries		24	8	16

Note: ***, ** and * denote significance at 1%, 5% and 10% respectively. GD = General government gross debt. Values in ( ) are the standard errors. Bootstrap *p*–values are computed with 1,000 bootstrap replications at trimming percentage of 15%.

Table 5. External debt and Gini coefficient

	Threshold test	Global OLS [Without threshold]	Without threshold	
			Regime 1 (ED ≤ 29.91%)	Regime 2 (ED > 29.91%)
LM test for no threshold	45.906	–	–	–
Bootstrap *p*–value	0.000	–	–	–
Threshold value (γ)	29.91%	–	–	–
95% Confidence interval (Γ)	[28.88%, 32.82%]	–	–	–
Constant		0.716351 (0.023644)	0.795204 (0.030859)	0.647327 (0.027873)
External debt stock		–0.000065 (0.000033)	–0.001292** (0.000649)	0.000020 (0.000037)
Inflation		0.000216* (0.000131)	0.000165 (0.000313)	0.000186* (0.000111)
Trade openness		–0.000132* (0.000080)	–0.000086 (0.000156)	–0.000154** (0.000067)
Human capital		–0.219886*** (0.034834)	–0.326552*** (0.050202)	–0.114801*** (0.041479)
Population growth		–0.013721*** (0.003248)	–0.038880*** (0.006042)	–0.002621 (0.003003)
Real GDP per capita		–0.000010*** (1.6632e–06)	–0.000016*** (2.5701e–06)	–4.3071e–06*** (1.1599e–06)
R^2		0.40	0.46	0.18
Heteroskedasticity *p*–value		0.008		
Number of countries		24	5	19

Note: ***, ** and * denote significance at 1%, 5% and 10% respectively. ED = External debt. Values in ( ) are the standard errors. Bootstrap *p*–values are computed with 1,000 bootstrap replications at trimming percentage of 15%.

Table 6. External debt and Palma ratio

	Threshold test	Global OLS [Without threshold]	With threshold	
			Regime 1 (ED ≤ 29.91%)	Regime 2 (ED > 29.91%)
LM test for no threshold	52.343	–	–	–
Bootstrap *p*–value	0.000	–	–	–
Threshold value (γ)	29.91%	–	–	–
95% Confidence interval (Γ)	[29.13%, 40.35%]	–	–	–
Constant		11.923237 (0.904452)	16.954144 (1.204138)	8.300237 (0.914814)
External debt stocks		–0.005704*** (0.001491)	–0.009868 (0.022398)	0.001333 (0.001375)
Inflation		0.007745 (0.005494)	–0.000474 (0.0122804)	0.005930 (0.004589)
Trade openness		–0.004168 (0.002988)	0.002482 (0.005982)	–0.005838** (0.002601)
Human capital		–9.28891*** (1.312822)	–14.729816*** (1.772265)	–3.987792*** (1.370387)
Population growth		–0.602364*** (0.140326)	–1.906051*** (0.251045)	–0.047418 (0.105107)
Real GDP per capita		–0.000454*** (0.000064)	–0.000706*** (0.000076)	–0.000147*** (0.000040)
R^2		0.51	0.57	0.18
Heteroskedasticity *p*–value		0.010		
Number of countries		24	5	19

Note: ***, ** and * denote significance at 1%, 5% and 10% respectively. ED = External debt. Values in ( ) are the standard errors. Bootstrap *p*–values are computed with 1,000 bootstrap replications at trimming percentage of 15%.

Table 7. External debt and Atkinson index

	Threshold test	Global OLS [Without threshold]	With threshold	
			Regime 1 (ED ≤ 38.11%)	Regime 2 (ED > 38.11%)
LM test for no threshold	53.190	–	–	–
Bootstrap *p*–value	0.000	–	–	–
Threshold value (γ)	38.11%	–	–	–
95% Confidence interval (Γ)	[29.13%, 40.35%]	–	–	–
Constant		0.862215 (0.028572)	0.962197 (0.042026)	0.752777 (0.026087)
External debt stocks		–0.000130** (0.000056)	–0.000392 (0.000620)	0.000106** (0.000047)
Inflation		0.000159 (0.000214)	0.000577 (0.000499)	0.000174 (0.000147)
Trade openness		0.000165 (0.000111)	0.000556*** (0.000199)	–0.000129 (0.000102)
Human capital		–0.325221*** (0.045950)	–0.429892*** (0.061637)	–0.086754*** (0.041446)
Population growth		–0.016895*** (0.004632)	–0.045258** (0.008099)	0.000349 (0.003590)
Real GDP per capita		–0.000014*** (1.8680e–06)	–0.00003*** (2.0941e–06)	–7.4802e–07 (1.0590e–06)
R^2		0.37	0.40	0.20
Heteroskedasticity *p*–value		0.017		
Number of countries		24	11	13

Note: ***, ** and * denote significance at 1%, 5% and 10% respectively. ED = External debt. Values in ( ) are the standard errors. Bootstrap *p*–values are computed with 1,000 bootstrap replications at trimming percentage of 15%.

On external debts–income inequality nexus, we find evidence of threshold with an identified threshold value of 29.91% for both Gini coefficient and Palma ratio while revealing a higher threshold of 38.11% for Atkinson index (see Tables 5 to 7). Notwithstanding the different threshold values for the income inequality proxies, external debts general decrease income inequality. For Gini coefficient in Table 5, what is observed is that even though countries' level of external debts dampen inequality, the effect is only significant – albeit marginally – for countries operating below the threshold. Once the external debts surpass the threshold value of 29.91%, the impact loses significance. However, using the Palma

ratio as a measure of income inequality shows that, the impact of external debt on income inequality is insignificant irrespective of whether a country is below or above the threshold. This finding is consistent with Akram (2016).

Interestingly, we notice that external debts widen income inequality – proxied by Atkinson index – with a statistically significant effect when countries exceed the threshold of 38.11%. Given this threshold, 13 countries representing 54% of the 24 countries are above the threshold (see Figure 2). These 13 countries operate in a regime where their higher external debts increase income inequality.

Indeed, the overwhelming evidence suggests from the study underscores the importance of keeping debts at optimal levels as estimated. Debts accumulation only negatively affects income inequality in countries that are below the thresholds estimated. In this case, further accumulation of debts is beneficial for income redistribution. However, the debt thresholds are surpassed, further accumulation of debts widens income inequality rather than narrowing it. This will be the case when countries' resources are used to service debt obligations leaving little to finance critical investment and growth. Thus, the crowding–out effect of debt accumulation and debt servicing weighs heavily on income inequality. On the control variables, the coefficient of inflation is positive albeit marginally significant. Thus, higher inflation heightens income inequality. However, when disaggregated along the regimes 1 and 2, this effect becomes negative in regime 1 suggesting that the income inequality–increasing effect of inflation does not hold for countries with debt levels below the threshold. Interestingly, irrespective of the regime, the impact of inflation on income inequality is insignificant at conventional levels. Trade openness appears to lower income inequality even though the impact is largely insignificant. However, the coefficient of human capital is negative and highly significant at all conventional levels. Findings from the global OLS show that, a unit–percentage rise in human capital reduces income inequality by 0.212%. The income inequality–reducing effect of human capital holds irrespective of whether countries operate in regime 1 or 2. In both regimes 1 and 2, improvement in human capital stock of the population significantly reduces income inequality by almost the same magnitude even though the effect is marginally higher in regime 2 relative to regime 1. Similar to the impact of human capital, the effects of population growth and real GDP per capita are negative and robustly related to income inequality. Interestingly, the income inequality–reducing effect these variables are higher when countries' government debt levels are below the estimated thresholds (see Tables 2 to 7).

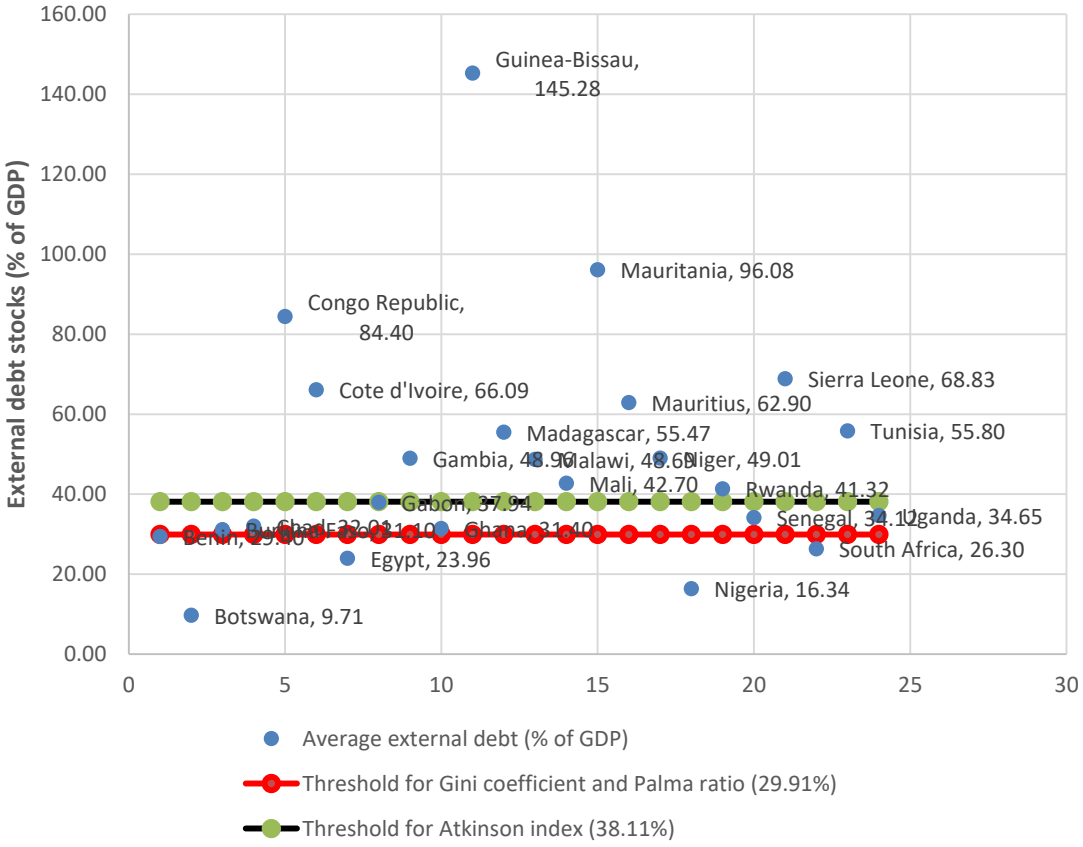

Figure 2. External debt stock threshold levels and income inequality

4. Conclusion and Policy Implications

Reducing income inequality and debts levels are important policy objectives of countries in Africa in an attempt to achieve the Sustainable Development Goals (SDGs). As such, there have been several efforts made aimed at narrowing the income inequality and debts. Confronted by constrained fiscal space and limited resources, majority of African governments have borrowed from both domestic and external sources to finance critical expenditure. However, how the accumulated debts empirically influence income inequality in Africa is yet to be uncovered since majority of the existing literature has largely focused on either the determinants of debts or implications of overall economic growth for income inequality levels in Africa. The absence of studies pertaining to the impact of debts on income inequality have limited policy making as knowledge on the direct relationship between debts and income inequality is scarce.

Remarkably, how debts influence income inequality may be conditioned on countries' debt levels and that, the precise impact is beyond what the simple relationships show. This study therefore fills the gap in the literature on debts–income inequality nexus by examining how debts explain cross–county differences in income inequality in Africa.

Using data on 24 countries in Africa spanning 2000 to 2014, this study relies on sample splitting and threshold estimation approach to investigate how debts affect income inequality. By relying on this approach, the study uncovers the disproportionate effects of debts on income inequality. Our findings show that, while debts generally reduce income inequality, unbridled debt stock exceeding the estimated threshold levels does not dampen income inequality. A key implication is that, the income inequality–reducing effect of debts largely holds at lower levels of debt–to–GDP ratio. This evidence is robust to the various indicators of income inequality and debts. Thus, while debts serve as additional financing option to countries, it could also contribute to increasing inequality. For economies like those in Africa where debts continue to increase and wealth distribution is highly uneven, the rising debt levels should be a concern especially in the era of COVID–19.

Increasingly, African countries have also borrowed from private lenders. In 2019, the public and publicly guaranteed long–term external debt of sub–Saharan Africa countries was about 40%. These creditors are not willing to offer debt relief to countries on terms like those offered by the G20. Furthermore, credit agencies are threatening to downgrade the debts of countries should they receive relief from the creditors, making it exceedingly difficult for countries to receive debt moratorium. Heavily indebted countries will need some form of relief to avoid defaults. In a bid to assist developing economies to cushion the adverse impact of the pandemic and to reduce the level of debt stock, multilateral institutions provided financial assistance and debt relief to African countries. African countries received assistance from the IMF to a tune of $25 billion, representing about 5% of global financial assistance. In addition, it provided debt service relief worth almost $400 million, constituting about 83% of total debt service relief granted globally (IMF, 2020). Furthermore, the G20 agreed to the Debt Service Suspension Initiative (DSSI), under which the world's poorest countries can postpone debt repayments due between 1 May 2020 and the end of June 2021, spreading over four years. The DSSI allowed some countries to save about 1% to 2% of GDP. Indeed, measures that lowers debts including the DSSI are critical for Africa's development since they do not only directly reduce Africa's debt stock, but indirectly dampen the rather higher income inequality in the continent.

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Appendix

Table 1A: List of countries

1. Benin	13. Malawi
2. Botswana	14. Mali
3. Burkina Faso	15. Mauritania
4. Chad	16. Mauritius
5. Congo Republic	17. Niger
6. Cote d'Ivoire	18. Nigeria
7. Egypt	19. Rwanda
8. Gabon	20. Senegal
9. The Gambia	21. Sierra Leone
10. Ghana	22. South Africa
11. Guinea–Bissau	23. Tunisia
12. Madagascar	24. Uganda