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Assessing Foreign Direct Investment Long-Run Contribution to Financial Development: Evidence from Namibia

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Abstract

Abstract We investigate the impact of Foreign Direct Investment on financial development using Domestic Credit to the Private Sector and Private Credit by Deposit money banks as a broader measure of financial indicators. We use the autoregressive distributed lag bounds co-integration analysis for long-run estimation on the Namibia economy as a case study for the periods 1990 to 2017. The Error Correction Model and the Granger causality approach are further used to examine the short-run dynamics and the direction of causality. Our results confirm the presence of a long-run association between FDI and financial development along with economic growth and human capital, the existence of uni-directional causal association from FDI to financial development measured in terms of domestic credit to the private sector, and bi-directional causation when measured in terms of private credit by deposit money banks. We conclude that FDI benefits Namibia financial system whilst playing a critical role in promoting human capital and economic development. Keywords: Foreign Direct Investment, Financial Development, Economic Growth, Human Capital, ARDL bounds, Granger Causality JEL: C3, E44, M5

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1. Introduction

There is voluminous literature that has examined the effect of FDI to economic growth, human capital, poverty and unemployment (Adeniyi et al. 2015; Nwaogu and Ryan 2015; Chowdhury 2016; Pradhan et al. 2016). Indeed, many of these studies have concluded that it produces a heterogenous effect both in developed and developing economies. For example, Balasubramanyam et al. (1996) and Borensztein et al. (1998) both have explained the impact of absorptive capacity in terms of commercial policies and human capital formation. On the other hand, Prasad et al. (2007) and Batten and Vo (2009) finds that developed economies with greater human capital have benefited more from a higher inflow of FDI where (Blomström et al. 1998) find no relationship between education and FDI inflows for developing countries.

No doubt, these literatures have explicitly looked at how and whether FDI enhances overall economic growth. However, it has also being increasingly realized by policymakers that different instruments of FDI can improve the recipients in the different ways (OECD 2007). It has been emphasized in many policy reports that the capital financing could be an instrument of disbursing aid for economic support as it allows for better alignment of goals of the donor and the recipient and more efficient use of resources (World Bank 2005; OECD 2007). In this spirit, Alfaro et al. (2010), for example, has also provided an evidence that with a better financial development compared to poor financial sectors and higher FDI inflows increases economic growth. By and large, these evidences suggest financial development could be stimulated by the flows of FDI and hence its contribution to the financial system is enormous and not to be ignored, and therefore its contribution to economic growth (De Gregorio and Guidotti, 1995; Lee and Chang 2009).

The core motivation of this paper, thus, is to examine the role of FDI's on financial development in developing economy. To examine our research contention, we use the Namibian economy as a case study over the period of 1990 to 2017. The reasons for choosing Namibia as a case study is linked to the recent concern raised in Namibia 5th National Development Plan (NDP 5) of 2019 by the Government of the Republic of Namibia where it was reported that Namibia, despite the fact that is one of the highest recipients of FDI in SADC region, will have slower economic growth relative to other countries in the African region. This concern has, thus, sparked the debate on the international policy forums that Namibia would not have enough capacity to deal with the country's triple challenge of *poverty, inequality, and unemployment.* More recently and in a similar spirit, the (World Bank report 2019) has also claimed that Namibia in the segment of Southern African economies, is far away from addressing the challenges of macroeconomic stabilization of good governance for public financial resources and growth.

Under the above policy concern and in line of our research contention, we take two important and most commonly measures of financial development indicators used in the literature. The first indicator is *Domestic Credit to the Private Sector (DCPS[1])* as a share of GDP and second indicator is *Private Credit by Deposit money banks (PCBD)*[2] as a share of GDP. To examine the relationship between FDI and financial development, we employ the autoregressive distributed lag (ARDL) bounds co-integration analysis[3]. Following this, we run an error

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[1] See Ozturk and Acaravei (2015), Dogan and Seker (2016) and Shahbaz et al. (2018) for detail discussion.

[2] See Hermes et al. (2003) and Alfaro et al. (2009) for studies that have used domestic credit to the private sector as a share of GDP and private credit by deposit money banks as a share of GDP, as a proxy for financial development.

[3] For small and finite sample data many econometric models do not report correct estimates. ARDL test in such cases are relatively more efficient thus report valid significant coefficients and t-statistics, even in the presence of autocorrelation and endogeneity Harris and Sollis (2003).

correction model (ECM) that provides short-run coefficients associated with long-run equilibrium without losing valid long-run coefficients. Additionally, the Granger causality (Wald test) is employed to investigate the direction of causality to test the robustness of our finding.

Our results show a positive relationship between FDI and financial development in both short- and long-run meaning that FDI inflows help to develops the better domestic financial system by providing the more financial resources and infrastructure which in effect promote access to finance and support services to the private sector including Small-Medium Enterprises (SME's) in Namibia. There is a uni-directional causal linkage running from FDI to DCPS. Interestingly, a bi-directional causal linkage is found between FDI and PCBD as a measure of financial development, suggesting that FDI promotes the development of financial systems, but also that a developed financial system is equally important in cultivating benefits from FDI in a host country such as in the case of Namibia.

The rest of the paper is organized as follows. Section 2, presents the review of the most recent literature linking FDI-growth-human capital and Financial development. In Section 3, we discuss the data sources and variables. Section 4, presents the methodology. Empirical results and discussions are presented in Section 5. In Section 6, we present the conclusion and policy recommendations.

2. Literature review

Across a wide variety of countries, a large body of literature has examined the impact of FDI and its spill-over effects on technology transfers; introduction to new process and productivity gain through trade openness and improvement in human capital (Liu 2008; Lin et al. 2009; Du et al. 2012 and He, Sun and Zou 2013**)**. In general, FDI has been seen as an important channel and has been characterized that its inclusion in economic policies improves the stable growth path. For example, Anwar and Nguyen (2010) has observed that the impact of FDI on economic growth is larger when investments are absorbed through education and training, improving technological knowledge and access to the financial market. Adeniyi et al. (2012) on the other hand has added evidence in FDI literature that the better financial market increases FDI profits in developing economies along with sound economic growth policies.

No doubt that FDI has been an important channel in economic growth in many studies, however, some studies have found that FDI has only limited effect in developing countries. Borensztein et al. (1998), for instance, finds that increased productivity is only possible with improved technology transfer and FDI only if the receiving country has a higher level of human endowment. In other words, FDI will led to positive and increasing effect on the receiving economy, if the receiving country has a better absorptive capacity. In addition to this, the impact of FDI has also emphasised in the form of capital flows[4] such as learning-by-doing. This may increase domestic productivity and thus the overall economic growth. However, these all depend upon direct capital financing in the receiving countries that can help the economy to grow at their full potential and promote growth.

[4] Some studies related to capital flows have found that lack of financial stability in developing economies, especially after East Asian financial crisis, has caused huge economic decline Fernandez et al. (2000).

These studies and some other studies, thus, have suggested that the lack of better financial markets, in particular, can adversely limit the economy's stability of taking full advantage of potential FDI spillovers. A different aspect of foreign investment can exert sharply different, and even opposing, impact on the establishment of financial development. It can cause more volatility in the financial market if the supply of foreign funds is not channelled properly Alfaro and Chen (2012) creates poor financial institutions linkage especially when trades involve complex goods Carluccioa and Fally (2012) and fail to attract multinational enterprises (MNEs) which promotes industrialisation through new technologies and better management practise Narula and Pineli (2017).

Despite the unanimously important role of financial linkage in economic growth, there is very limited research that has investigated the relationship between FDI and financial channel. In sum, if the FDI is not absorbed through better financial development along with productivity through externalities and spill-over effect then, likely, it cannot maximize the effect of FDI on host countries to its full potential and thus can slow down the speed of economic growth. To this end, in our next section, we examine the role of FDI through the financial channel using Namibia as a case study.

3. Data Sources and Variables

The data used for the investigation is annual and covers the period from 1990 to 2017 of Namibia. We use FDI stock (FDI), obtained from the United Nations Conference on Trade and Development (UNCTAD), as a measure of FDI inflow. Gross Domestic Product per capita as a measure of national income (GDP) and real gross fixed capital formation (GFCF) and total population (POP) were obtained from the World Development Indicators (WDI), collected by the World Bank, database. Inflation is measured as the percentage of change in the GDP deflator and used as a proxy for macroeconomic stability (INF), obtained from UNCTAD. The financial development measures, domestic credit to private sector (DCPS) and private credit by deposit money banks (PCBD) were sourced from Global Financial Development (GFD) database. The human capital (HC) measured in form of secondary school completion rates from (Barro & Lee 2010, 2016) dataset. Following Allison (1982) suggestion[5], we consider all variables in log-linear form. The detailed description of our variables is presented in Table 1.

4. Methodology

4.1 Unit root and ARDL Co-integration Analysis

Checking stationarity properties of variables is a precondition for investigating cointegration among them. For this reason, we apply *Augmented Dickey-Fuller (ADF) unit root test*, *the Phillips-Perron (PP) unit root test* and *Dickey-Fuller (DF-GLS)* to investigate the order of integration of the variables, and also to ensure that none is integrated at order 2 or *I(2)*. Once the order of integration of the variables under study is confirmed, for long and short-run analysis we proceed with the linear autoregressive and distributed lag (ARDL) bounds testing approach developed by Pesaran et al. (2001).

The ARDL bounds testing approach in co-integration analysis has numerous advantages over the other co-integration methods. First, it has good small sample properties for determining co-integration relationships Ghatak and Siddiki (2001). Second, The ARDL is applicable irrespective of whether the regressors in the model are purely I(0), purely I(1) or mutually co-integrated. Therefore, ARDL makes a good choice for our sample of 28 annual observations

[5] See Allison (1982) on the argument on the log-linear form.

than any other co-integration methods such as, Johansen co-integration techniques which require large data samples for the purposes of validity.

Third, with a small data sample, it is important to consider the delicateness of choosing a lag length that is sufficiently large to mitigate the residual serial correlation problem and at the same time, sufficiently small such that the conditional ECM is not unduly over-parametrised, particularly in view of limited time-series data[6]. Therefore, the optimal lag lengths for the unit root tests and ARDL bounds cointegration tests are considered by the Akaike Information Criterion (AIC) and Schwartz Bayesian Criterion (SBC). Lastly, the ARDL approach corrects the problem of serial correlation and therefore endogeneity is less of a problem by augmentation of the order of the regressors Pesaran and Shin (1999).

The ARDL bounds co-integration analysis requires estimating a conditional error correction model. Thus, the econometric speciation for financial models, both DCPS and PCBD, are presented below[7].

$$\Delta lnDCPS_t = c_0 + \delta_1 lnDCPS_{t-1} + \delta_2 lnFDI_{t-1} + \delta_3 lnGDP_{t-1} + \delta_4 lnINF_{t-1} + \sum_{i=1}^{p} \phi i\, \Delta ln\mathrm{DCPS}_{t-i} + \sum_{j=1}^{q} \varpi i\, \Delta lnFDI_{t-j} + \sum_{l=1}^{q} \varphi i\, \Delta lnGDP_{t-l} + \sum_{p=1}^{q} \gamma i\, \Delta INF_{t-p} + e_t \quad (1)$$

$$\Delta lnPCBD_t = c_0 + \delta_1 lnPCBD_{t-1} + \delta_2 lnFDI_{t-1} + \delta_3 lnGDP_{t-1} + \delta_4 INF_{t-1} + \sum_{i=1}^{p} \phi i\, \Delta ln\mathrm{PCBD}_{t-i} + \sum_{j=1}^{q} \varpi i\, \Delta lnFDI_{t-j} + \sum_{l=1}^{q} \varphi i\, \Delta lnGDP_{t-l} + \sum_{s=1}^{q} \gamma i\, \Delta INF_{t-s} + e_t \quad (2)$$

We estimate equations (1) and (2) to test for the existence of a long-run relationship among the variables. Following the steps aforesaid and once co-integration is established, the conditional ARDL (p ,q^1, q^2, $q,^3$, q^4)[8] long-run specifications can be estimated as:

$$lnDCPS_t = c_0 + \sum_{i=1}^{p} \theta_1\, ln\mathrm{DCPS}_{t-i} + \sum_{i=0}^{q1} \theta_2\, lnFDI_{t-i} + \sum_{i=0}^{q2} \theta_3\, lnGDP_{t-l} + \sum_{i=0}^{q3} \theta_4\, INF_{t-i} + e_t \quad (3)$$

$$lnPCBD_t = c_0 + \sum_{i=1}^{p} \theta_1\, ln\mathrm{PCBD}_{t-i} + \sum_{i=0}^{q1} \theta_2\, lnFDI_{t-i} + \sum_{i=0}^{q2} \theta_3\, lnGDP_{t-l} + \sum_{i=0}^{q3} \theta_4\, INF_{t-i} + e_t \quad (4)$$

Finally, we obtain the short-run dynamic parameters by estimating an error correction model associated with the long-run estimates as follows:

$$\Delta lnDCPS_t = \alpha + \sum_{i=1}^{p} \phi i\, \Delta ln\mathrm{DCPS}_{t-i} + \sum_{j=1}^{q} \varpi i\, \Delta lnFDI_{t-j} + \sum_{l=1}^{q} \varphi i\, \Delta lnGDP_{t-l} + \sum_{p=1}^{q} \gamma i\, \Delta INF_{t-p} + \pi_2 \mathrm{ecm}_{t-1} e_t \quad (5)$$

$$\Delta lnPCBD_t = \alpha + \sum_{i=1}^{p} \phi i\, \Delta ln\mathrm{PCBD}_{t-i} + \sum_{j=1}^{q} \varpi i\, \Delta lnFDI_{t-j} + \sum_{l=1}^{q} \varphi i\, \Delta lnGDP_{t-l} + \sum_{s=1}^{q} \gamma i\, \Delta INF_{t-s} + \pi_3 \mathrm{ecm}_{t-1} + e_t \quad (6)$$

The lagged residual term ($\pi_i \mathrm{ecm}_{t-1}$) in the above equation indicates the changes in the dependant variable. These changes are not only due to model setup in the co-integration analysis but in part, it is also linked to the other control variables that calculate the speed of convergence of the dependant variable from short to long-run equilibrium relationship Masih and Masih (1996). The error correction term, in such a situation, causes the dependent variable to converge to the long span of time for stable equilibrium caused by the variations in the independent variables.

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[6] See Pesaran *et al.* (2001).

[7] However, the econometric specification for two other models: economic growth and human capital are presented in Table 2.

[8] This are the number of lags to be considered in order to capture the data generating process in a general to specific framework.

4.2 Granger Causality

The existence of a long-run relationship offers useful insights towards testing for causal relationships, therefore, we analyse the causal linkage to determine the direction of causality between FDI and DCPS, PCBD, growth and finally human capital. To test for causality, we perform a Granger causality (Wald test) using the following equations:

$$lnY_t = \gamma + \sum_{i=1}^{k} \alpha_i\, lnY_{t-i} + \sum_{i=1}^{k} \beta_i\, lnX_{t-i} + u_t \quad (8)$$

$$lnX_t = \phi + \sum_{i=1}^{k} \partial_i\, lnY_{t-i} + \sum_{i=1}^{k} \lambda_i\, lnX_{t-i} + \eta_t \quad (9)$$

Where lnY_t are stationary time series sequences of $lnDCPS_t$, $lnPCBD_t$, $lnGDP_t$, $lnHC_t$, γ and ϕ are the respective intercepts, u_t and η_t are white noise error terms, and k is the maximum lag length used in each time series. The optimum lag length is identified using Hsiao's (1981) sequential procedure, which is based on Granger's definition of causality and Akaike's (1969, 1970) minimum final prediction error criterion. If H_0: in equation (8) $\sum_{i=1}^{k} \beta_i$ is significantly different from zero, then we conclude that FDI Granger causes the variables denoted by lnY_t. Separately, if $\sum_{i=1}^{k} \partial_i$ in equations (9) is significantly different from zero, then we conclude that lnY_t Granger causes FDI. Granger causality in both directions is, of course, a possibility.

5. Empirical results

5.1 Unit root results

The results of the unit root tests are presented in Table 3. The evidence reported by the ADF, PP and DF-GLS tests shows that all the variables under study are stationary at their first difference or I(1). Importantly, the unit root tests employed have shown consistency in determining the order of integration for all variables. Thus, in the next step, we examine the long-run impact of FDI on financial development in Namibia.

5.2 Autoregressive Distributed Lag (ARDL) results

We therefore now test our model as specified in the methodology using the ARDL approach. As suggested by Pesaran and Shin (1990) and Narayan (2004), we choose 2 lags as the maximum order of lags in the ARDL approach and estimate the short and long-run relationship between FDI and financial development, growth and human capital for Namibia for the period between 1990 and 2017.

Table 4, reports the results of the calculated F-statistics where log DCPS as a dependent variable for the model (i), log of PCBD as a dependent variable for the model (ii), log of GDP per capita as a dependent variable for the model (iii) and log of HC as a dependent variable for model (iv) in the ARDL specifications.

The calculated F-statistics for the co-integration test, Table 4, shows that the F-Statistic for Models (i), (ii) and (iv) with k=4 (k is the number of variables in the equation) is higher than the lower bound value of 3.43 and also higher than the upper bound value of 4.60 at the 1% significance value. The F-statistic for Model (iii) with k=5 is also higher than the upper bound critical value of 5.13 at the 1% significance value. Thus, the null hypotheses of no co-integration are rejected, implying a long-run co-integration relationship amongst the variables in the models.

Our results have established that a long-run co-integration relationship exists, equations (1) and (2) were estimated for financial development model linear specifications, model (i) and model (ii). We considered two model selection criteria the Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC) with a selection of maximum two lags. The point estimates obtained from the AIC and SBC are very similar but, the estimated standard errors obtained using the model selected by the AIC are considerably smaller given the much higher order ARDL model selected by the AIC[9]. And, therefore, the findings in our study are discussed based on the AIC model estimates.

In Table 5, we provide the long-run coefficients estimates, using the ARDL method, for FDI-financial development, FDI-growth and FDI-human capital. Firstly, analysing the long-run effect of FDI on financial development, by and large, our indicators of financial development (Table 5, Columns 1 & 2) has fared better than growth and human capital, and suggests that increasing inflow of FDI has significantly improved financial access in Namibia through both DCPS at around 16.9% and 26.7% through PCBD.

Secondly, confirming our results to the literature, our estimated long-run coefficients estimates on FDI-growth and human capital (Table 5, Columns 3 and 4 respectively), shows that the effect of FDI on both economic growth and human capital has exerted a significant and positive impact of around on average 6.4% and 5% respectively in the last three decades in Namibia. This implies that the presence of foreign investors through FDI (inflow) has led to a macro expansion in the Namibian economy and the development of human capital in the country.

Sequel to the acceptance of cointegration and estimation of the long-run coefficients, the analysis proceeds with an estimation of the short-run error correction models equations (6) and (7)[10] and the results obtained from the short-run dynamics are presented in Table 6.

Interestingly, the error correction term (ECT) estimated for both financial development in Models (i) and (ii) are significantly high at 63% and 49% respectively. The ECT coefficients have the correct sign and imply a quick speed of adjustment to equilibrium after a shock. Approximately 63% and 49% of disequilibria from the previous year's shock converge back to the long-run equilibrium in the current year. Similarly, the coefficient on ECT shows that model (iii) 29% and 79% for the model (iv) of the previous period's error is corrected for, in the current period. This further confirms that FDI has a strong causal effect on DCPS, PCBD, GDP per capita and HC. The R^2 of 75%, 89%, 80% and 52% respectively for models (i), (ii), (iii) and (iv) indicate that the error correction models fit with the data well.

To complement these findings, it is also important to investigate whether the long and short-run relationships found are stable for the entire period and do not suffer from any structural break. In Figure 1, we, therefore, plot the Cumulative Sum (CUSUM) and Cumulative Sum of Squares (CUSUMQ) for all four models. Indeed, both CUSUM and CUSUMQ indicates stability in the coefficients and shows that they do not suffer from any structural breaks.

5.3 Granger Causality Results

To study the causal relation between FDI and financial development, we employed the Granger Causality (Wald test) to determine the direction of the linkage and to confirm Granger feedback between the variables under study. To check for this relationship, Granger causality tests were run covering two different lag structures and presented in Table 7[11].

[9] Note: SBC results are identical to AIC and hence, not tabulated in Table 4.
[10] ECM short-run specifications for the model (iii) and model (iv) are presented in Table 5.
[11] Note: Table 8 presents granger causality results for economic growth (GDP) and human capital (HC).

From our test, it is evident the null hypothesis, of DCPS does not Granger cause FDI, cannot be rejected. However, FDI causes DCPS. Thus, confirming that FDI influences and causes DCPS, and is, therefore, an important determinant of DCPS development. For the second financial development measure (PCBD), the null hypothesis can be rejected. The results suggest unidirectional causation from FDI to DCPS and a bi-directional causation linkage between FDI and PCBD. This confirms that Namibia's capacity to progress and to develop the country's financial system will depend largely on the country's performance in attracting foreign direct investment. Such a result implies that FDI stock causes and promotes financial development in Namibia due to FDI related spill-over effects usually generated by the presence of foreign financial resources. These spill-over effects from FDI are more significant of two years.

6. Conclusion and Policy implications

The study examined the impact of FDI on financial development, economic growth and human capital in Namibia using annual data from 1990 to 2017. Namibia, in the last three decades, has traditionally been one of the biggest recipients of FDI (inflows) in the Southern African region. This capital inflow has boosted the Namibian economy in Southern Africa. The study has provided positive evidence that there is a long-run relationship between FDI and financial development, economic growth and human capital. Our findings have revealed various policies implication and one of that is FDI has been beneficial in instigating financial development and can lead to better economic performance and enhanced human capital in the country. Our findings also suggest that increase in FDI inflows is essential for the development of the country's financial system. This implies that higher inflow of FDI increases the size and efficiency of the financial sector and generate a positive effect on the Namibian economy. Furthermore, the causality analysis revealed that there was unidirectional causality from FDI inflows to domestic credit to the private sector, with a causal bi-directional association between FDI inflows and private credit by domestic money banks.

In addition, the study suggests that the relationship between FDI and financial development, both in the short and long run, is holistic to economic growth. It stipulates that the NDP5 that aims to achieve financial development goals of Namibia's 2030 objectives, can be accelerated through the promotion of greater financial inclusion via foreign investors seeking to access regional markets via SADC (Southern African Development Community), the TFTA (Tripartite Free Trade Agreement) or CFTA (Continental Free Trade Area). Similarly, the results suggest policymakers to give priority to those policies that are aiming to attract higher amount of FDI inflows to developing better capital markets and a good return on financial instruments to promote savings and provide long-term credit efficiently. These policy changes may help to alleviate funding constraints in general, which in effect will allow local enterprise development to benefit those business opportunities that are arising from foreign corporate activities. Thus, enhancing financial development and economic growth needed to achieve Namibia's Vision 2030 which is a policy that aims to move the country from a developing state to a developed economy.

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Tables and Figures

Table 1: Descriptive statistics of the variables in study

Variables	**FDI (log)**	**DCPS (log)**	**PCBD (log)**	**GDP (log)**	**HC (log)**	**INF (log)**	**GFCF (log)**	**POP (log)**
Mean	3.687	3.761	3.743	8.399	2.801	2.027	3.052	14.484
Standard Deviation	0.319	0.283	0.287	0.192	0.081	0.478	0.205	0.163
Minimum	3.024	2.940	2.928	8.175	2.701	0.833	2.627	14.163
Maximum	4.297	4.209	4.284	8.719	2.932	3.073	3.509	14.745
Obs	28	28	28	28	28	28	28	28

Note: Authors' calculation

Table 2: Econometric Specification for Economic growth and Human Capital

Unrestricted Error Correction Specifications

$$\Delta lnGDP_{t} = c_0 + \delta_1 lnGDP_{t-1} + \delta_2 lnFDI_{t-1} + \delta_3 lnGFCF_{t-1}\ \delta_4 lnINF_{t-1}\ \delta_5 lnPOP_{t} + \sum_{i=1}^{p} \phi i\ \Delta lnGDP_{t-i} + \sum_{j=1}^{q} \varpi i\ \Delta lnFDI_{t-j} + \sum_{l=1}^{q} \varphi i\ \Delta lnGFCF_{t} + \sum_{l=1}^{q} \gamma i\ \Delta lnINF_{t} + \sum_{l=1}^{q} \H{o} i\ \Delta lnPOP_{t}\ e_t$$

$$\Delta lnHC_{t} = c_0 + \delta_1 lnHC_{t-1} + \delta_2 lnFDI_{t-1} + \delta_3 lnGDP_{t-1} + \delta_4 POP_{t-1} + \sum_{i=1}^{p} \phi i\ \Delta lnHC_{t} + \sum_{j=1}^{q} \varpi i\ \Delta lnFDI_{t-j} + \sum_{l=1}^{q} \varphi i\ \Delta lnGDP_{t-l} + \sum_{s=1}^{q} \gamma i\ \Delta POP_{t-s} + e_t$$

ARDL long-run specifications

$$lnGDP_{t} = c_0 + \sum_{i=1}^{p} \theta_1\ lnGDP_{t-i} + \sum_{i=0}^{q1} \theta_2\ lnFDI_{t-i} + \sum_{i=0}^{q2} \theta_3\ lnGFCF_{t-i} + \sum_{i=0}^{q3} \theta_4\ lnINF_{t} + \sum_{i=0}^{q4} \theta_5\ lnPOP_{t} + e_t$$

$$lnHC_{t} = c_0 + \sum_{i=1}^{p} \theta_1\ lnHC_{t-i} + \sum_{i=0}^{q1} \theta_2\ lnFDI_{t-i} + \sum_{i=0}^{q2} \theta_3\ lnGDP_{t-l} + \sum_{i=0}^{q3} \theta_4\ POP_{t-i} + e_t$$

ECM short-run specifications

$$\Delta lnGDP_{t} = \alpha + \sum_{i=1}^{p} \phi i\ \Delta lnGDP_{t-i} + \sum_{j=1}^{q} \varpi i\ \Delta lnFDI_{t-j} + \sum_{l=1}^{q} \varphi i\ \Delta lnGFCF_{t-l} + \sum_{l=1}^{q} \gamma i\ \Delta lnINF_{t} + \sum_{l=1}^{q} \H{o} i\ \Delta lnPOP_{t} + \pi_1 ecm_{t-1} + e_t$$

$$\Delta lnHC_{t} = \alpha + \sum_{i=1}^{p} \phi i\ \Delta lnHC_{t-i} + \sum_{j=1}^{q} \varpi i\ \Delta lnFDI_{t-j} + \sum_{l=1}^{q} \varphi i\ \Delta lnGDP_{t-l} + \sum_{s=1}^{q} \gamma i\ \Delta POP_{t-s} + \pi_3 ecm_{t-1} + e_t$$

Table 3. Unit Root test Results

	ADF unit root test		PP unit root test		DF-GLS unit root test		
Variable (log)	**Level**	**First Difference**	**Level**	**First Difference**	**Level**	**First Difference**	**Conclusion**
FDI	-4.572***		-4.977***		-4.100***		I(0)
GDP	-1.035	-3.238*	-1.749	-3.312**	-1.473	-3.372*	I(1)
GFCF	-3.601**		-4.321***		-3.021	-4.449***	I(0)
INF	-1.635	-2.757**	-2.504	-8.048***	-3.496**		I(1)
POP	-5.825***		-2.628*		-7.765***		I(0)
DCPS	-0.528	-2.960**	-3.002**		-2.441	-4.639***	I(1)
PCBD	-0.437	-3.261**	-2.454	-3.363**	-2.037	-3.334*	I(1)
HC	-2.331	-3.38**	-1.720	-4.960***	-1.231	-4.239***	I(1)

[*** , ** & * denotes the rejection of the null at 1% , 5% & 10% significance level. This also denotes the acceptance of the null at both the 1 and 5% significance level for the DF-GLS unit root test.] ADF up to 4 lags were used.

Table 4: Results from Bounds tests

	Lags	F-stat	Outcome
Model (i).F(*lnDCPS*| *ln*FDI, *ln*GDP, *lnINF*)	2	15.06**	co-integration
Model (ii).F(*lnPCBD*| *ln*FDI, *ln*GDP, *lnINF*)	2	9.44**	co-integration
Model (iii).F(*ln*GDP| *ln*FDI, *ln*GFCF, *ln*POP, *ln*INF)	2	4.81**	co-integration
Model (iv).F(*lnHC*| *ln*FDI, *ln*GDP, *lnPOP)*	2	5.13**	co-integration

Notes: Asymptotic critical value bounds are obtained from Pesaran and Pesaran (2001); Case III: unrestricted intercept and no trend for k=4; lower bound I(0)=3.43 and upper bound I(1)=4.60. Case V unrestricted intercept and unrestricted trend, for model (i), k=5; lower bound I(0)=3.16 and upper bound I(1)=5.13 *** &** denotes significance at 1% & 5% level.

Table 5: Estimates of the Long-run coefficients based on ARDL models selected by AIC

	Dependant variable (DCPS)	Dependant variable (PCBD)	Dependant variable (Growth)	Dependant variable (HC)
Long-run coefficients	**AIC -ARDL**	**AIC –ARDL**	**AIC-ARDL**	**AIC –ARDL**
	(1,1,0,0)	**(1,1,0,0)**	**(2,2,0,2,2)**	**(1,0,0,1)**
lnFDI	0.169** (2.27)	0.267** (2.37)	0.064** (2.65)	0.05(1.74)*
lnGFCF	-	-	0.074** (3.32)	-
lnINF	0.115** (2.24)	-0.189** (2.64)	-0.55*** (3.59)	-
lnPOP	-	-	-2.12*** (7.74)	-0.36(-2.31)**
lnGDP	0.69*** (5.83)	0.609*** (3.53)	-	0.34 (2.99)**
Cons	-2.38** (2.055)	-1.79* (1.074)	37.73*** (9.39)	4.85 (3.11)**

** *, ** & * Denotes significance at the 1%, 5% & 10% level of significance. Numbers inside the parenthesis are the absolute value of t-ratios.

Table 6: ARDL Estimated Short-run Error Correction Model (ECM)

	Dependant variable (DCPS)	Dependant variable (PCBD)	Dependant variable (Growth)	Dependant variable (HC)
ΔlnFDISTCK			0.045**	0.044
$\Delta lnFDISTCK_1$	0.107**	0.132**	-0.027	
ΔlnGDP	-0.586*	-1.71***		0.271**
$\Delta lnGDP_1$			0.214*	
ΔlnGFCF			0.096***	
ΔlnINF	-0.73**	-0.93**	-0.017*	
$\Delta lnINF_1$			-0.023**	
ΔlnPOP			-7.261*	6.401**
$\Delta lnPOP_1$			8.24**	
CONS	-2.38**	-1.79*	37.73***	5.854***
TREND			0.81***	
ect(-1)	-0.63***	-0.49***	-0.29***	-0.79***
R	0.80	0.75	0.89	0.52
F-stat	20.25[0.000]	15.36[0.000]	10.02[0.000]	5.48[0.006]
DW-statistic	1.82	2.14	2.08[12]	2.1

Note: The AIC is used to select the optimum number of lag in the ARDL model. Δ is first difference of the variables**.** Numbers inside the parenthesis are p-values.

Table 7. Granger Causality (Wald test) for financial indicators (DCPS and PCBD)

	Number of Lags (Number of Observations)		
Null Hypothesis	**1**	**2**	Direction of Causality
FDI ⇒ DCPS	0.56	0.006**	*Uni-Directional*
DCPS ⇒ FDI	0.19	0.31	
FDI ⇒ PCBD	0.29	0.015**	*Bi-directional*
PCBD ⇒ FDI	0.24	0.002**	

*** Denotes significance at the 1% level and ** denotes significance at the 5% level of significance. Causality results for GDP and HC are **tabulated in Table 8**.

Table 8: Causality Results: Economic Growth and Human Capital

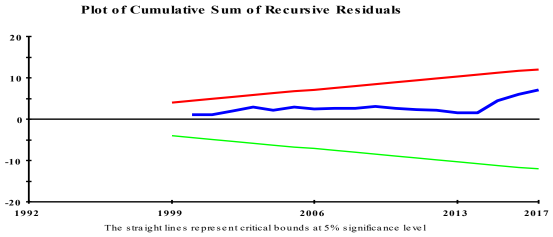
	Number of Lags (Number of Observations)		
Null Hypothesis	**1**	**2**	Direction of Causality
FDI ⇒ GDP	0.89	0.55	*Uni-Directional*
GDP ⇒ FDI	0.04**	0.03**	
FDI ⇒ HC	0.001***	0.001***	*Uni-directional*
HC ⇒ FDI	0.13	0.26	

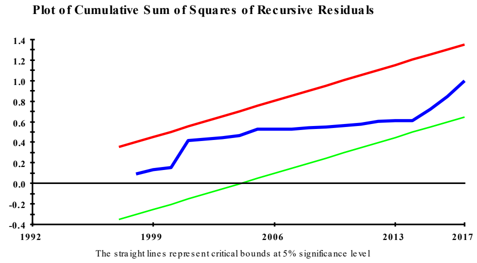
*** Denotes significance at the 1% level and ** denotes significance at the 5% level of significance

[12] The DW statistic are all approximately 2 and therefore suggest that autocorrelation may not be a problem. See for example, the following published papers with similar reporting's of the DW-Statistic; Ma et al. (2010), Adam (2009), Shahbaz et al. (2010), Blin et al. (2009) and Liu (2009).

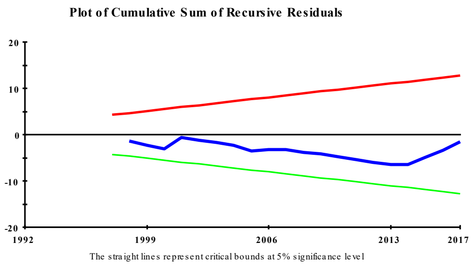
Figure 1: The structural break and coefficients stability tests: CUSUM and CUSUMQ

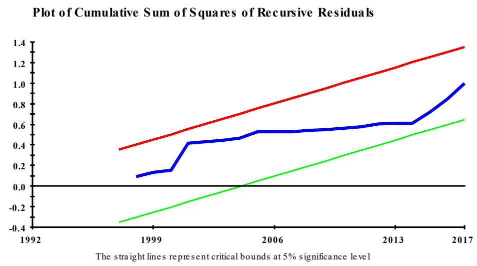
Model-DCPS



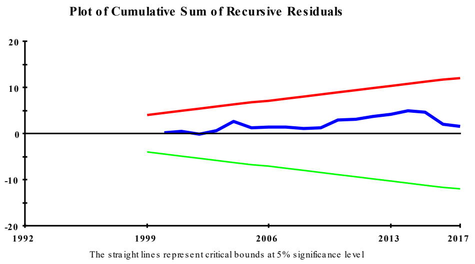


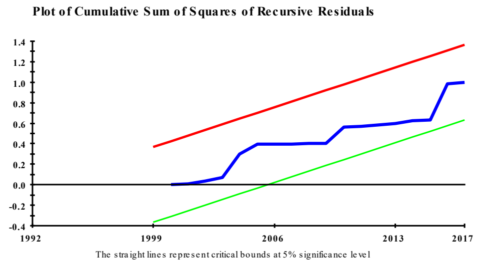
Model-PCBD



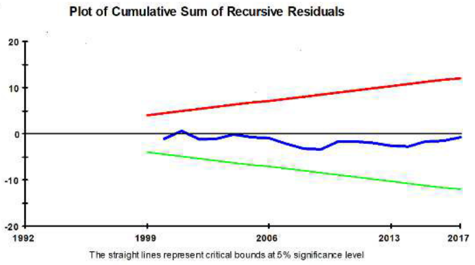


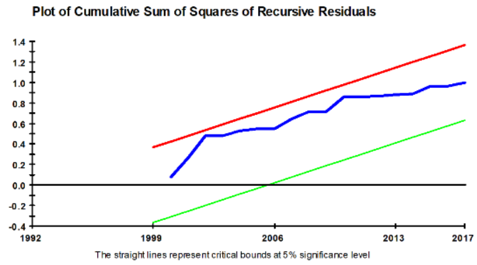
Model-Economic Growth





Model-Human Capital





Source: Authors'