

HOW DOES FINANCIAL DEEPENING MODERATE FOREIGN DIRECT INVESTMENT INFLOW TO AFRICAN COUNTRIES: A NOVELTY FROM DYNAMIC THRESHOLD PANEL?

AMUZU Dominic S.Y

&

AZURE Asaanbil Ndego Ndebang

Akim State University College

Abstract

This research paper examines the threshold value for which financial deepening moderates the inflow of foreign direct investment in the Africa context, relying on the composite financial sector indices developed by the international monetary fund. Previous studies have centred on Asia and America, while the few which looked at Africa failed to incorporate the newly developed International Monetary Fund's financial depth index. This study is novel for further examining the nonlinearity on the sub-regions with the threshold model. We find that financial deepening precipitates foreign direct investment inflow at the threshold of 0.2307. on the other hand, panel threshold regression analysis shows that below this threshold value, financial depth is unattractive to external investors. The implication for policymakers is that to attract the inflow of foreign direct investment to Africa, there is the need to deepen their financial systems above this threshold value. Notably, the findings of this study are robust to other estimators used, tackling issues of endogeneity, heteroscedasticity and serial correlation.

Key-words: *Threshold analysis, financial deepening, FDI, 2SLS, Africa, endogeneity*

Résumé

Ce document de recherche examine la valeur seuil pour laquelle l'approfondissement financier modère l'afflux d'investissement direct étranger dans le contexte africain, en s'appuyant sur les indices composites du secteur financier développés par le Fonds monétaire international. Les études précédentes se sont concentrées sur l'Asie et l'Amérique, tandis que les quelques-unes qui ont examiné l'Afrique n'ont pas réussi à intégrer l'indice de profondeur financière récemment développé par le Fonds monétaire international. Cette étude est nouvelle pour examiner plus en détail la non-linéarité des sous-régions avec le modèle de seuil. Nous constatons que l'approfondissement financier précipite l'afflux

d'investissement direct étranger au seuil de 0,2307. D'autre part, l'analyse de régression du seuil du panel montre qu'en dessous de cette valeur seuil, la profondeur financière n'est pas attrayante pour les investisseurs extérieurs. L'implication pour les décideurs politiques est que pour attirer l'afflux d'investissement direct étranger en Afrique, il est nécessaire d'approfondir leurs systèmes financiers au-dessus de cette valeur seuil. Notamment, les résultats de cette étude sont robustes aux autres estimateurs utilisés, abordant les problèmes d'endogénéité, d'hétéroscédasticité et de corrélation sérielle.

Mots-clés : Analyse de seuil, approfondissement financier, IDE, 2SLS, Afrique, endogénéité

Introduction:

Economies posed to grow and develop must content with how, where and the quantum of competing resource available to them. Resource classified in terms of funding, technology, technical know-how, manpower and material among others is necessary to ensure economic expansion. Africa is endowed with both human (though much of them unskilled) and natural resources. However, economic expansion can be achieved if long term capital in the form of FDIs is committed. Foreign direct investment in whatever form is a necessary factor for economic growth and development because of its propensity to exert positive and beneficial impact in the form of technology, trade, education, employment, skills training and technical knowhow to recipient economies(Hermes & Lensink, 2003; Aregbeshola, 2014). An additional benefit of FDI is that it enables local firms to gain a spirited advantage by imitating and adopting new ideas and technology from their foreign counterparts instead of undertaking expensive innovation (Giachetti & Lanzolla, 2016).

Foreign direct investment also brings in its wake the need for recipient economies to develop absorptive capacities in the form of education and skills training to enhance the chances of locating in that country, especially technical, technological and skilled intensive firms (Kheng, Sun, & Anwar, 2017). The need for human resource development therefore is paramount and a location advantage tool(Dunning, 1981). Several studies point to the fact that countries with high levels of unskilled labour are less likely to attract FDIs, especially MNCs with advanced

technology and highly skilled workforce requirements (P. Comolli, 2018; L. Comolli, 2019). Understandably, Kibria, Oladi, & Akhundjanov (2020) suggest that any increase in FDI to African economies bedevilled with unskilled labour could increase the incidence of conflicts but reduces the conflicts in countries with the increased skilled labour force.

Considering the importance and influence of foreign direct investment inflow to economies, financial deepening (FinDp) can act as an enhancing factor in the flow of FDI because FinDp is an important locational determinant for FDI as per the theory of ownership, location and international model (OLI) by Dunning and Lundan (2008). The focus of FinDp in attracting FDI is because investors will use the financial system to transfer funds for their initial investment purposes (Desbordes & Wei, 2017), as well as raise further funding in the domestic market which is considered cheaper as compared to that of foreign sources (Hermes & Lensink, 2003). Studies further reveal that deepening the financial space, helps in channelling various types of funds to the depository unit for investors to borrow from (Pradhan, 2010; Khan, Islam, & Akbar, 2020). Apart from the above benefits, financial deepening offers financial assets and instruments through which investors can channel their money into an economy to further moderate economic expansion.

Karimo & Ogbonna (2017), opine that economies reap the benefit of foreign direct investment if their the financial sector is well-deepened which leads to economic augmentation. This further influences the development of domestic firms and entrepreneurial abilities. However, a less developed financial sector limits the country's chances of benefitting from foreign direct investment inflows (Otchere, Soumaré, & Yourougou, 2016; Triggs, Kacaribu, & Wang, 2019). The indications above show the importance of a destinations' financial sector development to the inflow of foreign direct investment. several empirical studies have been modelled around traditional finance and economic growth proxy variables. This study includes the new IMF financial depth index, which is lacking in many

studies. Further, there is hardly any such study examining a wide range of financial depth indicators on threshold analysis on major Africa economies with seemingly well developed and functioning financial sector.

The exception, however, is the studies conducted by Liu, Islam, Khan, Hossain, & Pervaiz, (2020) used the new IMF financial depth index on threshold analysis but considered OBOR countries. Sahay, Čihák, N'Diaye, & Barajas, (2015) looked at emerging markets whilst Svirydzienka, (2016) aggregated indices of financial depth for 183 countries, to show the depth financial institutions and markets are. The current paper thus, examines how financial depth moderates FDI flows to Africa via threshold framework, using traditional financial development indicators and the newly developed financial depth index, to show that agglomeration is beneficial to influencing financial depth and an important factor to attracting FDIs. Agglomeration is a situation where the preexisting condition can trigger the added benefit of a new condition, in this case, variables such as monetary aggregates M3, private credit from the banking system as per cent of GDP (PCBank) and total financial sector deposits as per cent of GDP (FSD), differing from other existing studies.

This study diverges from other prior studies, first by settling on single and multiple threshold values indicating the upper bounds at which threshold precipitate FDI flows and a lower bound for which financial depth cannot precipitate FDI flows. Second, we shall adopt sequential exogeneity assumptions, that is specific lags of the original regressors is used as instrumental variables, in a condition of zero correlation between the instruments and the model errors to take care of dynamic panel endogeneity which is usually not taken care of in FDI-financial studies. The third issue is as alluded to earlier, is to incorporate financial depth index with traditional finance variables for agglomeration effect. Lastly, the study settles on recommendations for Africa countries in their dynamic heterogeneity, though one continent is beset with diver's development challenges and peripheral voices.

The rest of the paper is organized in the following order, section B underscore the reason for the choice of economies selected, section C presents theoretical and empirical literature related to the studies on hand and section D examines methodology and dataset used for the study. In section E, analysis for the study is presented empirically, concluding the study in section F with policy recommendation, investment opportunities and future research path to follow.

Section B: Reasons for considering some major Africa Economies

This study examines some major Africa economies made of eight (8) countries of diverse development and growth attainment, languages, currency and culture among others. the choice of a dataset is considered important, steaming from the fact that the continent is well endowed in terms of natural and human resources, holding a vast raw material base yet struggles to gain needed FDI inflows for economic augmentation. According to the world population project 2019, Africa accounts for 1.3 billion (16.8%) of the 7.7 billion global population in 2019 and is expected to contribute about 52% of the 2 billion global population that will be added between 2019 to 2050 (United Nations, 2019 p5). Additionally, the continent reports a nominal GDP of US\$2.6 trillion with an annual GDP growth rate of 3.4% as of 2019(ADB, 2020). Different from studies conducted by Baloch, Zhang, Iqbal, & Iqbal, (2019) which looked at economic footprints of 65 countries of BRI, controlling 65% of the world population and 31% of global GDP.

In terms of natural resources, the continent holds the largest land reserves in the world, rivers (Congo and Nile) second in terms of length and size in the world and second biggest tropical forest in the world. furthermore, Africa accounts for about 30% of the global mineral reserves and fisheries and aquaculture products are estimated to be around US\$24 billion(AfDB, 2010, 2020). From these statistics, the continent has no excuse to be lagging on economic growth and development, noting that natural and human resources form the bedrock for production

and growth. However, issues of governance, rule of law, corruption and bad policy choices cannot be ruled out of the equation(Natural Resource Government Institute, 2018).

Physical resources are an important and integral part of economic activity but without finance, the resource cannot be converted to any meaningful and tangible use. It is therefore important for the continent to attract the much-needed financial and technological resource through FDIs, to achieve economic augmentation. To this end, Africa needs to strengthen and deepen its financial sector which acts as a conduit not only for saving mobilization but for attracting FDI and portfolio investments (Acheampong, 2019; Islam, Khan, Popp, Sroka, & Oláh, 2020). Studies show that Africa is not attracting enough FDIs among whom are (Aregbeshola, 2016; Boğa, 2019; UNCTAD, 2019). Due in part to the weak and embryonic financial system and institutional inadequacy (Aregbeshola, 2014; Edokat & Njong, 2019; Kapaya, 2019).

Riding on the shoulders of finance to transform resources, this study seeks to examine how financial deepening could precipitate the inflow of FDI for economic augmentation in Africa. Because of the important and influential role financial deepening play in FDI attractiveness, it is necessary to interrogate some possible mitigating factors as well as commonalities in these countries. Africa is vast with different cultural, social and development challenges. First, the continent is generally characterized as low income (Ernest, David, & Irene, 2020). Second Africa boasts of a very dynamic youthful population(Njenga et al., 2020; Mutuku, 2020). Which is a good breeding ground for labour and product market. Notwithstanding, the financial system is mostly embryonic and shallow(Aibai, Huang, Luo, & Peng, 2019b).

Considering how the global financial space is integrated, Africa needs to deepen and integrate its financial space to attract much needed FDIs for growth and development by tapping into its natural and human resources. The study thus looks at the

moderating influence of FinDp in attracting FDI to Africa and to disseminate findings.

Section C: Literature and Conceptual Framework

C.1 Literature Review

Studies on financial deepening (FinDp) has gained considerable interest and attention in academia, policy and economic cycles (Fry, 1980; Rousseau & Wachtel, 2011, 2017; Waleed, Alrabadi, & Kharabsheh, 2016; Karimo & Ogbonna, 2017; Liu, Islam, Khan, Ismail, & Pervaiz, 2020). From a policy standpoint, however, Liu et. al (2019) notes that the most important policy initiative for economic augmentation is for countries to deepen their financial space to attract investment inflows. Copiously documented studies have reported positive linkage between financial sector depth and economic expansion (Okafor, Onwumere, & Chijindu, 2016; Waleed et. al, 2016; He, Zhang, Zheng, & Wan, 2019), while others do not see that linkage (Ndebbio, 2004; Ghildiyal, Pokhriyal, & Mohan, 2015). The debate on the significance of FinDp can be traced back to the Schumpeterian era. Schumpeter (1912) initiated the concept of finance-led growth in the literature. However, as time elapsed, other researchers argued for FinDp to hasten economic expansion (Goldsmith, 1969; Sackey & Nkrumah, 2012). The empirical evidence adduced by King & Levine (1993), Bittencourt (2011) and Apergis, Filippidis, & Economidou (2007) further lends credence to Schumpeterian theory and the importance of financial deepening for real economic growth. On the other hand, studies relying on recent data and adopting the principles of King and Levine (1993), Rousseau and Wachtel (2017) reports that when financial deepening exceeds a certain threshold due to significant financial liberalization, economic growth experiences deleterious effect.

Empirical studies widely suggest the importance of foreign direct investment flows to economies due to its positive externalities (including technological diffusion, managerial and technical knowhow) (Munemo, 2017; Song & Cieslik, 2018; Bakari & Sofien, 2019). Flowing from which deepening the sector which is a channel through saving mobilization is

possible, acts equally as a conduit for foreign direct investment flows. Ang (2011) notes that financial deepening leads to savings mobilization but Twerefou & Ayimadu (2018) disagree with that assertion. However, there is no denying the fact that the financial system acts as the intermediary institution for investment and reallocation of funds.

Studies by Liu et. al (2020) examined financial deepening on foreign direct investment in OBOR countries, Islam et al., (2018) looked at FinDp and FDI in china and Bara & Abel (2018) studies the effect of financial deepening on foreign capital inflows for the SADC community. However, no study so far has examined financial depth on FDI across the sub-regional divides in Africa and this study filled that lacuna in academic literature. An efficient and well-structured financial sector is very important for drawing in funds for development projects (Neto, Ogasavara, & Turolla, 2016) and can determine the cost/benefits analysis for investment projects as well. The extent to which deepening the financial atmosphere attracts FDI is well researched (Olawumi, 2017; Islam et al. 2019; Liu et al. 2010). As eluded to earlier, the benefits received by domestic firms in terms of technical, managerial, human capital development and technology spillover among others is enormous, which leads to home country firms developing competitive advantage (Iammarino, 2018; Joghee, Alzoubi, & Dubey, 2020). In a way, FinDp helps countries create global linkages that can help them invest, learn from new technology and benefit from R&D. Alfaro, Chanda, Kalemli-Ozcan, & Sayek (2004) argue succinctly that the advantage associated with linkages from MNCs has cost. However, the positive externalities derived by the domestic firms far outweighs the cost because internally, firms could not have been able to finance these costs on their own. In other words, the wider the disparity between perceived skills/knowledge, core competencies and technology, the larger the quantum of financing needed to close this gap, and subsequently, the need for foreign financing (Alfaro et al., 2004).

It is noted as pointed out earlier, that a well-developed financial system in a country has the propensity to lower the cost of capital to both foreign firms and their local partners thereby increasing the attractiveness of FDIs through MNCs because foreign firms can sort for additional funding at a cheaper rate than contracting loans from their home countries. Kaur, Yadav, & Gautam (2013), argue that a deep financial sector establishes a smooth foreign exchange regime, stimulates financial transition and brings down financing cost. Additionally, they affirm that an enhanced financial depth guarantees the flow of information and safeguards financial transaction safety as well as reliability. As argued (Olawumi, 2017; Liu et al. 2020) financial deepening involves the development of both the banking and stock markets, developing financial assets and instruments which enables investors to take advantage by investing in both short and long-dated instruments on the stock market platforms, hence enhancing the attractiveness of both FDI and portfolio investments. Another reason for FDI attractiveness by way of mergers and acquisitions is that local firms float their shares on the stock market to raise capital.

For financial depth to allow for FDI inflows, a minimum level of financial deepening threshold needs to be achieved. Studies show that foreign inflows are conditioned upon the institutional quality threshold, capacity and market openness (Asongu, 2017; Bouchoucha & Benammou, 2018; Cantah, Brafu-Insaidoo, Wiafe, & Adams, 2018). Gaies, Goutte and Guesmi (2019) did a study decomposing the effect of Foreign Direct Investment on long-term economic growth for developing economies. In their examination, the first controlled contagion effect of banking sector crisis through a baseline study then analyzed the FDI threshold level and finally regressed the banking crisis with logit panel or conditional fixed-effect model.

Results for this study were mixed, showing that FDI inflows are positive and become high by lowering the effect of the banking crisis. Further, above a higher threshold level, FDI does not impact on FDI inflows and that inflows will be conditioned upon the absorptive capacity of the country. Similarly, Ibhagui

(2017) used a panel of 45 SSA economies for their study, analyzing the effect of FDI on growth dynamics with variables such as population growth, trade openness, inflation, human capital and financial sector development. The study further made use of both endogenous and exogenous threshold value analysis. Results indicate that when inflation is taken to be the threshold, the value of 10.23% trigger FDI inflows but decreases to 6.19% because of issues of endogeneity. Financial development accounts for between 14.58% and 5.5%, trade openness is 87.48% and 3.09% while population growth is 182.68% and 0.39% respectively. The methodological dwarfism for this study in terms of threshold analysis is to assume linearity for all countries' growth dynamics.

Azman-Saini et al (2010: 212-213) relied on threshold analysis to investigate the relationship between financial markets and foreign direct investment inflows to countries with different levels of institutional development and using variables such as private credit from financial institutions to GDP, deposit money banks credit to private sector/GDP and liquid liability to GDP ratio for 30 years in a panel of ninety-one countries. The study suggested that foreign direct inflows to these economies are positive and significant, bringing in its wake technological spillover at a threshold level of 49.7%. Furthermore, the threshold value above which FDI becomes attractive is 43.1% for bank credit, 68.8% for liquid liability and 89.1% for commercial bank assets as a percentage of Central Bank and bank assets. The shortcomings in this methodological analysis are that they did not address the issues of endogeneity, unlike the study done by Ibhagui (2017). This accounts for the high threshold values reported.

Hermes and Lensink (2003) further looked at financial sector development, FDI and economic growth, analyzing the threshold at which FDI becomes attractive and impact on the growth of the economy. They contended that at 12% threshold value of private sector credit to GDP from the banking sector is attractive to FDI flow but below this value, the country cannot attract FDIs. The limitation in my view for this study is the use

of a single banking sector variable to analyze, excluding other financial market variables (Hermes & Lensink, 2003:152). In their study, they found only 40% of countries under study reported threshold value above 12%.

In conclusion, studies indicate that financial deepening is a conduit through which foreign direct investment flows into an economy, leading to economic augmentation in various countries, few have examined the effect of FinDp on FDI attractiveness to Africa across the regional divides. Further, those few studies were conducted focused on individual economies or groups of comparable economies. This study, however, uses a heterogeneous panel of eight Africa economies across sub-regional divides, looking at the threshold level at which FinDp attract FDI. We are also mindful of the potential endogeneity between these two indicators, which was typically ignored in previous studies. More importantly, we measure the threshold level of FD that moderates FDI inflow, using additional financial depth index (findx) developed by the IMF, which is considered as the most comprehensive proxy for FinDp.

C.2 Conceptual Framework

Earlier economists argued that financial intermediation services like savings mobilization, facilitating the transaction and managing risk promotes economic performance (Schumpeter, 1912). Wells(1974) demonstrated the link between financial development and economic expansion for some sampled countries. Notwithstanding, Robinson (1979) submits that financial sector reforms, which lead to financial depth, are influenced by economic output. On the contrary, Lucas (1988) and Romer (1986) believe causality between financial depth and development is overstated. However, King and Levine (1993:734) agree that “financial development is correlated with the future rate of economic growth, physical capital accumulation and economic efficiency”.

Effective and efficient financial depth gives wider and easier accessibility. Also, the fact that credit is available through intermediary units such as banks, lowers the risks inherent in

these investments, thereby promoting absorptive capacity of the host country receiving FDI inflows (Jayaraman, Choong & Ng, 2017). Conversely, a repressed financial system with distorted un-incentivized intermediaries leaves economies without external capital flow, hence their reliance on high-interest domestic bank finance loans which in the long-run prevents the prospects of financial and economic deepening (Chakraborty, 2019).

Having understood the significance of financial deepening in economic augmentation from earlier arguments, it is important to follow the trail of previous empirical studies suggesting the need for an economy to deepen its financial space as fundamental to pulling in financial resources, both foreign and domestic influencing the country's growth. We try to understand and trace the issues causing linkages between financial deepening and microeconomic variables in the economy as identified in earlier paragraphs. Certain factors that act as drivers or pulling agents for financial deepening, chief of which more weight is laid, pull and push factors of supply and demand as suggested by Odhiambo (2007).

Recent studies have expanded the theory of supply leading and demand following discourse in the field of development economics (Karimo & Ogbonna, 2017). The theory opines that there exists a linkage between financial depth and economic augmentation in an economy and that this linkage is demonstrated in the formation of financial institutions before the existence of demand for such institutions (supply-leading). This means that the presence of financial services moderated the demand for them by business owners and individuals in the modern market place (Isu & Okpara, 2013). On the other hand, if in the process of economic expansion demand for financial services grows, it triggers the supply for same, therefore influencing financial deepening in the economy (Olawuni et. al, 2017). This understanding is buttressed in the work of some scholars (Patrick, 1966; McKinnon, 1988; Isu & Okpara, 2017). However, several studies have diverged from this understanding by stating that causality can be experienced in both ways, that

is, bidirectional rather than one way (unidirectional) at various points in the growth curve of the economy.

In the financial deepening process, financial market and banking institutions are developed, expanded and innovated to accommodate increasing service provision which will help expand demand for financial service. Therefore, economic expansion activities, business growth and entrepreneurial enhancement hinge on the development of the financial sector to augment the country's growth trajectory. Odhiambo and Nyasha (2019) investigated whether financial development leads to the growth of the Democratic Republic of Congo's (DRC) economy. The study found a causal linkage between finance and growth for DRC but the direction of causality was mixed and depended on the choice of proxy. The significance of demand for which economic activity anchors could be understood from a basic economic principle that supports demand as the predictor for supply. It stands to reason that providers of goods and service predict the demand surplus to make available adequate supply to satisfy the market (Smith, & Todaro, 2009).

From the preceding arguments, the assumption is that to deepen the financial system, both the banking and stock markets should be comprehensively developed such that the sector will benefit from deepening, inclusion, and access of all financial variables. We, therefore, propose a conceptual framework as shown in figure 1.

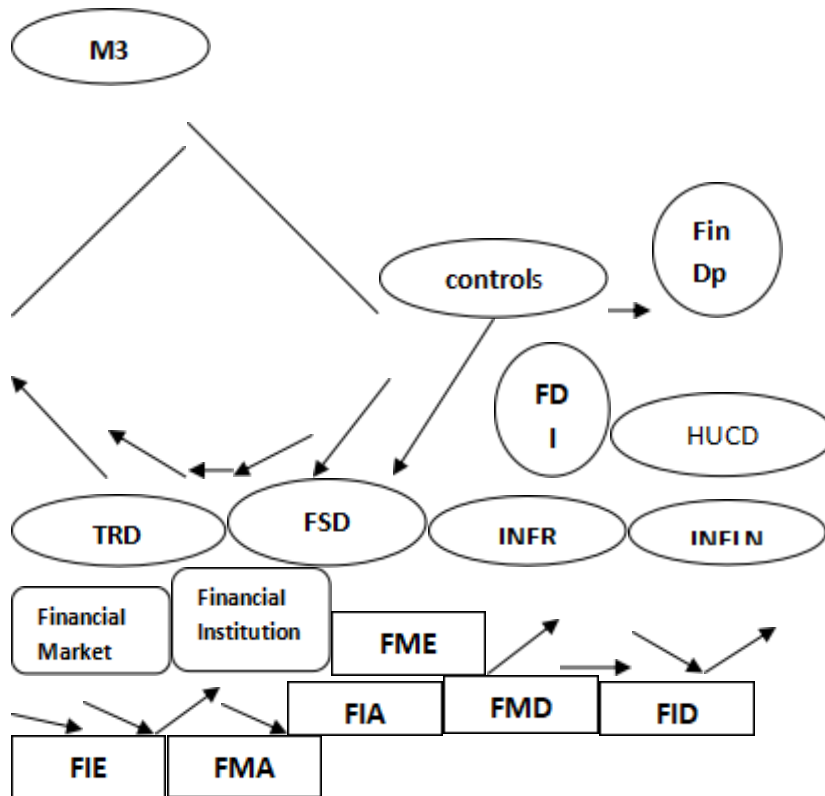


Figure 1 Theoretical Framework

Having comprehensively reviewed theoretical and empirical literature, we propose the following hypothesis:

H₀: FinDp attracts FDI to African countries

H₁: FinDP-FDI at a certain threshold level, the relationship between FinDP and FDI changes

Section D: Methodology

The model indicating the relationship for the various variables is represented by the equation shown:

$$FDIfl_{it} = \alpha_0 + \alpha_1 FinDp_{it} + \alpha_3 X_{it} + \mu_{it} \dots\dots\dots(a)$$

Here, $FDIfl_{it}$ represents the net foreign direct investment flows as per cent of GDP, this FDI measure, is more representative of the cumulative amount of FDI inflows into the country as its

share of the GDP because it does not include outflows (Aregbeshola, 2014) in the country i and year t period, proxied as FDI in the reviewed literature (Siddica & Angkur, 2017; Ahmad et al., 2019; Musabeh & Zouaoui, 2019; Abonazel & Shalaby, 2020).; $FinDp_{it}$ represents the proxies for financial deepening while X_{it} are the control variables from literature and they include, infrastructure (proxied by the number of telephone lines/100)(Ibrahim, Adam, & Sare, 2019; Aibai, Huang, Luo, & Peng, 2019); inflationary pressure (Liu et. al, 2020); human capital development (Nkoa, 2018; Islam et al., 2020); trade (import/export)(Pradhan, Arvin, Hall, & Nair, 2017; Contractor, Dangol, Nuruzzaman, & Raghunath, 2020); gross fixed capital formation (Cantah et al., 2018; Liu et. al, 2020); credit allocation to the private sector by Banks as per cent of GDP(Alfaro, Chanda, Kalemli-Ozcan, & Sayek, 2004; Khan, Kong, Xiang, & Zhang, 2019); monetary aggregates $M2/GDP$ (Trabelsi & Cherif, 2017) and financial deepening index (Sahay et al., 2015; Svirydzenka, 2016). The α_0 , α_1 and α_3 are the coefficients of the variables.

An explanation for the Variables used:

The use of net foreign direct inflows (FDI_{fl}) as a share of GDP, indicates exactly how much inflows the country received, and it is more focused and measurable because it shows how much it contributes to GDP. For the regressor variables, we relied on the newly constructed international monetary fund financial depth index (findx) which encompasses several financial indices (financial institution depth, access and efficiency, financial market depth, access and efficiency) (Svirydzenka, 2016). Additionally, we included the commonly used financial variables such as private credit allocation from the financial sector to GDP (PcBank). This measure is normalized by the GDP indicating the intermediary role played by the private sector in channelling funds to the demand sector of the economy (Ghartey, 2015).

Monetary aggregate M3, normalized by the economic size ($M3/GDP$), measures the size of the financial sector in the expanding economy and therefore it is a good indicator for

financial deepening and as well money in circulation shows how deep the financial sector is. This finance measure has been used extensively in finance literature (Giedeman & Compton, 2009; Hamdi, Sbia, & Tas, 2014). The controls variables used in this study include inflation (INFLN), which measures the consumer price index and it is included due in part to its propensity to impact negatively or positively on financial sector performance as well as lower FDI inflows (Shah & Zeb, 2017). Trade (TRD) as a share of GDP indicates the difference between or net of exports and imports, showing how the economy is ready to do business with the outside world and also allows for MNC locating in the destination country. Infrastructural development (INFR) is proxied by the number of telephone lines per 100 population (Wekesa, Wawire, & Kosimbei, 2016). This measure assures investors of ease of business in the destination country because of the ability to communicate effectively and efficiently.

Human capital development (HUCD), is included to gauge out how ready the country is in deepening its financial sector because of the availability of trained and skilled labour. The highly skilled workforce could encourage MNCs to locate in that country, and it's a good FDI determinant. Financial system deposits to GDP (FSD), indicates the ability to mobilize deposits through financial deepening efforts. A sample of eight African economies is used for the study, with dataset spanning the period from 1980 to 2018. It is illustrated in the T1 below:

Table T1: Variables and source of data generation

<i>Variables</i>	<i>Meaning of abbreviated data</i>	<i>Data Sources</i>
<i>FDIfl</i>	Net Foreign direct investment inflow %GDP	World development indicators
<i>PcBank</i>	Private credit from financial institutions %GDP	WDI
<i>findx</i>	IMF financial depth index	International monetary fund

M_3	Broad money +quasi money % GDP	WDI
$INFLN$	Inflation % change in CPI	ADI
$INFR$	Infrastructure (% of ICT imports)	International telecom Union
$HUCD$	Human capital development	ADI/WDI
TRD	Trade openness (net imports and exports)	WDI
FSD	Deposits through the financial system % GDP	WDI

From the simplified equation (a), we envisage that estimation could be fallacious and bias due to issues of endogeneity that may result because of covariance of the regressor variable and the stochastic error term, as well as a bidirectional causal effect. Thus, to smoothen this problem, we rely on the use of 2SLS regression. Our chosen approach uses instrumental variable having two defined features: first, it must considerably influence the regressor variable and second, it must not explain the Regressand. Therefore, the estimation is started using 2SLS, as shown:

$$Z_{it} = \beta_0 + \beta R_{it} + \beta_2 H_{it} + \mu_{it} \dots\dots\dots (b)$$

From Eqn. (b) the (R) value predicted is gotten by using $R_{it} = \alpha_0 + \alpha_1 K_1 + \alpha_2 X_{it} + \mu_{it}$, where K_1 represents the instrument which is used for FinDp, and X_{it} is the vector of control variables illustrated earlier. We rely on Durbin-Watson's χ^2 score and Hausman F-stats to test for endogeneity. Additionally, we employ Sargan's to test for over-identification restrictions in the estimation and eigenvalues ensure the strength of the instruments.

From the preceding, nonlinearity relationship in finance-foreign direct investment flow nexus is further investigated. Such investigations are often conducted by including a nonlinear variable in the model. According to Huang, Liu, Cai, Hao, & Lei (2018), using traditional approach might trace nonlinearity relationships but fails to recognise any potential structural breaks, that is the point at which the relationship changes direction, and how it does so. To cure such a scenario, (Hansen, 1999, 2000) threshold model is appropriate in which case, it can trace the turning points, to allow for more efficient decision to be made. Thus, we use a dynamic panel threshold model to check the threshold value of financial deepening at which foreign direct investment inflows is precipitated. Further, we model our threshold equation following Hansen (1999) as rehased in (Abdulahi, Shu, & Khan, 2019; Huang et al., 2018; Ibrahim & Alagidede, 2018). Using a threshold regression based on a single value, we model as shown:

$$FDIfI_{it} = \begin{cases} \alpha_1 + \beta_1^i X_{it} + \mu_{it} & q_{it} \leq \gamma \\ \alpha_2 + \beta_2^i X_{it} + \mu_{it} & q_{it} > \gamma \end{cases} \dots\dots\dots (c)$$

Here, $FDIfI$ represents to our Regressand indicator, the net foreign direct investment inflows; X is a vector of regressor indicators or variables; q is the threshold term; i is country and t represent, time; α_1 and α_2 and β_1^i and β_2^i are the respective coefficients for the regressors and threshold variables; γ is the threshold value; α_1 represents the fixed effects; and $\mu_{i,t}$ is the stochastic error term with a zero mean, determinate variance, and normally distributed.

Where a single threshold is determined, further threshold values are tested for. In which case, multiple threshold tests are conducted as depicted below:

$$FDIfl_{it} = \begin{cases} \alpha_1 + \beta_1^i X_{it} + \mu_{it} & q_{it} \leq \gamma \\ \alpha_2 + \beta_2^i X_{it} + \mu_{it} & q_{it} > \gamma \end{cases}$$

$$\{ \alpha_3 + \beta_3^i X_{it} + \mu_{it} \quad q_{it} \geq \gamma \quad \dots\dots\dots (d)$$

From equation (d) α_3 and β_3^i are the respective coefficients for the independent and threshold

Indicators and γ_1 and γ_2 are the alternative threshold values.

Section E: Results and discussions

Table 2 shows the descriptive summary for the study indicating values for the mean, standard deviation, minimum, and maximum, skewness, and kurtosis among others for each indicator used in the analysis. The study sample is composed of a panel of 8 African economies, spanning a period of 39 years (1980 to 2018), with 312 observations.

Table 2: Summary statistics of equation (a) (1980-2018)

	FDIfI	FINDX	M3	PCBAN K	FSD
Mean	1.91451	0.19352	34.4032	21.91141	24.8312
		2	3		8
Median	1.104368	0.15884	26.8130	14.22983	17.8430
		1	5		8
Maximum	40.16725	0.62666	119.348	78.29413	88.8504
		1	9		
Minimum	-	0.05480	9.06332	1.542268	2.81967
	6.057209	4	9		
Std. Dev.	3.611788	0.12343	23.9157	19.99101	19.1988
		1	2		8
Skewness	5.365667	1.71935	1.82050	1.298925	1.44723
		3	3		8
Kurtosis	49.0646	5.48083	6.23637	3.497558	4.65226
		7	4		7

Jarque-Bera	29082.42	233.730	308.503	90.95301	144.403
		3	5		7
Probability	0.0000	0.0000	0.0000	0.0000	0.0000
Sum	597.3272	60.3788	10733.8	6836.359	7747.36
			1		
Sum Sq. Dev.	4056.999	4.73816	177880.	124288.2	114633.
		6	1		6
Observations	312	312	312	312	312

Table 2 contains a descriptive summary of pooled data of 8 economies on the continent of Africa which attracts a substantial amount of foreign direct investment inflows but have varying degrees of financial deepening. With the pooled descriptive of 312 observations, the analysis indicates that the maximum FDI inflow as a percentage of GDP (FDIinFL) was received by Angola in 1999 (40.16725), and the highest foreign direct investment outflow (disinvestment) occurred in the same country Angola in 2017 (-6.05721). Within the period under review for the selected Africa economies, the mean value for FDI as a percentage of GDP stood at 1.915% with a standard deviation of 3.6118. The pooled data descriptive shows that the skewness and kurtosis are at variance with assumptions of normal distribution. Further, considering the level of our sample size (312) and level of significance *p-value* (0.0000), we fail to reject the null hypothesis of normal distribution at 1%.

Further, financial depth for the sampled economies indicates that South Africa exhibits the highest level of financial depth in 2017 (0.626661), showing that the depth of South Africa's financial sector is better than the rest of the sampled economies under review within the sampled period. On the other hand, Tanzania showed the weakest in terms of the depth of its financial sector, recording a value of 0.054804 in 1999. The same normality condition applies as explained earlier in the case of FDI. In the case of monetary aggregates (M3/GDP), the descriptive analysis suggests that the highest broad money

supply as a percentage of GDP was recorded by Morocco in 2017 (119.3489), while the least recorded amount of money supply as a percentage of GDP was experienced by Nigeria in 1996 (9.063329).

Furthermore, examining the quantum of credit advanced to the private sector by the financial system as a percentage of GDP (PcBank), the highest credit advanced to the private sector was recorded by South Africa in 2007 (78,29413), while the lowest was Ghana in 1983 (1.542268). Similar normality distribution hypothesis check is applied for these variables as observed for the other variables analyzed earlier. Additionally, summary statistics of financial system deposits as a share of GDP (FSD) indicates that Morocco showed higher performance in the level of deposits as a share of GDP in the financial system in 2016 (88.85040) as compared to Ghana (2.819670) in 1984. We analyzed the above five variables because they were considered the main variable for the estimation. Analysis from Table 2 is consistent with results from studies done by Maysami and Koh (2000, Odhiambo (2017), Aregbeshola (2018), Blander, Mobler and Avni (2018), Dimirguc-Kunt and Levine (2018) Beck and Levine (2018), Shukla (2019) and UNCTAD (2019).

Table 3 presents the correlation between the variables. Noting that some of the regressors Regressand variable are high, though reasonable, no such heightened correlation values are found between the regressors variables. However, the correlation between regressor variables which is lower than or equal to 80% should not be an impediment and that in such a situation, multicollinearity is not expected (Gujarati & Porter, 2009; Rahman, Ashraf, Zheng, & Begum, 2017).

Table 3. Correlation matrix for the variables for the panel (1980-2018)

Variables	FDIF L	FIN DX	M2	PCBA NK	FSD	INFL N	INF R	TR D	HUCD
FDIF									
L	1								
	-								
FIN	0.079								
DX	9	1							
	-								
	0.048	0.753							
M2	8	3**	1						
	-								
PCBA	0.129	0.861	0.857						
NK	9**	8**	4**	1					
	-								
	0.098	0.782	0.962	0.911					
FSD	0	3**	3**	8**	1				
	-								
INFL	0.110	0.045	0.057	0.181	0.168				
N	5	8	4	5**	9**	1			
	-								
	0.074	0.844	0.763	0.898	0.803	0.115			
INF	7	1**	1**	9**	4**	2**	1		
	-								
	0.347	0.012	0.190	0.033	0.038	0.482	0.003		
TRD	8**	7	8**	5	6	7**	4	1	
	-								
HUC	0.003	0.666	0.590	0.662	0.634	0.136	0.614	0.03	
D	6	3**	5**	4**	9**	1**	9**	04	1

From table 3 above, there have been both positive and negative correlation among variables of interest. Foreign direct investment inflows are found to be correlated with private

sector credit allocation from the financial institutions (PcBank) and trade (TRD). However, the correlation between FDIfl and PCBank is negative while its association with TRD is positive and significant. This presupposes that an increase in trade in Africa would lead to corresponding FDI inflows to the region, while an efficient and effective private credit allocation could trigger an outflow of FDI, *ceteris paribus*.

It is further observed that FDIfl correlates with (1) financial deepening index(findx), (2) monetary aggregates (M2), (3), financial sector deposits (FSD), inflation (INFLN) and infrastructure (INFR) at 5% statistically significant level. The positive nature of the correlation between financial deepening variables foreign direct investment inflows to Africa suggests that increased efficiency in financial depth could lead to higher FDI inflows to the region. On the other hand, variables such as inflation though significant is negatively correlated with credit allocation to the private sector from the financial institutions (PCBank) and financial sector deposits (FSD) as a share of GDP. In other words, high inflation could negate credit and credit mobilization efforts in the region.

Furthermore, inflation affects infrastructural delivery, thus, the negative correlation relationship between INFLN and INFR. Finally, apart from inflation which has a negative correlation with human capital development (HUCD), all other variables are significant and positively correlated with HUCD. Thus, the increased performance of the financial sector would lead to a better human capital base for Africa. Analysis from the table, however, shows that apart from the correlation between PCBank and M2, PCBank and findx as well as between FSD and findx, M2 the rest are within limits and therefore multicollinearity might not exist among variables of interest as well as between variables.

Having established that there is a correlation between financial deepening and foreign direct investment flow, we now turn to analyze the threshold level at which FDI inflow is precipitated.

Section E.1: Threshold Analysis

Proceeding to investigate the nonlinearity relationship existing between FDI_{fl} and FinDp, we first examine the threshold of the data. According to Hansen (1999, 2000), the analysis runs the risk of bias if an arbitrary threshold value is selected. Thus, we determine our threshold value by undertaking a dynamic panel threshold estimation approach which can split the data sample to achieve the result (Abdulai et al, 2019; Liu et al 2020). Additionally, we rely on the bootstrap technique (Hansen, 1999) which makes it possible for the construction of confidence level as well as evaluate the statistical relevance of threshold value identified.

In threshold estimation, values differ with the type of dataset used. Because of this, we undertake various levels of analysis to ascertain the most appropriate estimates applicable for this study. Therefore, we conducted single and multiple analysis to find out the one which is statistically relevance at 0.01 percentage level. Our findings rejected the presence of multiple thresholds but indicated that there exists a single for the FinDp-FDI relationship. The estimated threshold value for FinDp is 0.2307, from which we divided our sample into two. Lower level FinDp threshold and a higher-level threshold region for which FDI inflows can be triggered. We continue with a system re-estimation for the two divided samples as before from which we report relevant statistical estimates as shown in tables 4 and 5. Additionally, we present an equation of best fit for the threshold analysis in figure 1. Our estimated baseline results indicate that financial deepening (FinDp) has a positive and statistically significant effect in pulling in FDI with its consequential positive externalities. However, at lower than the required threshold, the propensity for increased FDI inflows dissipates.

Table 4: Threshold Effect Estimates (1980-2018)

	Single Threshold	Double Threshold	Triple Threshold
F	-134.09	-123.25	837.00
P-Values	0.9840	0.9940	0.0000
Critical Values			
10%	227.11	80.53	96.75
5%	326.98	106.13	131.55
1%	491.10	100.31	175.72
BOOTSTRAP	500	500	500

Table 5: Threshold estimates

Threshold Values	0.95% confidence interval	
	Lower threshold	Upper
0.2307	Threshold	
	0.1908	
	0.2320	

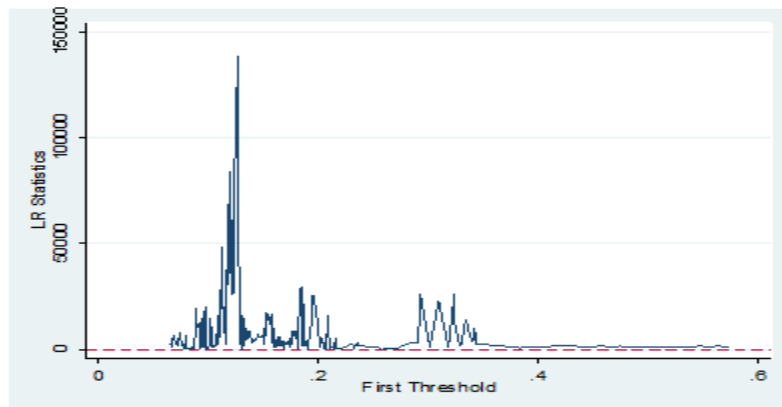


Figure1: construction for a single threshold estimate

Section F: Conclusion and Policy Recommendation

The importance of economic expansion and development is not doubted. However, the means of achieving such growth depends on the quantum and quality of investment capital. This study examines the effect of financial deepening in precipitating foreign direct investment inflows to African economies using panel data from 1980 to 2018. We analysed the linkages based on the pooled sample and also divided the sample into regional groups (not reported) to examine the nonlinearity through panel threshold estimator. Our pooled sample indicates that financial deepening (FinDp) has a deep influence in attracting FDI. We employ the use of the newly developed IMF (2016) financial depth indicator (findx) which encompasses all the financial sector measurement indices (Sahay et al. 2015; Svirydzienka, 2016; Liu et al. 2020). To ensure the validity of the regression estimates of findx, we included other traditional variables that proxy FinDp mostly used in studies on finance-growth nexus.

Our findings are consistent and creditable for financial depth index (findx) to provoke increased foreign direct investment inflows as compared to the other financial indicators. Additionally, the paper relies on panel threshold to determine a threshold value of 0.2307 outside which renders the effect of financial sector depth' attractiveness to foreign direct investment inflow unenthusiastic. Furthermore, our regional analysis (not reported) reports of consistent results.

The importance of our findings and its lessons for policymakers are that to draw in the much-needed external funding that can supplement domestic savings mobilization for economic development, policies and strategic choices that help to deepen the financial sector is advocated. Specifically, efficiently regulated financial institutions, accessible, reliable, and well-consolidated banking and stock market-based services can signal confidence to external partners to invest in the region, which can lead to a prosperous Africa. Additionally, it is necessary for policymakers in Africa to facilitate the establishment of quality institutions as well as develop human capital through training and education services, especially

technological innovation to improve absorptive capacity for foreign direct investment inflows.

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