

# THE ROLE OF MOBILE PHONE PENETRATION ON FOREIGN DIRECT INVESTMENT INFLOW: EVIDENCE OF SUB-SAHARAN AFRICA

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## ABSTRACT

*This study assesses the enhancing effect of mobile phone penetration on Foreign Direct Investment (FDI) for a panel dataset of all the 48 Sub-Saharan African countries, which is extracted from World Bank database between 2000-2018. This study adopts 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. The results are defined as follows: (i) the coefficient estimates of the mobile phone penetration on FDI are positive and statistically significant; (ii) the net effect of mobile penetration remains positive on the FDI. The paper recommends that considering the low investment in the technology infrastructure and resultant benefits of the infrastructure in Sub-Saharan Africa, the governments in the region should make substantial investment in the localized technology, which in turn will encourage the foreign direct investment inflows into the region.*

**Keywords:** Mobile Phone Usage, Internet Penetration, Technology, Foreign Direct Investment, Sub-Saharan Africa

## INTRODUCTION

The recent progressive economic and societal welfare in the last few decades can be traced to technology utilization (World Bank, 2017). Globally, technology is identified as the central ingredient in socio-economic development, and its effective usage is seen as the essential player for development strategies (Heeks & Stanforth, 2015). Therefore, this phenomenon has ascended stakeholders' interest in exploring the stages of technological changes such as technological diffusion, innovation, adaptation, and link development. Similarly, developing economies have experienced a significant technological quantum leap. The Global System for Mobile Communications (2019) validates the strong growth of technological advancements in developing countries. The report reveals the advancement of technology in the developing countries since the 1990s, while technological progress has been faster, reflecting the increased exposure to foreign technology compared to the developed countries. However, there remains a technological gap between advanced and low-income countries. The technological gap between the developed countries and their counterparts is more noticeable for innovative technologies. This gap is traceable to the domestic factors such as weak basic infrastructure and weak governance quality, which tend to stunt the level of technological progression (Asongu & Odhiambo, 2019b; Elu & Price, 2010).

FDI refers to the movement of capital to the host country. World Bank (2017) avers foreign direct investment as the cross-border venture by the foreign investors that have significant ownership control on the organization to establish a sustainable corporation. The criterion of ownership shall be at least 10 percent of the electoral authority. As a measure of sustainable investments multinational institutions such as the World Bank and International Monetary Fund support foreign direct investment, especially in developing countries. FDI has been identified as a strong determinant for countries' economic progressiveness, especially developing economies, mostly accompanied by capital transfer and technology diffusion. The annual FDI flows worldwide have risen with different figures over the years, as their height reached US\$ 1.400 billion in 2000, according to the UNCTAD report (2015). In three years, global flows then declined by 60% as the global economy weakened. Global FDI flows recovered from 2004 to 2007, exceeding USD 1.900 billion prior to the financial crisis declining again in 2008. In 2009, global FDI flows dropped to \$1.200 billion, and in 2015 they plummeted to \$1.760 billion.

African FDI influx has been rising strongly since 2002, rising to 53 billion USD relative to 2007, rising by 47.2 percent in 2006, and at its highest historic pace since 2008, before the financial crisis. Despite the downturn in African share in global FDI flows, the estimates for 2008 are expected to stay resilient, rising by 16.8 percent to USD 61.9 billion compare to 2008, while Africa's share in global FDI flows decreased to 2.9 percent in 2007, down from 3.2 percent in 2006. In Africa, FDI return rates have risen since 2004, with 12.1 percent becoming the highest for host regions in the developed world in 2007. It is argued. Mergers and acquisitions (M&AS) in Africa rose by an estimated 157 percent to USD 26 billion in 2008. It should be noted that the entire share of global FDI flows in Sub-Saharan Africa has been fluctuating between 2-3% from 2003 through 2015; although flow to South Africa has increased considerably in the last 20 years, its share in global FDI is still very poor.

An interesting strand of literature has documented the benefits accrued to Foreign Direct Investment in the host countries, which include technology transfer and human capital development together with the likely spill over influence on local investment and building strong institutions (Asongu & Odhiambo, 2019b; Brada et al., 2019; Brafu-Insaidoo & Biekpe, 2014; Peters & Kiabel, 2015). Nevertheless, the substantive benefits are harvested depending on the predominant conditions in the host country.

Prior studies have primarily highlighted the inter-relationship between FDI and economic outcomes while others have identified diverse determinants of FDI (Brada et al., 2019; Brafu-Insaidoo & Biekpe, 2014; Canare, 2017; Gordon et al., 2012; Hunady & Orviska, 2014; Jones & Temouri, 2014). However, there exist limited studies examining the synergy effect of ICT on FDI, especially FDI inflows. With the potential for a higher level of ICT utilization in Sub-Saharan, it is vital to explore whether increased investment in ICT domestically could attract more FDI in Sub-Saharan Africa.

Thus, this Study explores whether increasing the mobile phone penetration would enhance foreign direct investment in Sub-Saharan Africa. The remainder of the study is structured accordingly. Section 2 deals with the theoretical framework underpinning the study and review of prior study. 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

The endogenous growth theory underpinned Information Communication Technology (ICT) as an indicator of FDI inflow in any country. The theory posited technology spill over or diffusion from host to home country to spur FDI (Fontoura & Crespo, 2007; Borensztein et al., 1998). Endogenous growth theory postulated five dimensions of technological spill over or diffusion directly linked to FDI inflow. These dimensions co-exist such that they promote innovations for market entrants in technology infrastructure penetrations that offer foreign investors the opportunity to choose their investment destinations without fear of the forces of business environmental factors. Such factors include best global practices in technology innovations, keen competitions, labour mobility, backward and forward integrations, exportations, and intellectual capital developments. These factor models help attract and retain FDI inflows by expanding market size for host countries; while promoting new skills and competitive structures.

This theoretical underpinning premised FDI as a systematic means by which productive activity in foreign-based entity operates in a business environment characterized by imperfect competition of market conditions. This theory compares the difference between FDI inflow into a country and portfolio investment. The theory posited the investment portfolio's theoretical frameworks to encapsulate capital flight from regions with a lower interest rate to a higher interest rate until there is a consensus ad idem to reconcile the disparity in the interest rate applicable in the regions. However, capital flight, such as uncertainties and risks, has no barrier. The empirical study credited to Hymer gained tremendous support in other scholarly works of literature (Vaitsos, 1974; Cohen 1975; Knickerbocker, 1973; Lemfalussy, 1961; Caves, 1974; Kindleberger, 1969; & Dunning, 1974). According to Hymer (1976), portfolio investment theory does not pose any causal effect of control on FDI in the host country. Hymer's theory of FDI characteristics postulated fierce competitive emergence. To that effect, benefits obtained from language, consumer's taste, culture, and legal frameworks peculiar to domesticated entities have to be competed for by foreign entities penetrating international borders. The returns from market forces interaction will compensate for the exchange rate risk from international exposure.

## EMPIRICAL REVIEW

The evolving consequences of globalization trends are inevitable, whereas ICT development and FDI penetration cannot be contrived as undeserving phenomena. The interactions between both concepts are astronomically evident in environmental, economic, political, and socio-cultural destinations and domiciliation of investment. However, ICT development has been posited to contribute significantly towards the growth of an economy. As posited by the Department for International Development, ICT was articulated as any technological developments that enhance effective communication, information transmission, and processing through electronic mechanisms. Owing to Heeks & Duncombe (1999) research underpinnings, ICT was posited as any means of electronic mechanism for capturing, storing, processing, and sharing information. In generally acceptable definitions, ICT connotes the use of computer and electronic-based technologies for gaining access to information and shared awareness with the global community. Various prior literatures that have investigated the nexus between FDI penetration and ICT development are discussed below.

The linkages between ICT development and FDI penetration on the growth potential of an economy were first examined. These studies were investigated in two decades back and were premised on a statistical significance that ICT 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). Evidence from emerging economies such as Taiwan and South Korea, Hong Kong, and Singapore has experienced rapid and successful diffusions in ICT developments, making them highly industrialized and high income-based economies.

These empirical investigations that have posited a positive and significant causal nexus between ICT 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 ICT development on the growth of an economy are statistically insignificant (Veeramacheni, 2011). However, the limited studies that have also posited a negative impact of FDI penetration and ICT development reiterated much of the labour market and employment prospects. These empirical investigations also elaborately articulated that a society predominant of poor individuals usually have limited resources that adapt and acquaint them with modern ICT infrastructures, which, as a result, increase income inequalities and poverty index. Moreover, the development of ICT favours countries characterized by a developed status than developing ones in domestic markets.

Das (2010) stressed that unprecedented integration experienced globally has continued to shape and influence liberalization frontiers in trade and financial opportunities. The dynamic nexus encompassing the variance in economic growth, and globalization has been frequently investigated using various statistical measures. Breznitz & Murphree (2011) & Dreher (2006) observed that the index of capital account openness revealed statistical insignificance between low-income economies and globalization. The dynamism of these empirical investigations also posited cross-sectional estimates of characteristics that are inconsistent with time. As posited in other empirical studies, modern approaches were employed with panel data specifications to investigate the nexus between economic growth and globalization. To this end, Dreher, et al. (2008) stressed that enhancement in trade liberalization frontiers fostered by FDI penetration has always resulted in increased growth of the economy.

Most recently investigated studies have comprehensively stressed that the nexus between the growth of the economy and globalization are statistically significant. Accordingly, Adhikary (2010) posited that economic growth and globalization are statistically significant in the Bangladesh economy.

The fourth strand of empirical literature identified FDI as a critical factor for driving the economy's growth characterized by a developing potential. At the same time, a limited number of empirical literatures have also been explored directly to examine the level of interaction between FDI penetration and the growth of an economy. The majority of the existing literature has posited a statistical significance between economic growth and identified FDI as the complementary concept in many host regions. Findings documented in this empirical literature showed that most countries that receive FDI demonstrate significant growth in their economy (Ramona, 2015). Hoa, et al. (2016) posited analytically that FDI trends are the primary determinant that has significantly improved the Malaysian economy.

Market liberalization and globalization of the financial sector have been identified as important concepts that stimulate significant penetrations in FDI and market entrants for ICT development in some countries characterized by a developing potential. The classical economic

school of thought contrived FDI as an engine that drives the growth of an economy. The school of thought further reiterated that FDI is responsible for significant appreciations in output per capital (Sahoo et al., 2014). FDI is an amplifying mechanism for growth and injection of potential investments into an economy and consequently, the factor that mitigates income inequality and enhances employment generation (Sharma, 2013).

The author further asserted that FDI plays pivotal roles in the attraction of investment into the Indian economy. Numerous empirical studies bothering on FDI penetration and growth puzzles of economy regarded various frameworks and models, one of which is proposed by Kida (2014) on the premise that a dynamic relationship and interaction exists between the growth of an economy and FDI penetration with the aid of endogenous and Solow models. However, findings revealed that a positive and statistical significance exists between FDI penetration and economic growth characterized by developing and developed potentials. Findings also stressed that the growth of the economy precipitates long term enhancement of FDI penetration.

Moreover, evidence from the European Union stated that FDI models the frameworks that enhance its growth. It also articulated that a significant recoverable amount of GDP is largely contributed by FDI penetration in the region (Liviu & Lucian, 2013). Meanwhile, growing empirical investigations have explored the developmental frameworks for analyzing the nexus between ICT development and FDI penetration. Reports generated from these empirical backgrounds in literature and conceptual overviews; support the significant impact that technology exerts on the growth of an economy.

Many reforms have been conceptualized and documented in the BRICS region to promote ICT markets for industrial development. Therefore, it is imperative to investigate to what extent ICT development affects this region's growth potential. However, data analyzed from 2000 to 2014 revealed that ICT development and FDI penetration are compatible, making the BRICS region more susceptible to liberalization in the ICT sector for FDI. It also results in a tremendous transformation in the advancement of ICT infrastructures that enable fast transmission of data and information.

## **DATA AND METHODOLOGY**

### **Data**

To achieve the objective of this study, 48 Sub-Saharan African countries' panel data between 2000-2018 is extracted from mainly the World Bank database and data from the United Nations Conference on Trade and Development (UNCTAD). The main collection of development indicators collected from internationally recognized official sources is the World Development Indicators. This provides national, regional and global estimates and the new and most reliable global development data available.

### **Measurement of Variables**

#### **Dependent Variable**

The key dependent interest variable – the FDI inflow - is derived from the World Development Indicators. FDI consists of funding obtained in the country from foreign entities. The dependent variable therefore is the inflow as a share of the nominal gross domestic product of FDI.

## Independent Variable

Following previous research on the use of Information And Communication Technology (ICT) (Asongu & Nwachukwu, 2016; Tchamyu, 2017), we follow simple ICT metrics, namely: the cell phone use rate per 100 people. 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 providing 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 section explains the regression methods adopted to test the formulated hypotheses. This study employs three distinct regression techniques such as Ordinary Least Square (OLS), Fixed Effect Regression (FE), and Generalized Moment of Method (GMM). The first step of this analysis estimates the foreign direct investment's technological determinants using the Ordinary Least Square estimator. This estimator pools all the observations in which the model ignores the panel structure of the dataset. However, the estimator assumes the same intercept values for all sample countries. Furthermore, the assumption that the adopted independent variables' slope coefficient is identical for all sampled countries seems very unrealistic. This implies that the Ordinary Least Square cannot explain the true relationship between the dependent variable and independent variables. Although the fixed effect model against the Ordinary Least Square allows the sampled countries to allocate different intercepts, the chosen period is time-invariant. It is also assumed that the time-invariant characteristics are individually unique, which should be uncorrelated with other individual characteristics. The error terms in the fixed effect specification assume a constant variance over time and are serially uncorrelated while the random effect specification controls for heterogeneity (Boudriga et al., 2010).

The panel Fixed Effect model is shown as follows:

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

Where  $FDI_{i,t}$  is the foreign direct investment inflows of the country  $i$  in period  $t$ ,  $\sigma_0$  is a constant,  $Internet$  represents the Fixed broadband subscriptions,  $Mobile * Mobile$  denotes the quadratic interactions between the Mobile cellular subscription subscriptions.  $W$  is the vector of control variables (Trade openness, GDP growth and school enrollment),  $\tau$  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,  $\eta_t$  is the country-specific effect and  $\varepsilon_{i,t}$  is the error term.

Table 1 DESCRIPTION OF VARIABLES AND DATA SOURCES		
Variable	Description	Source
<b>Dependent Variable</b>		
Foreign Direct Investment	Foreign direct investment, net inflows (% of Gross Domestic Product)	WDI
<b>Independent Variables</b>		
Mobile Penetration	Mobile cellular subscriptions (per 100 people)	WDI
<b>Control Variables</b>		
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		

Similarly, the study intends to capture the FDI trends, net inflows (% of Gross Domestic Product). To achieve this objective, it is essential to elaborate on the study’s analysis as an independent variable. The presence of lagged dependent variable as an explanatory variable in the autocorrelation and interaction results, constituting heterogeneity amidst the units (Baltagi, 2013). The stated effects render the OLS and Fixed effect estimator biased and inconsistent. Therefore, the Generalized Methods of Moment estimator proposed by Arellano and Bond (1991) eliminates the stated effects alongside the time-invariant regressors. Likewise, two prominent tests are required to confirm the applicability of the GMM estimator. For the GMM estimator to be valid for analysis and estimation, null hypothesis for First Order [AR (1)] autocorrelation test is rejected while the null hypothesis for Second Order [AR (2)] autocorrelation test is not rejected. Again, to determine the validity of instruments used, Sargan test of over-identifying restriction is suggested in which its null hypothesis is not rejected.

The below equation in level (2) and difference (3) summarize the standard method of system GMM evaluations.

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

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

Where  $\tau$  denotes tau and  $\xi_t$  is the time-specific constant.

## EMPIRICAL RESULTS

### Descriptive Statistics

Table 2 reports the results of the descriptive statistics of each variable for the purposes of the study and comprises the mean, minimum, limit, standard deviation, kurtosis and variable skewness. From the Table, the foreign direct investment of the selected SSA 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 mobile phone penetration of the selected Sub-Saharan African countries reports a mean of 44.05, with a minimum and maximum value of 0 and 184.3, respectively. The Table also reports the standard deviation of foreign direct investment as 41.72, with the kurtosis of 3.013 and 0.902 level of skewness.

Likewise, internet penetration presents a positively correlated inflow of foreign direct investment with a coefficient value of 0.0455 in Table 3. Although the degree of relationship is weak and low, it also remains insignificant at 5% level. This implies that increased internet penetration results in a higher level of foreign direct investment inflow.

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

	<b>Mean</b>	<b>Min</b>	<b>Max</b>	<b>SD</b>	<b>Kurtosis</b>	<b>Skewness</b>
FDI	4.942	-6.057	103.3	8.846	45.93	5.596
Mobile	44.05	0	184.3	41.72	3.013	0.902
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

	<b>Fdi</b>	<b>Mobile</b>	<b>Openness</b>	<b>Gdp</b>	<b>Tertiary</b>
FDI	1				
Mobile	0.0289	1			
Openness	0.307***	0.524***	1		
GDP	0.07	-0.204***	-0.0578	1	
Tertiary	-0.0682	0.638***	0.346***	-0.204***	1
*p< 0.05, **p< 0.01, ***p< 0.001					



## Empirical Result Relating to the Effect of Mobile Phone 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 FDI 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 "mobile phone penetration."

Table 4 presents the result of the effect of the mobile phone penetration on the explained variable that is the FDI. This is done with the motive to explain the level of influence of mobile phone 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 applicability of OLS estimator, 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 4.3. The R-squared reports the 38.3% of the independent variables to explain the level of the foreign direct investment. 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 shows that the coefficient estimates of mobile phone penetration on foreign direct investment are positive and statistically significant at a 5% significance level, except for column 1 of Table 4. The positive sign signifies the direct impact and relationship between mobile phone penetration and the increasing trend of FDI in SSA. Thus, it is suggested that the increased penetration of mobile phone usage in Sub-Saharan African countries tends to encourage FDI inflow.

Also, this study contains an interactive regression. When the interactive effect is considered for enhancing mobile phone 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 FDI inflows. However, with the identified pitfalls of interactive regression, this study rectifies the pitfall identified by computing "net effect" estimate and adds all the constructive variables to the specification (see Brambor et. al. 2006). Following prior studies (Asongu & Odhiambo, 2019a), the study computes enhancing effect of mobile phone penetration on foreign direct inflow. For instance, from the ultimate column in Table 4, the net effect from the enhancing mobile phone penetration is  $0.0137 (2*(-0.000110*44.05)+(0.0234))$ . The computation is based on mean value of mobile penetration of 44.05, while the unconditional effect of mobile penetration is 0.0234 and the marginal impact of mobile phone penetration is -0.000110. In addition, the study establishes a positive net effect of mobile phone penetration on FDI inflows.

## Discussion of Results

The result from Table 4 shows that increased mobile phone usage contributes positively to the inflows of FDI in Sub-Saharan African countries. This further explains that effective

mobile phone penetration in Sub-Saharan African countries signifies infrastructural benefits for foreign companies to establish their business across the Sub-Saharan African region.

There have been evolving strands of scholarly underpinnings that have motivated determining empirical justifications for assessing broad benefits offered by mobile phone penetrations for attracting FDI (Mpogole et al. 2008). By examining the empirical study as posited by Kliner, et al. (2013), mobile phone penetration in SSA has deliverable capacity for attracting FDI in the entire region; this corroborates what Kirui, et al. (2013) posited as benefits offered by the utilization of installed capacity in mobile phone penetration for closing the digital divide in SSA.

This is imperative because the benefits of technological innovations in mobile phone developments provide an enabling platform for economic integration and trade openness. Rural and urban integrations enable information acquisition through mobile phone interactions, the benefits which translate into commodity purchase (Warren, 2007).

In the study conducted by Mishra & Bisht (2013), evidence from emerging economies, despite the digital divide in SSA region, has been a more inclusive approach towards acknowledging mobile telephony's contribution to foreign direct investment attraction in SSA. By leveraging the economic system that develops its policies to create room for FDI inflow, ICT development was their primary objectives central to enhancing economic growth (Demombynes & Thegeya, 2012). The literature on mobile phone impact in attracting FDI into SSA can be posited from the trio stance encompassing reducing the digital gap in urban and rural diversity, gender empowerment, and trade openness for FDI penetration.

<b>Dependent Variable: Foreign Direct Investment (% of GDP)</b>						
<b>Independent Variable: Mobile phone penetration (per 100 people)</b>						
	OLS	OLS	FE	FE	GMM	GMM
L.FDI	-	-	-	-	0.563***	0.559***
	-	-	-	-	-0.00918	-0.00836
Mobile	0.00991	0.0746***	0.0240*	0.0571**	0.0109***	0.0234***
	-0.0126	-0.027	-0.0138	-0.0223	-0.00324	-0.00647
Mobile x Mobile	-	0.000510***	-	0.000318*	-	0.000110**
	-	-0.0002	-	-0.00017	-	-0.0000429
Openness	0.0806***	0.0838***	0.0845***	0.0802***	-	-0.0507***
	-0.0118	-0.0118	-0.0167	-0.0168	0.0507***	-0.00265
Tertiary	-0.189**	-0.187**	-0.196*	-0.149		
	-0.073	-0.0725	-0.107	-0.109		
GDP	0.151	0.157*	0.00415	0.0145	0.127***	0.0804***
	-0.0947	-0.0941	-0.07	-0.07	-0.0376	-0.0275
Net Effect	NA	0.0297	NA	0.029084	NA	0.013709

Constant	0.492	1.695	0.597	0.984	3.978***	4.215***
	-0.991	-1.08	-1.237	-1.251	-0.487	-0.307
R-squared	0.212	0.326	0.275	0.383	-	-
RMSE	8.13	8.076	5.303	5.288	-	-
F-test	14.78***	13.44***	8.607***	7.634***	345.7***	567.9***
Hansen Prob	-	-	-	-	[0.714]	[0.320]
AR(1) Prob	-	-	-	-	[0.008]	[0.016]
AR(2) Prob	-	-	-	-	[0.776]	[0.140]
No. of Instruments	-	-	-	-	26	32
Observations	472	472	472	472	792	792
Number of Country	45	45	45	45	45	45

## CONCLUSION

To achieve the objective of this study, 48 SSA countries' panel data for the period 2000-2018 is extracted from mainly the African Development Indicators of the World Bank and data from the United Nations Conference on Trade and Development (UNCTAD). The main collection of development indicators collected from internationally recognized official sources is the World Development Indicators. This provides national, regional and global estimates and the new and most reliable global development data available.

We find that the mobile phone penetration has a significant and positive influence on FDI inflow in Sub-Saharan African countries. The positive sign signifies the direct impact and relationship between mobile phone penetration and the increasing FDI trend in Sub-Saharan African countries. Besides, this study contains an interactive regression. When the interactive effect is considered for enhancing mobile phone penetration, 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, whereas a positive net effect of mobile phone penetration on foreign direct inflows is established.

From the empirical findings of this study, the following recommendations are stipulated. This study is predominantly motivated by the information technology revolution in Sub-Saharan Africa. It provides an empirical assessment of the impact of ICT on foreign direct investment inflows in sub-Saharan Africa. The analysis implies that speculation on ICT's potential opportunities to enhance foreign direct investment in sub-Saharan Africa is genuine. Thus, the governments in the region should implement policies that could help enhance technology usage and penetration. Considering the low investment in the technology infrastructure and resultant benefits of the infrastructure in Sub-Saharan Africa, the governments in the region should make

substantial investment in the localized technology, which in turn will encourage the foreign direct investment inflows into the region.

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