# A multidimensional appraisal of domestic investment, external debt and economic development nexus: evidence from SSA

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Received 21 December 2022
Revised 23 April 2023
14 July 2023
5 September 2023
13 October 2023
16 December 2023
Accepted 18 December 2023

## Abstract

**Purpose** – This study examines the effect of external debt and domestic capital formation on economic development in Sub-Saharan African (SSA) economies.

**Design/methodology/approach** – Using the Dynamic Common Correlation Effects (DCCE) technique and the Driscoll and Kraay fixed-effect technique, this paper conducts a multidimensional assessment of external debt and domestic investment on economic development across a panel of 35 SSA countries from 1995 to 2018. The data utilized are sourced from the World Development Indicators (2021) and the United Nations Development Program (UNDP) database (2021).

**Findings** – The results reveal that domestic investment has a positive impact on economic development in SSA countries, consistent across all three dimensions of the human development index (income, education and life expectancy). However, external debt exhibits an adverse effect on economic development, consistently yielding negative outcomes for life expectancy, education and income.

**Practical implications** – Based on these findings, the authors recommend that SSA economies implement appropriate policies, such as reducing bureaucratic requirements and addressing corruption, to enhance domestic capital investment. Additionally, efforts should be directed toward channeling contracted debt into productive sectors like road construction and electricity provision.

**Originality/value** – This study is among the first to assess the impact of domestic investment and external debt on the three dimensions of human development outlined by the UNDP. Furthermore, it employs a robust econometric method that considers cross-sectional dependence (CD).

**Keywords** Economic development, External debt, Domestic investment, DCCE

**Paper type** Research paper

## 1. Introduction

Development can only be achieved when the resources needed for significant developmental projects are accessible and efficiently utilized. This is why every economy seeks to mobilize capital to finance investments for economic growth and development. Africa, particularly Sub-Saharan Africa (SSA), emerges as one of the major regional blocs in the world facing concerns due to limited capital and basic infrastructure (Fonchamnyo *et al.*, 2021; Awad, 2021; Dinga *et al.*, 2020). The continent's challenges in mobilizing capital and addressing essential infrastructure hinder progress towards eliminating poverty and hunger, aligning with Sustainable Development Goals (SDGs) 1 and 2. Approximately 40% of Africa's output is

**JEL Classification** — O11



Journal of Business and Socio-economic Development
Emerald Publishing Limited
e-ISSN: 2635-1692
p-ISSN: 2635-1374
DOI 10.1108/JBSED-12-2022-0130

impeded due to a lack of investment in critical infrastructures such as electricity, roads, water and telecommunications (World Economic Forum [WEF], 2019). External sources of finance, like external debt, exacerbate the issue, since the servicing requirements and principal repayment further divert resources from productive activities, thereby curbing domestic capital formation, making the snowball effect a reality (Abille and Kiliç, 2023; Fonchamnyo *et al.*, 2021; Awad, 2021; Arisma, 2018). According to Arisman (2018), debt servicing destroys citizens' purchasing power, raises the rate of inflation, exacerbates poverty and increases the unemployment rate. Current statistics from the Brookings Institute indicate that a significant debt crisis might affect 40% of SSA countries and the number of African nations at high vulnerability to financial trouble has increased from 8 in 2013 to 18 in 2018. The debt-to-gross domestic product (GDP) ratio has also increased from 23% in 2008 to 46% in 2017 (WEF, 2019).

As concerns about whether external debt in developing countries acts as a hurdle to economic development growth, researchers have explored its relationship with economic growth and development (Kharusi and Ada, 2018; Zaghdoudi, 2018), with many focusing on the impact of foreign debt on economic growth. Notable works in this domain include Chigeto (2017), Forgha *et al.* (2014) and Kharusi and Ada (2018), while others like Zaghdoudi (2018) have investigated the effects on development. Some authors, such as Panizza *et al.* (2010), justify the relevance of external borrowing to prevent crowding out the private sector and financial instability resulting from excessive domestic borrowing, a perspective countered by others like Senadza *et al.* (2018). Eaton (1993), however, sees foreign debt as an addition to local investment.

As of 2019, SSA countries such as Cape Verde, Mauritania, Congo, Angola, Eritrea and Liberia still have a significant portion of their Gross National Income (GNI) comprised of external debt, with percentages standing at 93.3, 71.6, 64.8, 64, 51.5 and 50%, respectively (The World Bank Annual Report, 2021). This underscores the substantial role of foreign debt in the public debt structure of these nations. Fortunately, none of these economies relies on loans from the International Monetary Fund (IMF).

Domestic capital formation contributes to the productive capacity of countries, playing a pivotal role in fostering growth and development. This is because it provides the resources, both physical and human, necessary to fund the economy's investment efforts, thereby stimulating development. According to Ainabor *et al.* (2014), one of the challenges faced by developing nations arises from low rates of capital formation. Given that many SSA countries are in the early stages of development, they may need to resort to external borrowing to acquire the capital required for investment, aligning with Todaro and Smith (2006). To enhance national output, it is paramount for developing countries to save, necessitating a sacrifice of present consumption in favor of future consumption (Fonchamnyo *et al.*, 2021).

Given the consistently low level of development in African nations, coupled with inadequate domestic investment and a continuous rise in external debt, the Regional Economic Outlook (2018) highlights that private investment in SSA significantly lags behind other regions, while debt continues to exhibit an upward trend. The critical question arises as to whether these economies should prioritize policies that enhance domestic capital formation or explore external sources such as external debt to achieve the most desired sustainable development objectives.

This study aims to investigate the impact of foreign debt and domestic capital formation on development in SSA. This paper, therefore, seeks to address the following research questions: Does domestic capital formation influence economic development in SSA? How does the effectiveness of external debt usage affect economic development in SSA? The study contributes to the limited body of research on external debt and economic growth in developing nations, especially those in SSA, by employing a more inclusive measure of economic development (the Human Development Index (HDI)). Additionally, it considers methodological approaches that account for cross-sectional dependence (CD), leading to more

robust outcomes and sound policy recommendations. The study also elucidates how SSA countries can enhance their development using both domestic capital and external finance, specifically external debt. The remainder of this study is organized as follows. Section two reviews pertinent literature; Section three provides a description of the facts, model and theoretical framework; The analytical findings are presented and discussed in Section 4, along with their potential policy implications in Section 5.

## 2. Literature review

Several studies have explored the relationships among domestic capital formation, external debt and economic growth, yet few have investigated their impact on development. Economic theory suggests that a moderate level of debt enhances economic growth for both developed and developing nations (Pattillo *et al.*, 2002). However, the debt overhang theory (Krugman, 1988; Sachs, 1989) suggests when debt surpasses a certain threshold, unsettled foreign debt becomes a constraint for the government to invest in productive projects and enact economic reforms. However, the debt overhang theory does not unequivocally explain the consequence of debt on growth, and substantial debt is known to lower growth through its investment reduction effect (Pattillo *et al.*, 2002). The Harrod-Domar model (Harold, 1939; Domar 1946) also emphasizes the importance of external borrowing to close the savings and investment gap. Elevated debt levels stifle economic expansion, leading to increased interest rates, thereby making it challenging to borrow for both investment and consumption purposes. Several economic growth theories highlight the significance of capital formation as a key driver of growth (Solow, 1956; Mckinnon, 1973). Solow (1956) proposes neoclassical theory and McKinnon's (1973) Q-theory contends that investment stimulates higher economic growth. Similarly, according to the Keynesian theory, investment depends on the anticipated rate of return of capital and positively affects economic growth. Based on these theories, a lack of capital to carry out major projects such as road construction forces countries to seek foreign capital, including external debt, to meet their domestic capital needs. This implies that without available capital, development projects in sectors like the health sector and education sector cannot be realized, and SDGs such as goals 4 and 3 may remain unachievable.

Despite a growing body of work on the impact of foreign debt on growth, limited attention has been given to the relationship between external debt, domestic capital formation and economic development. Zaghdoudi (2018) uses a panel smooth threshold regression (PSTR) model to explore the association between external debt and human development for 95 emerging nations from 2002 to 2015. They discover a nonlinear relationship between the two, with an identified threshold of external debt at 41.7775%. Similarly, Fonchamnyo *et al.* (2021) conclude that external debt exerts a negative influence on domestic capital formation. In a comparable context, Ale *et al.* (2023) note that external debt has a detrimental impact on the long- and short-term economic growth of South Asian economies.

Furthermore, Kharusi and Ada (2018) investigate the connection between government external boring and economic growth from 1990 to 2015, using the Autoregressive Distributed Lag cointegration approach. Their findings indicate that gross fixed capital positively influences growth performance in Oman, while external debt negatively affects economic growth. In a similar vein, Senadza *et al.* (2018) investigate the impact of SSA's external debt on economic growth and find a negative association. However, the classification of nations based on per capita income does not influence the nexus between external debt and economic growth, nor does it reveal a nonlinear relationship. Positive shocks from external debt were recently examined for the Ghanaian economy by Abille and Kiliç (2023). Their outcome demonstrates an insignificant influence of positive external shocks on growth. In contrast to the aforementioned outcomes, Udemba *et al.* (2023) empirically support the view that external debt positively affects India's economic growth.

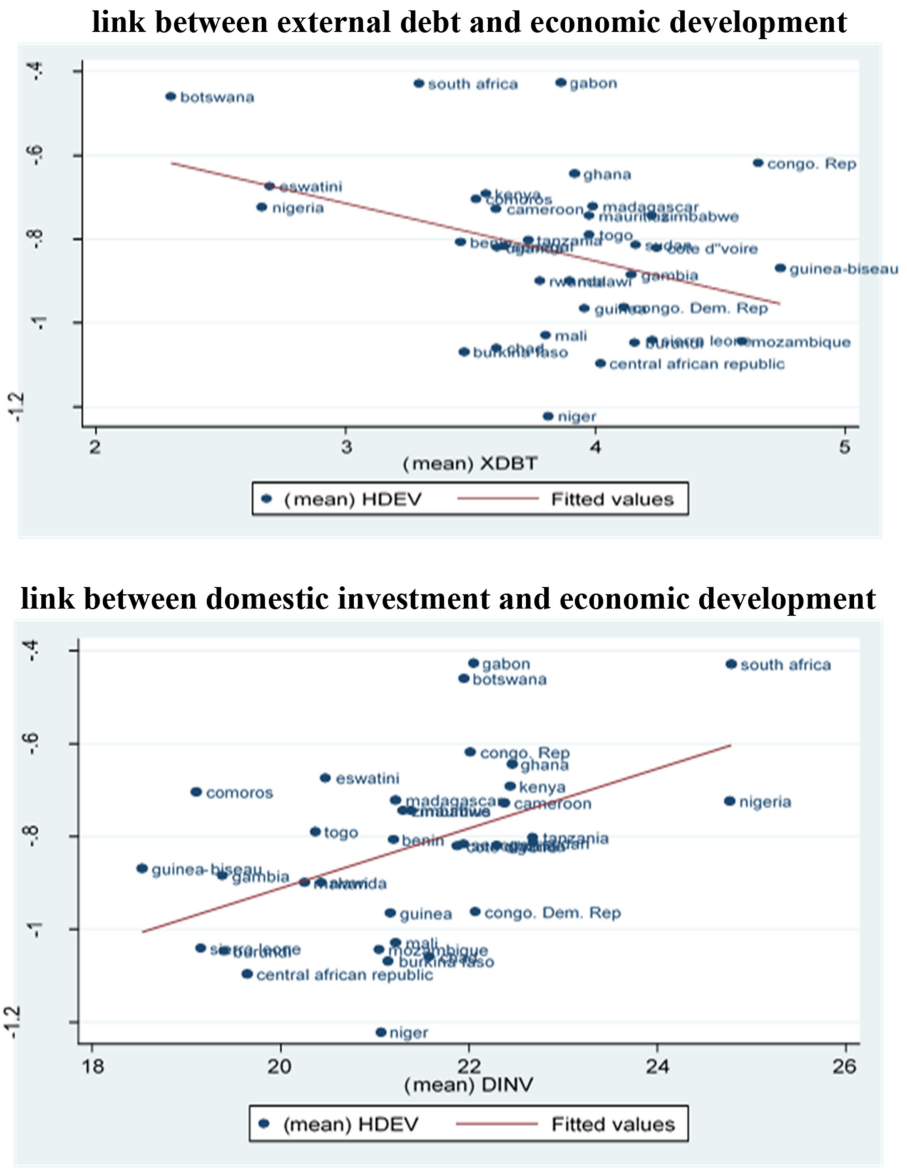
Studies conducted by Sohail and Li (2023), Shuaib and Ndidi (2015) and Emeka *et al.* (2017) primarily focus on the effects of domestic investment on economic growth. In a comprehensive investigation covering 41 African nations, Younsi *et al.* (2021) utilize a fixed effect and system-generalized method of moments (GMM) estimation technique to explore the impact of foreign aid, foreign direct investment and local investment on economic growth. Their findings reveal that domestic capital formation not only enhances foreign direct investment but also contributes significantly to economic growth. Similarly, recent observations in the Pakistani economy by Sohail and Li (2023) reaffirm the positive effect of domestic investment. In the same light, Anyanwu's (2014) exploration of different factors influencing Africa's economic growth concludes that domestic investment plays a pivotal role in driving growth, aligning with the results of Afumbom *et al.* (2020). However, most of these studies have primarily concentrated on the relationship between external debt and economic growth, with less emphasis on the impact of domestic capital formation on growth. Using economic growth as a measure of development in these studies provides a limited perspective of economic progress compared to the more inclusive HDI, reflecting a person's capabilities and well-being. This study takes a multidimensional approach, assessing the combined effects of external debt and domestic investment on the human capital accumulation, health and income dimensions of development. This analytical framework is notably absent in the current literature. Many existing studies rely on traditional estimating procedures that neglect CD between individual units, potentially leading to biased estimation outcomes (Dinga, 2023; Emmanuel *et al.*, 2023). By investigating the aggregate-level combined impact of external debt and domestic capital formation on economic development (using the HDI as a measure of development) and conducting comparative analyses of various development-related variables using the dynamic common correlation effects (DCCE) technique, which accounts for CD, this study contributes to the limited empirical literature on this subject.

## 3. Data, model and empirical approach

To empirically investigate the impact of external debt and domestic investment on economic development, this study utilizes a pooled dataset comprising annual observations spanning from 1995 to 2018 for 35 [1] SSA economies. The selection of the 35 SSA economies and the chosen time period is based on data availability. Data for external debt (XDBT), domestic investment (DINV), foreign direct investment (FDI), financial development (FINDEV) and trade openness (OPEN) were sourced from the World Development Indicators (2021). Additionally, data on development, as assessed by the HDI and its three components, were collected from the United Nations Development Program (UNDP) database (2021). DINV is measured as gross fixed capital formation (constant 2010 US dollars), following a methodology similar to that of Fonchamnyo *et al.* (2021), XDBT is represented as the external debt stock as a percentage of gross national income, aligning with the approach adopted by Senadza *et al.* (2018). FDI is measured as foreign direct investment net inflows (Balance of payment (BOP), current US dollars), consistent with the methodology employed by Emmanuel *et al.* (2023) and Dinga and Fonchmnyo (2021). FINDEV stands for Scores of Principal Component Analysis Index, incorporating Broad Money (% of GDP) and Domestic Credit to Private Sector (% of GDP), in line with Saud *et al.* (2023). OPEN denotes trade openness, measured using the trade openness index [2] developed by Squalli and Wilson (2011) and recently adopted by several authors (Dinga, 2023; Emmanuel *et al.*, 2023; Ngouhouo and Nchofoung, 2021a, b). The HDI, a measure of economic development, includes indicators such as a long and healthy life span (captured by the life expectancy index-HLDEV), access to education (measured by the mean years of education for the adult population and the expected years of schooling for children at school entry age- HEDEV) and

lastly, a respectable standard of living (captured by an index of gross national income per capita for the price level of the nation- HIDEV).

It should be noted that capital accumulation and the contraction of debts are expected to contribute to growth and development. As illustrated in Figure 1, domestic investment positively affects economic progress, while there is a somewhat negative correlation between debt and development. However, recognizing that correlation does not necessarily imply




**Source(s):** Authors' computation from STATA 17

**Figure 1.**
Fitted line graphs

causation, the relationships between these variables will be empirically investigated. Furthermore, additional descriptive statistics for all other variables are presented in Appendix. To ensure unbiased results, this study incorporates three control variables that have been empirically demonstrated to contribute to growth and development in different studies, including trade openness (Ngouhouo *et al.*, 2021), financial development (Li and Wei, 2021) and FDI (Fonchamnyo *et al.*, 2021).

To explore the impact of foreign debt and domestic investment on economic development, this paper adopts the following models:

$$HDEV_{it} = \lambda_0 + \lambda_1 HDEV_{it-1} + \lambda_2 DINV_{it} + \lambda_3 XDBT_{it} + \lambda_4 X_{it} + \gamma_i f_t + \varepsilon_{it} \quad (1)$$

$$HEDEV_{it} = \delta_0 + \delta_1 HEDEV_{it-1} + \delta_2 DINV_{it} + \delta_3 XDBT_{it} + \delta_4 X_{it} + \gamma_i f_t + \varepsilon_{it} \quad (2)$$

$$HIDEV_{it} = \alpha_0 + \alpha_1 HIDEV_{it-1} + \alpha_2 DINV_{it} + \alpha_3 XDBT_{it} + \alpha_4 X_{it} + \gamma_i f_t + \varepsilon_{it} \quad (3)$$

$$HLDEV_{it} = \beta_0 + \beta_1 HLDEV_{it-1} + \beta_2 DINV_{it} + \beta_3 XDBT_{it} + \beta_4 X_{it} + \gamma_i f_t + \varepsilon_{it} \quad (4)$$

Where $HDEV_{it}$, $HEDEV_{it}$, $HIDEV_{it}$ and $HLDEV_{it}$ are the human development index, education index, income index and life expectancy index of country i at time t. X denotes different exogenous variables, namely trade openness, FDI and financial development, identified in the literature as major determinants of economic development. ft stands for unobserved common factors with heterogeneous factor loadings, while γi and $\varepsilon_{it}$ denote distinctive error terms. $\delta_1, \delta_2, \delta_3, \delta_4, \alpha_1, \alpha_2, \alpha_3, \alpha_4, \beta_1, \beta_2, \beta_3, \beta_4$ are the elasticities, given all the variables are in their log-linearized form (i.e., all variables are in logarithm form, implying that the models are log-log models). This methodology aligns with Saud *et al.* (2023), Dinga (2023) and Fonchamnyo *et al.* (2021). Equation (1) assesses the general impact of external debt and domestic investment on development, while Equations 2, 3 and 4 examine the effects on human capital development, the standard of living and health, respectively.

Using the DCCE method proposed by Chudik and Pesaran (2015), we estimate the four equations. The DCCE is advantageous as it addresses the concern of CD within panels, corrects for small sample bias, introduces a novel approach for estimating heterogeneous panel models using common correlation effects and includes a test for CD within each estimated model (Ditzen, 2016). The econometric procedure follows a sequence: The CD-test establishes independence among countries in the panel, facilitating the choice between first-generation and second-generation pre-estimation tests within panels. We utilize the Pesaran (2004, 2015) CD-tests. The test statistics for the Pesaran (2004, 2015) tests are defined in Equations 5 and 6 below:

$$CD_{2004} = \sqrt{\frac{2T}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \frac{(T-k)\widehat{\rho}_{ij}^2 - E\left[(T-k)\widehat{\rho}_{ij}^2\right]}{var\left[(T-1)\widehat{\rho}_{ij}^2\right]} \quad (5)$$

$$\mathrm{CD}_{2015} = \sqrt{\frac{2T}{N(N-1)}} \left( \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \widehat{\rho}_{ij} \right) \quad (6)$$

where $\widehat{\rho}_{ij} = \widehat{\rho}_{ij} = \sum_{t=1}^{T} \frac{\widehat{\mu}_{it}\widehat{\mu}_{jt}}{\left(\sum_{t=1}^{T} \widehat{\mu}_{it}^2\right)^{1/2} \left(\sum_{t=1}^{T} \widehat{\mu}_{jt}^2\right)^{1/2}}$, T and N represent the time and individual units, respectively, $\widehat{\rho}_{ij}$ symbolizes the coefficient of pairwise correlation obtained from ordinary least squares and $\widehat{\mu}$ stands for the disturbance term. The test statistics' null hypothesis is that the error terms exhibit weak cross-sectional dependence.

Following the confirmation of CD, the order of integration is determined using the second-generation tests of cross-sectional augmented Dickey–Fuller (CADF) and cross-sectional Im-Pesaran-Shin (CIPS). Subsequently, the second-generation cointegration test of Westerlund (2007) is employed to ascertain the existence of a long-run relationship. After the confirmation from various pre-tests in our panel, we proceed to estimate different specifications of the models.

## 4. Empirical results

Before estimating the aforementioned four equations, we conduct preliminary tests to validate the method used. Firstly, we utilize four-unit root tests to ascertain the order of integration, including both first [3] and second-generation [4] tests (see Table 1). The results reveal that all variables are integrated at order 1, while FDI and financial development are integrated at order zero, indicating stationarity at the level. The determination of the order of integration is based on the entire set of test statistics. Table 1 also presents the Pesaran CD-test, encompassing both the CADF (Pesaran, 2004) and CIPS (Pesaran, 2015). The null hypothesis of no cross-dependence is rejected at 1% for both test statistics, providing ample evidence of cross-dependence among SSA countries during the study period. The confirmation of CD suggests that the second-generation tests are more efficient. Additionally, we perform the second-generation Westerlund (2007) cointegration test,

Panel unit root test

| | *IPS* | | *LLC* | | CADF | CIPS CV(−2.49 −2.540 −2.630) | |
|---|---|---|---|---|---|---|---|
| Variables | Stats | *p-v* | Stats | *p-v* | | | Status |
| *HDEV* | 8.235 | 1.00 | −3.292*** | 0.00 | −2.300 | −2.521 | |
| *D(HDEV)* | −3.992*** | 0.00 | – | | −3.390*** | −4.569*** | I(1) |
| *HEDEV* | 0.245 | 0.59 | −8.272*** | 0.00 | −2.060 | −1.982 | |
| *D(HEDEV)* | −10.214*** | 0.00 | – | – | −3.127*** | −4.203*** | I(1) |
| *HIDEV* | 3.456 | 0.99 | −0.719 | 0.24 | −2.321 | −2.252 | |
| *D(HIDEV)* | −13.387*** | 0.00 | −9.667*** | 0.00 | −3.651*** | −4.444*** | I(1) |
| *HLDEV* | 13.583 | 1.00 | – | 0.00 | −2.465 | −2.038 | |
| *D(HLDEV)* | −2.341** | 0.01 | 23.898*** | – | −2.561** | −3.099*** | I(1) |
| *DINV* | 2.734 | 0.99 | −0.955 | 0.17 | −2.246 | −2.090 | |
| *D(DINV)* | −14.144*** | 0.00 | – | 0.00 | −3.772*** | −4.569*** | I(1) |
| *XDBT* | 1.289 | 0.90 | 14.470*** −1.870** | 0.03 | −2.482 | −2.610** | |
| *D(XDBT)* | −13.161*** | 0.00 | – | – | −3.566*** | −4.508*** | I(1) |
| *FDI* | −3.259*** | 0.00 | −2.029** | 0.02 | −2.571** | −3.355*** | I(0) |
| *OPEN* | 6.553 | 1.00 | −0.283 | 0.389 | −2.173 | −2.069 | |
| *D(OPEN)* | −13.506*** | 0.00 | – | 0.00 | −3.522*** | −4.353*** | I(1) |
| *FINDEV* | 3.217 | 0.99 | 11.377*** −1.718 | 0.04 | −2.679*** | −2.570** | I(0) |
| *D(FINDEV)* | −14.271*** | 0.00 | – | – | – | – | |

Panel cross-sectional dependence test

| | HDEV CD-test | | HEDEV CD-test | | HIDEV CD-test | | HLDEV CD-test | |
|---|---|---|---|---|---|---|---|---|
| Test | CD-stat | *p*-value | CD-stat | *p*-value | CD-stat | *p*-value | CD-stat | *p*-value |
| Pesaran (2015) | 14.34*** | 0.00 | 12.51*** | 0.00 | 14.65*** | 0.00 | 38.92*** | 0.00 |
| Pesaran (2004) | 90.866*** | 0.00 | 101.60*** | 0.00 | 52.546*** | 0.00 | 84.351*** | 0.00 |

**Note(s):** ***, ** and * are the respective significant level at 1, 5 and 10%. CADF denote cross-sectional augmented Dickey–Fuller and CIPS denote cross-sectional augmented Im-Pesaran-Shin
**Source(s):** Authors' computation from STATA 17

**Table 1.** Panel unit root and cross-sectional dependence test

accounting for CD within panels. This test is chosen given the presence of CD within the preliminary test framework. The results in Table 2 support the null hypothesis, implying the absence of cointegration for the four test statistics. The null hypothesis is rejected for at least two test statistics in each case considered, suggesting the presence of a long-term relationship among the variables. Having confirmed the necessary preliminary tests for our panel, we proceed to estimate Equations (1) to (4).

Table 3 reports the baseline estimated outcome of Equation (1), using the HDI as a measure of economic development. Simultaneously, Table 4 presents the outcomes for the education, standard of living and health dimensions.

Columns (1) and (2) in Table 3 showcase the bivariate regression specification, where domestic investment and external debt are the sole determinants of human development, respectively. Columns (3)–(8) indicate the robustness of the baseline model by incorporating various control variables identified in the literature as significant factors affecting development.

According to Table 3, Column (1) illustrates that domestic capital formation positively impacts economic development, while Column (2) reveals a negative impact of external debt on economic development. The coefficient of domestic investment is 0.014 units, indicating that a percentage increase in domestic investment corresponds to a 0.014% increase in development. This supports the findings of Afumbom *et al.* (2020), who empirically establish a positive and significant effect of domestic investment on economic growth in both the short and long run. These results are consistent with the conclusions of Ijirshar *et al.* (2019), Younsi *et al.* (2021), Anyanwu (2014) and Shuaib and Ndidi (2015) suggesting that domestic investment serves as a key determinant of development in SSA, signaling infrastructural development and yielding high returns on investment. Similarly, the external debt coefficient is −0.011, implying that a 1% increase in external debt results in a 0.011% decrease in development. The outcomes presented in Columns (3) to (8) reaffirm the baseline model results. However, these findings diverge from those of Chigeto (2017), who establishes a nonlinear connection between economic growth and external debt. Nevertheless, they are in line with the findings of Kharusi and Ada (2018) and Senadza *et al.* (2018), both of whom find that external debt negatively influences economic growth. This discrepancy may be attributed to the fact that debt repayment diverts resources away from productive activities, as suggested by the cited studies.

The coefficients associated with external debt and domestic investment remain negative and positive, respectively, and both are statistically significant. This indicates that domestic investment and external debt are key determinants of economic development. Specifically, an increase in domestic investment is linked to an increase in development, while a rise in external debts is associated with a decline in the economic development of the recipient nation. These findings align with our *a priori* theoretical expectations. This may be attributed to the fact that external debt could discourage both domestic and foreign investment, especially when the debt becomes unsustainable. Additionally, debt servicing erodes the purchasing power of citizens, exacerbates poverty and contributes to an increase in the unemployment rate. The *F*-test statistics for the different models are all significant, indicating a good fit for the employed models.

In Table 4, a comprehensive analysis of the impact of domestic investment and external debt on economic progress is conducted by estimating Equations (2), (3) and (4) to examine their effect on the human capital dimension, standard of living dimension and health dimension. The results from the baseline model in Column (9) of Table 4 suggest that external debt negatively affects human capital formation and has a positive link with domestic investment. However, these outcomes are not statistically significant. This corroborates the findings of Tchereni *et al.* (2013), who establish a negative but insignificant effect of external debt on economic development in Malawi. Moving to the standard of living model in Column

**Table 2.** Panel cointegration test

| | DINV | | XDBT | | FDI | | OPEN | | FINDEV | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coeficient | *p*-value | Coeficient | *p*-value | Coeficient | *p*-value | Coeficient | *p*-value | Coeficient | *p*-value |
| *HDEV* | | | | | | | | | | |
| Gt | 0.138 | 0.55 | −0.235 | 0.41 | 0.709 | 0.76 | 1.317 | 0.91 | 1.467 | 0.929 |
| Ga | −10.826** | 0.00 | −11.338** | 0.00 | −7.371** | 0.00 | −9.900** | 0.00 | −8.650** | 0.00 |
| Pt | 3.412 | 1.00 | −0.570 | 0.28 | 0.427 | 0.67 | 2.409 | 0.99 | 1.701 | 0.956 |
| Pa | −4.681** | 0.00 | −10.384** | 0.00 | −4.303** | 0.00 | −4.440** | 0.00 | −5.974** | 0.00 |
| *HEDEV* | | | | | | | | | | |
| Gt | 0.369 | 0.64 | 0.069 | 0.53 | −0.653 | 0.26 | −0.244 | 0.40 | −0.588 | 0.28 |
| Ga | −12.091** | 0.00 | −13.308** | 0.00 | −11.006** | 0.00 | −14.439** | 0.00 | −14.070** | 0.00 |
| Pt | 2.791 | 0.99 | 0.833 | 0.80 | 2.022 | 0.98 | 1.980 | 0.98 | 2.208 | 0.99 |
| Pa | −4.026** | 0.00 | −11.532** | 0.00 | −3.920** | 0.00 | −4.760** | 0.00 | −6.028** | 0.00 |
| *HIDEV* | | | | | | | | | | |
| Gt | −2.312 | 0.01 | −6.455** | 0.00 | −3.083** | 0.00 | −3.167** | 0.00 | −1.914* | 0.03 |
| Ga | −3.163** | 0.00 | −12.714** | 0.00 | −5.833** | 0.00 | −4.306** | 0.00 | −6.808** | 0.00 |
| Pt | −1.949* | 0.03 | −5.372** | 0.00 | −1.520* | 0.04 | −2.354* | 0.01 | 1.510 | 0.94 |
| Pa | −4.33** | 0.00 | −8.818** | 0.00 | −2.276** | 0.01 | −4.643** | 0.00 | −1.666* | 0.04 |
| *HLDEV* | | | | | | | | | | |
| Gt | −12.452** | 0.00 | −17.733** | 0.00 | −25.465** | 0.00 | −12.835** | 0.00 | −12.707** | 0.00 |
| Ga | −22.151** | 0.00 | −41.939** | 0.00 | −38.091** | 0.00 | −22.927** | 0.00 | −30.443** | 0.00 |
| Pt | −21.046** | 0.00 | −29.016** | 0.00 | −43.221** | 0.00 | −23.027** | 0.00 | −24.342** | 0.00 |
| Pa | −34.356** | 0.00 | −43.582** | 0.00 | −37.931** | 0.00 | −36.448** | 0.00 | −37.767** | 0.00 |

**Note(s):** ** and * are respective significant level at 1 and 5%. Pt and Pa statistics investigate cointegration in whole panel while Gt and Ga statistic investigate the existence of cointegration in at least one panel

**Source(s):** Authors computation from STATA 17

| | DCCE-estimate Dependent variable: HDEV | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| L.HDEV | 0.222*** | 0.189*** | 0.206*** | 0.118** | 0.192*** | 0.137** | 0.105* | 0.113* |
| | (0.056) | (0.055) | (0.056) | (0.059) | (0.053) | (0.062) | (0.057) | (0.07) |
| DINV | 0.014*** | | 0.0127** | 0.012** | 0.011** | 0.013** | 0.012** | 0.012** |
| | (0.004) | | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) |
| XDBT | | −0.011*** | −0.010*** | −0.010*** | −0.009*** | −0.010** | −0.009*** | −0.007** |
| | | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) | (0.03) | (0.003) |
| FDI | | | | 0.001* | | | 0.001* | |
| | | | | (0.0003) | | | (0.0003) | |
| OPEN | | | | | 0.0100* | | 0.003 | 0.007 |
| | | | | | (0.005) | | (0.005) | (0.006) |
| FINDEV | | | | | | −0.005 | | −0.006* |
| | | | | | | (0.004) | | (0.004) |
| constant | 0.001 | 0.001 | 0.001 | −0.001 | 0.001 | 0.002 | −0.001 | 0.002 |
| | (0.001) | (0.001) | (0.001) | (0.002) | (0.001) | (0.001) | (0.002) | (0.001) |
| *F*-stat/ | 4.57 | 4.66 [0.00] | 4.18 [0.00] | 3.68 [0.00] | 3.51 [0.00] | 3.77 (0.00) | 3.20 [0.00] | 3.26 [0.00] |
| | [0.00] | | | | | | | |
| CD-stat | 10.29 | 8.80 [0.00] | 8.66 [0.00] | 10.23 [0.00] | 8.75 [0.00] | 7.24 (0.00) | 10.30 [0.00] | 7.34 [0.00] |
| | [0.00] | | | | | | | |
| *R*-sq | 0.56 | 0.55 | 0.49 | 0.45 | 0.46 | 0.45 | 0.42 | 0.42 |
| No obs | 714 | 714 | 714 | 714 | 714 | 714 | 714 | 714 |

**Note(s):** ***,** and * are the respective significant level at 1, 5 and 10%. *F*-stat, is the Fisher statistics, CD-stat is the cross-sectional dependence statistics, R-sq coefficient of determination, [ ] are *p*-values and ( ) are the standard errors

**Source(s):** Authors computation from STATA 17

**Table 3.** DCCE-HDEV estimated results

| | HEDEV | | HIDEV | | HLDEV | |
|---|---|---|---|---|---|---|
| | (9) | (10) | (11) | (12) | (13) | (14) |
| L.HDEV | 0.160*** | 0.0268 | 0.0292 | −0.024 | 0.794*** | 0.799*** |
| | (0.050) | (0.051) | (0.046) | (0.049) | (0.031) | (0.033) |
| DINV | 0.0096 | 0.0119 | 0.025*** | 0.019*** | 0.0006 | 0.0016 |
| | (0.007) | (0.011) | (0.007) | (0.005) | (0.002) | (0.003) |
| XDBT | −0.0071 | −0.0063 | −0.020*** | −0.020*** | −0.0018** | −0.0018* |
| | (0.0043 | (0.004) | (0.006) | (0.006) | (0.0008) | (0.0011) |
| FDI | | 0.003*** | | 0.001 | | 0.0046 |
| | | (0.001) | | (0.001) | | (0.002) |
| OPEN | | −0.0117 | | 0.022** | | |
| | | (0.013) | | (0.008) | | |
| FINDEV | | | | 0.0057 | | 0.0019 |
| | | | | (0.005) | | (0.002) |
| constant | −0.0004 | −0.007** | −0.0003 | 0.0001 | −0.0005 | −0.0005 |
| | (0.001) | (0.003) | (0.001) | (0.003) | (0.002) | (0.002) |
| *F*-stat / | 1.46 [0.00] | 1.27 [0.00] | 3.32 [0.00] | 2.75 (0.00) | 78.45 [0.00] | 51.41 [0.00] |
| CD-stat | 7.42 [0.00] | 0.66 [0.00] | 2.26 [0.02] | 1.07 [0.29] | 14.28 [0.00] | 11.66 [0.00] |
| *R*-sq | 0.74 | 0.66 | 0.56 | 0.42 | 0.44 | 0.41 |
| No. obs | 714 | 714 | 714 | 714 | 714 | 714 |

**Note(s):** ***,** and * are the respective significant level at 1, 5 and 10%. *F*-stat, is the Fisher statistics, CD-stat is the cross-sectional dependence statistics, R-sq coefficient of determination, [ ] are *p*-values and ( ) are the standard errors

**Source(s):** Authors' computation from STATA 17

**Table 4.** DCCE-multidimensional estimated results

(11) of Table 4, its association with external debt and domestic investment is negative (−0.020) and positive (0.025), respectively. These outcomes are statistically significant at the 1% level. This indicates that a 1% increase in external debt will decrease the standard of living by 0.020%. This may be a consequence of unsustainable external debt reducing the purchasing power of citizens in SSA. This finding is consistent with Murshed and Saleh (2013), who suggest that high debt services are detrimental to human development. Servicing external debts can increase the risk of fiscal crisis and higher taxes, which may discourage work, leading to a decrease in savings and investment. These results align with our *a priori* expectations.

Moreover, a percentage increase in domestic investment elevates the standard of living by 0.025%. An increase in domestic investment signifies heightened productivity, contributing to an increased stock of goods available for citizens. Similarly, upon examining the results of the baseline model for the health dimension presented in Table 4, specifically in Column (13), it is observed that while the impact of domestic investment and external debt on the health standard is positive and negative, respectively, only external debt appears to exert significant effects. These findings are further substantiated by the results obtained with the inclusion of other exogenous variables in Models 10, 12 and 14 of Table 4. Overall, these results indicate that external debt negatively impacts all three dimensions of human development, with the most pronounced effects observed in the standard of living and health dimensions. This suggests that, through the crowding-out effect of external debt, available income is diminished across different economies, leading to a decline in consumption habits and a reduction in funds allocated to health-related expenses. Consequently, this diminishes living standards and hampers improvements in the health sector. These outcomes align with the debt overhang theory, which posits that an increase in the stock of accumulated debt results in higher taxes on future production, discouraging private investment and impeding growth. Additionally, domestic investment tends to have a favorable impact, although the results suggest that investment mostly influences the dimension of the standard of living. This implies that, through the output enhancement effect of investment, overall income per capita increases, thereby enhancing the living standards of citizens within SSA.

In Table 5, we employ the Driscoll–Kraay [5] standard error method to estimate the initial model presented in Table 3 as a robustness check on our findings, as this method accounts for CD. Generally, the outcomes of various specifications (Columns (15) to (22) in Table 5) used to estimate Model 1 through the Driscoll–Kraay method indicate that domestic investment consistently has a positive impact on economic development, whereas external debt consistently exerts a negative effect. This aligns with the results obtained in Table 3. However, external debt has a more significant effect across all specifications. Similarly, Table 6 serves as a robustness check for the results of the three dimensions estimated in Table 4. Examining Columns (23) to (28) of Table 6, it is evident that domestic investment exerts a positive effect on all three dimensions of human development, while external debt exhibits a negative effect, thus confirming the outcomes observed in Table 4.

## 5. Conclusion and recommendation

This article aims to evaluate the impact of external debt and domestic investment on economic development in SSA. Employing a panel of 35 countries spanning from 1995 to 2018 and utilizing the DCCE approach to identify the relationship between variables, we conducted preliminary tests, including the panel CD-test of Pesaran (2004, 2015), panel unit tests and Westerlund's (2007) second-generation cointegration test, accounting for CD. These tests were crucial in validating the chosen methodology. Our study provides strong evidence that external debt hampers economic development, while domestic investment fosters economic development in SSA. Furthermore, domestic investment positively influences all three

| | Driscoll–Kraay-estimate | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (15) | (16) | (17) | (18) | (19) | (20) | (21) | (22) |
| L.HDEV | 0.439*** | 0.431*** | 0.431*** | 0.430*** | 0.417*** | 0.431*** | 0.416*** | 0.417*** |
| | (0.107) | (0.107) | (0.107) | (0.108) | (0.104) | (0.108) | (0.105) | (0.106) |
| DINV | 0.0025 | | 0.0025* | 0.0025* | 0.0013 | 0.0025* | 0.0014 | 0.0014 |
| | (0.002) | | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| XDBT | | −0.0089*** | −0.0089*** | −0.0088*** | −0.0084*** | −0.009**** | −0.008*** | −0.008*** |
| | | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| FDI | | | | −0.020 | | | −0.0244 | |
| | | | | (0.061) | | | (0.068) | |
| OPEN | | | | | 0.0164 | | 0.016*** | 0.016*** |
| | | | | | (0.002) | | (0.002) | (0.002) |
| FINDEV | | | | | | −0.0001 | | −0.0001 |
| | | | | | | (0.002) | | (0.002) |
| constant | 0.007*** | 0.007*** | 0.007*** | 0.521 | 0.0063*** | 0.0069*** | 0.634 | 0.006** |
| | (0.002) | (0.002) | (0.002) | (1.573) | (0.002) | (0.002) | (1.736) | (0.002) |
| *F*-stat / | 66.83 [0.00] | 115.48 [0.00] | 116.65 [0.00] | 129.00 [0.00] | 109.04 [0.00] | 87.67 [0.00] | 133.74 [0.00] | 87.91 [0.00] |
| No obs | 748 | 748 | 748 | 748 | 748 | 748 | 748 | 748 |

**Table 5.** Driscoll–Kraay estimated results

**Note(s):** ***, ** and * are the respective significant level at 1, 5 and 10%. *F*-stat, is the Fisher statistics, [ ] are *p*-values and ( ) are the standard errors
**Source(s):** Authors' computation from STATA 17

| | HEDEV | | HIDEV | | HLDEV | |
|---|---|---|---|---|---|---|
| DV | (23) | (24) | (25) | (26) | (27) | (28) |
| L.DV | 0.2162 | 0.202 | 0.111** | 0.106** | 0.818*** | 0.820*** |
| | (0.126) | (0.128) | (0.046) | (0.047) | (0.027) | (0.028) |
| DINV | 0.0005 | 0.0002 | 0.0044 | 0.0022 | 0.0005 | 0.0007* |
| | (0.001) | (0.001) | (0.003) | (0.002) | (0.0004) | (0.004) |
| XDBT | −0.0065** | −0.0058** | −0.018*** | −0.018*** | −0.0019** | −0.0019** |
| | (0.002) | (0.002) | (0.004) | (0.004) | (0.001) | (0.001) |
| FDI | | −0.318** | | 0.150** | | |
| | | (0.130) | | (0.064) | | |
| OPEN | | 0.0092 | | 0.033*** | | −0.002*** |
| | | (0.009) | | (0.004) | | (0.001) |
| FINDEV | | | | 0.0009 | | −0.0001 |
| | | | | (0.001) | | (0.001) |
| constant | 0.158*** | 8.190** | 0.004*** | −3.847** | 0.003*** | 0.003*** |
| | (0.003) | (3.352) | (0.001) | (1.647) | (0.001) | (0.001) |
| *F*-stat / | 12.39 [0.00] | 9.81 [0.00] | 3.51 [0.00] | 17.74 (0.00) | 861.08 [0.00] | 556.27 [0.00] |
| No. obs | 748 | 748 | 748 | 748 | 748 | 748 |

**Table 6.** Driscoll-Kraay-multidimensional estimated result

**Note(s):** ***, ** and * are the respective significant level at 1, 5 and 10%. *F*-stat, is the Fisher statistics, [ ] are *p*-values and ( ) are the standard errors and DV is the dependent variable
**Source(s):** Authors' computation from STATA 17

dimensions of human development, whereas external debt postulates a negative impact. We recommend that external debts be accompanied by effective government policies, ensuring these loans are directed toward priority projects, such as development-friendly and economically profitable road infrastructures. Similarly, encouraging domestic enterprises through incentives and protectionist policies can enhance productivity and competitiveness.

## Notes

1. Benin, Burkina Faso, Burundi, Cameroon, Chad, Comoros, Congo, Central African Republic and Botswana. Democratic Republic of the Congo, the Republic of the Congo, Cote d'Ivoire, Eswatini, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Madagascar, Malawi, Mali, Mauritius, Mozambique, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Sudan, Tanzania, Togo, Uganda and Zimbabwe.
2. $CTS = \frac{(X+M)_i}{\frac{1}{n}\sum_{j=1}^{n}(X+M)_j} \frac{(X+M)_i}{GDP_i}$, X denotes export, M denotes import, while GDP stands for gross domestic product.
3. Levin Lin chou (LLC) and Im Pesaran Shin (IPS).
4. CADF and CIPS.
5. Driscoll and Kraay (1998) estimation method.

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## Appendix

| Variable | Obs | Mean | Std. Dev | Min | Max |
|---|---|---|---|---|---|
| *HDEV* | 925 | 0.473 | 0.104 | 0.231 | 0.804 |
| *HLDEV* | 840 | 0.554 | 0.103 | 0.17 | 0.846 |
| *HEDEV* | 840 | 0.4 | 0.132 | 0.097 | 0.736 |
| *HIDEV* | 840 | 0.497 | 0.13 | 0.23 | 0.848 |
| DINV | 840 | 5.934e+09 | 1.383e+10 | −37,371,138 | 8.667e+10 |
| *XDBT* | 840 | 66.23 | 62.917 | 3.895 | 760.711 |
| Import | 840 | 8.267e+09 | 1.772e+10 | 76,682,359 | 1.323e+11 |
| Export | 840 | 8.894e+09 | 2.153e+10 | 47,726,060 | 1.503e+11 |
| Broad money | 840 | 26.583 | 18.209 | 2.857 | 163.325 |
| Credit to private sector | 840 | 19.235 | 25.137 | 0 | 160.125 |
| FDI | 840 | 5.850e+08 | 1.205e+09 | −8.836e+08 | 9.885e+09 |

**Source(s):** Authors' computation from STATA 17

**Table A1.**
Descriptive statistics

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