

ENHANCING INTERNET PENETRATION FOR FOREIGN DIRECT INVESTMENT IN SUB-SAHARAN AFRICA

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ABSTRACT

This paper explores the effect of internet penetration on foreign direct investment. This study uses a panel dataset of all the 48 Sub-Saharan African countries, which is extracted from World Bank database for the period 2000-2018. This study employs three distinct regression techniques such as Ordinary Least Square (OLS), Fixed Effect Regression (FE) and Generalized Moment of Method (GMM). Ordinary Least Square and Fixed Effect Regression tends to be biased and inconsistent. Therefore, the Generalized Methods of Moment estimator eliminate the stated effects alongside with the time-invariant regressors. The subsequent findings are recognized: (i) the coefficient estimates of the internet penetration on foreign direct investment is positive and statistically significant; (ii) the net effect of both internet penetration has positive on the FDI inflows. In the lights of the established findings, this study recommends that the governments in the region should implement policies that could help enhance the usage and penetration of technology.

Keywords: Internet penetration, technology, foreign direct investment, Sub-Saharan Africa

INTRODUCTION

In Sub-Saharan Africa, leveraging technology that offers a great deal of promising future is needed to speed up the rate of economic development across all sectors in the region to achieve the 2030 agenda for sustainable development (Tchamyou, 2017; Kaunda, 2015). In 2018, around 239 million people were reported to have active internet access in the Sub-Sahara region of Africa in accordance with the Global System for Mobile Communications Association (GSMA, 2019). This record has increased the number of online markets to significant customer growth and mobile phone users by stimulating human capital empowerment and ease of doing business. In Sub-Saharan Africa, people in active mobile internet subscriptions are expected to increase to about 483 million by 2025, representing an increase of 102% from 2018. In such a region, technological utilization tends to become an opportunity to foster economic growth, health, inclusive education, and foreign investment inflow.

In accordance with the United Nations Conference on Trade and Development (UNCTAD), Global Investment Trends Monitor (2019) reports that global foreign direct investment declined by approximately a fifth in 2018, which estimated \$1.2 trillion compared to \$1.47 trillion in 2017. The drop brings the flow of foreign direct investment to the lowest point since the 2008/2009 global financial meltdown, while the decline is highly concentrated in the developed economies, which fell by 40% to an estimated amount of \$452 billion. The report also confirms that the 2018 foreign direct investment decline is traceable to the recent corporate tax reform in the United States of America. United States transnational corporations since 2017 have started repatriating accumulated foreign earnings, which has negatively influenced Europe (UNCTAD, 2019). In contrast, foreign direct investment in developing countries remains

resilient. In 2018, UNCTAD reports that foreign direct investment in developing countries had increased by 3% with an estimated amount of \$694 billion. Among the developing countries, Asia and Africa mostly benefited from the foreign direct investment inflows with an increase of 5% in Asia, while African foreign direct investment inflows grew up to 6%, mostly concentrated in Egypt and South Africa.

In the Sub-Saharan African context, the trend of FDI has been increasing even though this could not be attributed to a specific factor. In addition, FDI is shifting from the traditional source into new territory. For instance, the 2019 World Investment Report asserts that "while FDI in some large economies on the continent - such as Nigeria and Egypt - contracted, this was outweighed by a surge in flows to others, most significantly, South Africa. This has instigated competition among the host countries to attract foreign investment. Similarly, FDI composition and nature are changing. Africa is gaining to attract FDI, especially from China, which is claimed to establish long-term relationships with the governments, unlike the FDI from the West predominately derived from the multinational with limited risk appetite and long-term commitment (Agbelenko et al., 2012; Renard, 2011).

ICT and FDI have attracted considerable attention from scholars and policymakers, emphasizing the phenomena' causal relationship. Recently, there is a growing literature on the link between technology and foreign direct investment (Asongu & Odhiambo, 2019b; International Chamber of Commerce, 2015). Strand of literature considers technology as a "location" factor attracting foreign direct investment and establishes the technology utilization as one of the foreign direct investment determinants. Thus, technological utilization tends to lower the foreign investors' transaction and production and reduce information asymmetry on investment opportunities (Brafu-Insaidoo & Biekpe, 2014; Canare, 2017; Hunady & Orviska, 2014; Wan, 2010). Emphasizing the effect of technology and foreign direct investment, Gani & Sharma (2003), Addison & Heshmati (2004) report that technology and its innovative diffusion are significant striking factors for foreign direct investment. Also, Gholemi, et al. (2006) attest that increased technology utilization leads to a higher inflow of foreign direct investment in developed countries. On the other hand, studies have examined the association between internet usage and foreign direct investment establishing the causal effect (Ko, 2007). Similarly, information and communication technology are considered an essential domestic factor that maximizes the spill over absorption and linkages derived from foreign direct investment. Notably, these strands of literature focus on developed economies.

This study aims to explore how enhancing internet penetration promote FDI in Sub-Saharan Africa. The remainder of the study is structured accordingly. The theoretical structure for studying and evaluating the previous research is explored in Section 2. Section 3 concerns data and methods while Section 4 contains empirical analysis, corresponding discussion in relations to possible policy implications. Section 5 concludes the paper and reports possible research directions.

LITERATURE REVIEW

Theoretical Framework

This theoretical underpinning is on the proposition's nexus between FDI and ICT for the economic development of the Sub-Sahara region's economic development (Asongu & Odhiambo, 2018). The theory profoundly aligned ICT with FDI and established that the two are inseparable in the modern era of millennium development goals as macroeconomic factors. FDI is widely recognized as an input to the domestic development of an economy as it brings about

industrialization (Asongu, Nwachukwu & Aziz, 2018). The linkages between ICT and FDI are a matter of concern for global investors (Asongu, Nwachukwu, Pyke & le Roux, 2019; Chipeta & Muthinja, 2018; Okolo-Obasi & Uduji, 2018; Ntayi, Malinga, Bongomin & Munene, 2018). As posited in a study credited to Hussien, et al., (2012), a good reason for FDI and ICT nexus is the creation of competitions in global markets achieved through economies of scale.

As posited by Hellstrom (2008), technological infrastructures' enhancement is imperative for sustainable development and foreign direct investment in SSA. Likewise, ICT is required to promote governance, accountability, information dissemination, and maintain institutional quality and legal frameworks. The maintenance of law and order in the country, right economic environment, legal and political systems influence investors' choice of a global hub for investment attraction and penetration. This theory posited logical underpinning that mobile phone proxy also facilitates information dissemination and mitigates information asymmetrical diffusions between foreign and local investors. Mobile phone convergence has more economic mutual bonding for promoting innovations consistency with global best practices.

The theory of intuition proposed that the underlying decadence of information communication technology in Sub-Sahara Africa is due to low mobile phone penetration. This situation results in the dearth of SSA's poor economic conditions despite the enormous potentials and market capacity for innovation. Owing to this, developments in ICT infrastructures in SSA have constrained the inflow of foreign direct investments substantially.

Empirical Review

This study explored various literature to gain a holistic insight into the study dimensions and measures based on prior studies on FDI and ICT nexus. According to Latif et al. (2017), engagement of ICT infrastructures helps in environmental sustainability development of the South Asia economy amidst country variations in ICT deployment for inclusive development and growth of the economy, bringing about continuous penetration of ICT in the Asian continent that would continue to drive the economy's FDI and growth potential. The study adopted annualized panel dataset estimator techniques for measuring the heterogeneity and cross-sectional nexus for the variable used for ICT and FDI nexus. The author found statistical significance between FDI and inclusive growth leveraging ICT benefits for sustainable development in Asia.

In the study posited by Latif, et al., (2018) examining the dynamic assessment of globalization of ICT cum FDI inflow among BRICS countries (South Africa, China, Russia, India, and Brazil), empirical evidence found was that ICT impacts positively on economic development of those countries based on the gradient of ICT penetration and market size for FDI into those countries. Technically, the determining basis of FDI in any economy has been far isolated from ICT infrastructures' mediating role for inclusive economic development and growth (Sarbu & Carp 2015, Kida 2014). Salahuddin & Gow (2016) in their study on FDI determinants and mediating role of ICT. The author found a positive relationship between internet penetration frequency and economic growth in the wake of FDI inflows and that internet usage, economic growth, and FDI have a causality effect due to cross-sectional estimators.

According to Masoud & Zunaidah (2016), the author examined the extent to which ICT impacts the SSA region's growth potential. The author investigated the mediating nexus between FDI and inclusive ICT indicators between 2000 and 2014. A period of 27 years before the United Nations' official launch agenda for global sustainable development, the investigation went further by examining the non-linear nexus between ICT and growth potential with their dynamic indicators. The study also examined the economic growth trend, along with the enhancement of

ICT infrastructures. The panel data approach was used as proxy for ICT and FDI indicators for economic growth, the author also used the Generalized Method of Moment (GMM), and a dataset of 45 SSA countries from 1990-2014 was collected and analysed for the study. The ICT proxy used for the study was broad internet bandwidth, telephone, and mobile phone penetration per 100 subscribers' inactive subscriptions to network operators. The study found that mobile phone and internet penetration directly impact growth potential and FDI penetration in the SSA region, while for the non-linear effect, ICT proxies have no statistical significance on growth prospects and FDI attraction into the region. The threshold analysis indicated only a 4.5% significant effect of ICT penetration frequency with mobile phone and internet while telephone had a 5% effect on growth potential cum FDI penetration.

As posited by Andrianaivo & Kpodar (2011), the author investigated the direct mediating effect of ICT penetration on the economic development of 44 SSA countries between 1998 and 2007. Data were analysed using the GMM system to proxy for ICT indicators (mobile phones, telephones, and their direct impact on FDI inflow). The GMM analysis showed that telephone penetration rate and mobile phone usage both have fixed effects on the region's growth prospects and equally determined the location of FDI in the regions. Similar to the findings posited by Andrianaivo & Kpodar (2011), Sridhar & Sridhar (2004) observed that telephone penetration has marginal effects on FDI's economic growth than mobile phone proxy.

Nevertheless, averse to the propositions on the empirical study of previously cited authors, Albiman & Sulong (2016) found a non-linear relationship between ICT proxies and FDI inflow for economic growth. The result of their findings posited 4.5% and 5% respectively for the penetration rate of both mobile phones and the internet before their capacity utilization could have direct impacts on economic growth. Based on transmissions broad bandwidth of mobile phones and internets, the author also reiterated that these ICT gadgets exert enormous influence on inclusive human capital development, economic development, institutional quality, regulatory efficiency, and domestic resources and FDI location in the SSA region. Sulong & Albiman, (2016) found opposing relationship between ICT proxies and their influences on financial development nexus; the authors directly linked the digital divide in SSA to the government's inefficiency by their failure to imitate what is in global best practices in ICT development. Besides, structural weaknesses attributable to ICT infrastructural deployment throughout the region were said to have dampened the region's financial sectors' development.

According to Asiedu (2006), the author examined the stream of integrated economic factors considered to influence FDI penetration into the SSA region while an annualized panel dataset was used for 22 SSA countries between 1984 and 2000. The study primarily investigated natural resources and market size with fixed inclusion of government policy, institutional quality of the host country, political environments, and their reaction to influence the location of FDI in the SSA region. Data analyzed indicated that only regions with natural resources abundance or market size potential most likely determine FDI penetration. However, countries with inadequate natural resources can also attract foreign investments if those regions' governments develop frameworks that promote and strengthen the institutional quality, environmental sustainability, effective and efficient political administration, free corrupt society, and quality education. These proposed frameworks have identified with investors' confidence and risk patterns for choosing their investment destinations globally.

In the wake of the previously cited author's findings, there was consensus that regional blocs like the Southern African Development Community (SADC) have the potential capacity for foreign direct penetration in SSA region. Likewise, the market expansion for ICT penetration

was proposed to create enabling environments for regional advantage in promoting a sound political system and the right incentives for FDI attraction in the SSA region. Between 1970 and 2000, Bende-Nabende, (2002) investigated macro destinations of FDI in the SSA region. The author's flow of thought was premised on the grounds of co-integration assessments of the relationship between FDI determinants in attracting FDI in 19 SSA regions. The author employed a panel data model for the study, and the result showed that major FDI determinants in SSA are linked directly with market expansion, hence trade liberalization strategies for less restrictive import on FDI. Foreign exchange rates and market size influence these factors. As concerning SSA countries, FDI penetration can usher a developing framework that stimulates the macroeconomic system to coordinate liberalized FDI effectively and increase installed capacity for export-based growth.

DATA AND METHODS

Data

This study is an ex-post study that explores precisely the quantitative research technique. The quantitative research uses empirical analysis to answer the formulated research questions. The selection of the sampling size is constructed on the availability and consistency of the decoded data. The study's time limit ranges between 2000 and 2018, which captures the period of significant inflows of FDI in SSA. The study's data was extracted from the World Development Indicators of the World Bank database for the period 2000-2018. Relevant data is derived mainly from the World Bank database and data from the United Nations Conference on Trade and Development (UNCTAD). The World Development Indicators (WDI) is the main compilation of development indicators from globally recognized sources collected by the World Bank.

Measurement of Variables

Dependent variable: The primary dependent variable of interest – Inflow of FDI – is extracted from the World Development Indicator of the World Bank. The foreign direct investment is made up of funding FDI as a share of nominal gross domestic product.

Independent variable: Following previous research on the use of Information And Communication Technology (ICT) (Asongu & Nwachukwu, 2016; Tchamyu, 2017), this study adopts the internet use rate per 100 people to proxy ICT. The reasonableness of following this metric appears to have consequences for policy implication. We then apply a year lagged of technical usage with the assumption that investment and utilization of technology in the prior year will have a progressive effect.

Control variables: This study includes a battery of control variables to account for omitted variables, namely, exchange rate movement, inclusive human development, trade openness, gross domestic product, inflation, secondary school enrollment, and primary school enrollment. Concerning the relationship between the factors, FDI and the lagged GDP (a measure for market size) are projected to have a favorable relationship. To work on large markets requires to provide exposure to a vast domestic demand. This association is linked to the global market-seeking policy. It can have beneficial impacts on FDI, allowing multinationals to improve efficiency by purchasing capital products and advanced technologies. In this situation, trade liberalization is related to the global fostering policy formulation instead. The exchange rate may positively impact international investment as it exceeds the firms' relative income. That indicator will be mainly relevant to the quest for productivity solutions, linked to lower prices, and the hunt for properties in the long-term purchasing dimension.

METHODOLOGY

This study adopts panel data for the analysis. Panel data is generally known as longitudinal or cross-sectional time-series data, which observe firms' characteristics across time. With panel data, different levels of variables are suitable for multilevel modeling. Static and dynamic estimators could analyse panel data. Fixed effect analysis is useful when the researcher is interested in the influence of variables that varies over time. The model estimates the relationship between the variables within the entity. It is assumed that individual impact on the outcome variables should be controlled. Fixed effect eliminates the effect of time-invariant characteristics by examining the net effect of the predictors on the outcome variable. Besides, it is assumed that the time-invariant characteristics are individually unique, which should be uncorrelated with other individual characteristics. However, the fixed effect will be inappropriate when the different characteristics error terms are correlated.

The panel Fixed Effect model is shown as follows:

$$FDI_{i,t} = \sigma_0 + \sigma_1 Internet_{i,t} + \sigma_2 Internet * Internet_{i,t} + \sum_{h=1}^3 \delta_h W_{h,i,t-\tau} + \eta_i + \varepsilon_{i,t} \quad (1)$$

Where $FDI_{i,t}$ is the foreign direct investment inflows of the country i in period t , σ_0 is a constant, $Internet$ represents the Fixed broadband subscriptions, $Internet * Internet$ denotes the quadratic interactions between the Fixed broadband subscriptions. W is the vector of control variables (Trade openness, GDP growth and school enrollment), τ denotes the coefficient of auto regression that is one within the framework of this study because a year lag is capable of capturing past information, η_i is the country-specific effect and $\varepsilon_{i,t}$ is the error term.

Table 1 DESCRIPTION OF VARIABLES AND DATA SOURCES		
Variable	Description	Source
Dependent Variable		
Foreign Direct Investment	Foreign direct investment, net inflows (% of Gross Domestic Product)	WDI
Independent Variables		
Internet Penetration	Fixed broadband subscriptions (per 100 people)	WDI
Control Variables		
Trade Openness	Imports of goods and services (% of GDP) plus exports of goods and services (% of GDP)	WDI
Gross Domestic Product	GDP growth (annual %)	WDI
Tertiary	School enrollment, tertiary (% gross)	WDI
Note: WDI: World Development Indicators		

Furthermore, this study also adopts the dynamic panel data to estimate the dynamic behaviour of the variables' economic relationships. Increased previous studies used panel estimators for observational analysis on cross-country panels. Although dynamic panel estimators permit dynamic economic activities, they also monitor unnoticed heterogeneity. Difference Generalized Moment Method (DGMM) and System Generalized Method of Moment (SGMM) among other dynamic estimators are the most common. If the dynamic panels are implemented with a set effect or random effect, both the endogenous regressors and preset

regression systems will correlate with the unidentified individual results. In order to eliminate the unobserved individual effect and its related variable distortion, Arellano and Bond (1991) therefore established a DGMM estimator. The study uses the Arellano-Bond (AB) Generalized Method Of The Moment (GMM) estimator, which is more efficient, compared to Anderson and Hsiao estimator (Baltagi, 2013). The GMM dynamic model requires the adoption of instruments which is correlated with the dependent variable but not with the error term.

In addition, Arellano and Bond (1991) suggest a test of the hypothesis of the non-observed differentiation equation disturbance without any second-order serial correlation. This becomes unavoidable when a hypothesis is based on the accuracy of the GMM estimator. The applicability of the GMM differential evaluators, namely first order [AR (1)] and second order [AR (2)] autocorrelation tests, is predicted in two autocorrelation tests, among others. Therefore the [AR (1)] test null hypothesis is expected to be rejected in the case of the Arellano-Bond GMM estimator being true, while not rejecting this null [AR(2)] hypothesis. The Sargan test and Hansen's test of over-identification constraints have been proposed for assessing the validity of the instruments used. Roodman (2006), however, indicates that the choice of relying on the Hansen J or Sargan test would depend on whether the failure to render the error is heteroscedastic. For both Sargan and J tests, we expect that the null hypothesis will not be rejected. However, the statistics of Sargan are assumed to be a special case of Hansen's J in the event of homoscedasticity, making the statistics of Sargan experiments inconsistent with stable GMM systems. The below equation in level (2) and difference (3) summarize the standard method of system GMM evaluations.

$$FDI_{i,t} = \sigma_0 + \sigma_1 FDI_{i,t-\tau} + \sigma_2 Internet_{i,t} + \sigma_3 Internet * Internet_{i,t} + \sum_{h=1}^3 \delta_h W_{h,i,t-\tau} + \eta_i + \xi_t + \varepsilon_{i,t} \quad (2)$$

$$FDI_{i,t} - FDI_{i,t-\tau} = \sigma_1 (FDI_{i,t-\tau} - FDI_{i,t-2\tau}) + \sigma_2 (Internet_{i,t} - Internet_{i,t-\tau}) + \sigma_3 (Internet_{i,t} * Internet_{i,t} - Internet_{i,t-\tau} * Internet_{i,t-\tau}) + \sum_{h=1}^3 \delta_h (W_{h,i,t-\tau} - W_{h,i,t-2\tau}) + (\xi_t - \xi_{t-\tau}) + (\varepsilon_{i,t} - \varepsilon_{i,t-\tau}) \quad (3)$$

where τ denotes tau and ξ_t is the time-specific constant.

EMPIRICAL RESULTS

Descriptive Statistics

Table 2 reports the results of each variable's descriptive statistics to unveil the objectives of this study, which includes the mean, minimum, maximum, standard deviation, kurtosis, and skewness of each variable. From the Table, the foreign direct investment of the selected Sub-Saharan African countries reports a mean of 4.942, with a minimum and maximum value of -6.057 and 103.3, respectively. The Table also reiterates the standard deviation of foreign direct investment as 8.846, with the kurtosis of 45.93 and 5.596 level of skewness.

Table 2 shows the internet penetration of the selected Sub-Saharan African countries reports a mean of 0.764, with a minimum and maximum value of 0 and 21.64, respectively. The Table also reports the standard deviation of internet penetration as 2.528, with the kurtosis of 34.87 and 5.445 level of skewness.

Similarly, the mobile phone penetration presents a positively correlated inflow of foreign direct investment with a coefficient value of 0.0289 in Table 3. Although the degree of relationship is weak and low, it also remains insignificant at 5% level. This implies that the increased mobile phone penetration result into a higher level of foreign direct investment inflow.

In addition, Table 3 reports the Pearson correlation matrix for the independent variables adopted in the analysis. The table reveals that the variables are low in correlation. There is thus no suggestion that the adopted versions are severely multi collinear

	Mean	Min	Max	SD	Kurtosis	Skewness
FDI	4.942	-6.057	103.3	8.846	45.93	5.596
Internet	0.764	0	21.64	2.528	34.87	5.445
Openness	69.73	0	311.4	41.64	6.584	1.195
GDP	4.49	-36.39	63.38	5.31	30.56	1.053
Tertiary	7.897	0.352	40.6	7.071	7.77	1.968

	FDI	Internet	Openness	GDP	Tertiary
FDI	1				
Internet	0.0455	1			
Openness	0.307***	0.532***	1		
GDP	0.07	-0.106	-0.0578	1	
Tertiary	-0.0682	0.575***	0.346***	-0.204***	1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Empirical Result Relating to the Effect Of Internet Penetration and FDI

This section reports the regression analysis carried out to test the formulated hypotheses. Table 4 presents the empirical findings of the technological determinant of foreign direct investment in Sub-Saharan African countries. While column 1, 3 & 5 of each Table contain the unconditional effect of the policy variables (*i.e.*, without the interactive effect of the technology penetration), the column 2, 4 & 6 of each Table show the conditional effects of the policy variables (*i.e.*, with the interactive effect of the technology penetration). Moreover, technology penetration is characterized by "internet penetration."

Table 4 presents the result of the effect of internet penetration on the explained variable that is the foreign direct investment. This is done with the motive to explain the level of influence of the internet penetration on foreign direct investment, which encompasses other determinants (*i.e.*, control variables such as trade openness, school enrollment in tertiary, and gross domestic product growth). As explained earlier, Breusch-Pagan Lagrange Multiplier rejects the OLS estimator's applicability, while the validity of fixed-effect regression and Generalized Method of Moment is established. It is also essential to explain the preliminary level of goodness of fit of the overall model and the strength of the regressors' explanatory power, especially for fixed effect regression in column 4 of Table 4. The R-squared reports 33.2% of the independent variables to explain the foreign direct investment level. In addition, the regressors' explanatory power is statistically significant by the p-value of *F statistics* of 0.0001, which enhanced the model's reliability and validity.

Table 4.4, shows that the coefficient estimates of the internet penetration on foreign direct investment are positive and statistically significant at a level of significance of 5% except for column 1-3 of Table 4.4. The positive sign signifies the direct impact and relationship between internet penetration and the increasing trend of foreign direct investment in Sub-Saharan

African countries. Thus, it is suggested that the increased penetration of internet usage in Sub-Saharan African countries tends to encourage foreign direct investment inflow.

Also, this study contains an interactive regression. When the interactive effect is considered for enhancing internet penetration in Table 4, a negative and significant influence on foreign direct investment inflow is established. In economic terms, a negative sign shows that the particular phenomenon is limiting foreign direct investment inflows, while a positive influence identifies the increased effect of such phenomena on foreign direct investment inflows.

However, with the identified pitfalls of interactive regression, this study rectifies the pitfall identified by computing “net effect” estimate and add all the constructive variables to the specification (Brambor et. al., 2006). Following prior studies (Asongu & Odhiambo, 2019a), the study computes enhancing effect of internet penetration on foreign direct inflow. For instance, from the ultimate column in Table 4, the net effect from the enhancing internet penetration is 1.481 ($2*(-0.0711*0.764)+(1.59)$). The computation is based on mean value of internet penetration of 0.764, while the unconditional effect of internet penetration is 1.59 and the marginal impact of internet penetration is -0.0711. In addition, the study establishes a positive net effect of internet penetration on foreign direct inflows.

DISCUSSION OF RESULTS

The result from Table 4 reflects that increased internet usage contributes positively to the inflows of foreign direct investment in Sub-Saharan African countries. This further explains that significant internet penetration in Sub-Saharan African countries signifies infrastructural benefits for foreign companies to establish their business across the Sub-Saharan African region. Prior studies have established the linkages between internet development and FDI penetration on an economy's growth potential. These studies were investigated in two decades back and premised on a statistical significance that internet development and FDI penetration are two mutually exclusive concepts that bring about the growth of an economy (Pradhan et al. 2014; Chakraborty, 2009; Das, December & Erumban, 2016; Vu, 2011; Alam & Shahiduzzaman, 2014; Ishida, 2015). These empirical investigations that have posited a positive and significant causal nexus between internet development and FDI penetration on the growth of an economy were averse to other empirical underpinnings where uncertainty and ambiguity arising from the impacts of FDI penetration and internet development on the growth of an economy are statistically insignificant (Veeramacheneni, 2011).

Table 4						
INTERNET PENETRATION AND FOREIGN DIRECT INVESTMENT						
	Dependent Variable: Foreign Direct Investment (% of GDP)					
	Independent Variable: Internet penetration (per 100 people)					
	OLS	OLS	FE	FE	GMM	GMM
L.FDI	-	-	-	-	0.643***	0.622***
	-	-	-	-	-0.00687	-0.00707
Internet	-0.216	0.0907	0.32	2.015***	0.286***	1.590***

	-0.212	-0.688	-0.239	-0.588	-0.0776	-0.0604
Internet x Internet	-	-0.0184	-	0.0829***	-	0.0711***
	-	-0.0392	-	-0.0264	-	-0.0029
Openness	0.106***	0.104***	0.123***	0.125***	0.0356***	0.0819***
	-0.016	-0.0165	-0.0225	-0.0221	-0.00584	-0.00226
Tertiary	-0.189**	-0.205**	-0.254**	-0.402***	-	-
	-0.0785	-0.0856	-0.102	-0.111	-	-
GDP	0.161	0.165	-0.0504	-0.0438	0.221***	0.203***
	-0.146	-0.146	-0.0943	-0.0929	-0.044	-0.038
Constant	1.155	1.022	1.263	0.927	2.431***	5.654***
	-1.543	-1.57	-1.717	-1.695	-0.546	-0.287
Net Effect	NA	NA	NA	1.888329	NA	1.481359
R-squared	0.132	0.233	0.203	0.332	-	-
RMSE	8.764	8.775	4.824	4.752	-	-
F-test	12.64***	10.13***	8.329***	8.842***	354.2***	645.6***
Hansen test	-	-	-	-	[0.403]	[0.384]
AR(1)_test	-	-	-	-	[0.044]	[0.023]
AR(2)_test	-	-	-	-	[0.107]	[0.426]
No. of Instruments	-	-	-	-	26	32
Observations	337	337	337	337	579	579
Number of Country	42	42	42	42	44	44
Standard errors in parentheses						
*** p<0.01, ** p<0.05, * p<0.1						
N/A means Not Applicable						

CONCLUSION

The study's objectives were achieved by exploring a panel data of 48 in Sub-Saharan African countries with data from many of the databases for the period 2000–2018, including the World Bank Development Indicators and the United Nations Conference on Trade and Development (UNCTAD). The periodicity followed, and the analyzed countries at the time of the analysis are dependent on data constraints, and the period signifies significant inflows of foreign direct investments in Sub-Saharan Countries. This study's empirical evidence is based on three estimation strategies: the ordinary least square, fixed effect regression, and generalized method of moments to account for endogeneity concerns. These multiple strategies tend to establish the robustness of the study's findings.

We find that the internet penetration is significantly positive on the foreign direct investment inflows in Sub-Saharan Africa. The positive sign signifies the direct impact and relationship between internet penetration and the increasing foreign direct investment trend in Sub-Saharan African countries. Furthermore, the interactive regression shows a negative and significant influence on foreign direct investment inflow, whereas a positive influence identifies the increased effect of internet penetration on foreign direct investment inflows. However, the study computes a net effect due to the pitfalls of interactive regression. The study establishes a positive net effect of internet penetration on foreign direct investment inflows.

Although 48 Sub-Saharan African countries were used, the study's generalization is restricted to the region considered, and the periodicity was limited to 2000 - 2018. This study also fails to explore the entire African countries or other developing countries because it is believed that Sub-Saharan Africa tends to have unique characteristics. For instance, extreme poverty is declining in regions of the world except for Sub-Saharan Africa, where poverty is enormously increasing. The 2017 World Bank report on the Millennium Development Goals reiterates that extreme poverty is growing in Sub-Saharan African countries. These worrisome findings signify that most Sub-Saharan African countries are far from achieving the Millennium Development Goals extreme poverty target. Future studies should augment the ICT indicators with policy variables such as governance quality, control of corruption, government effectiveness, political stability, quality of regulations, the rule of law, and accountability to provide more room for policy implications.

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