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The Spirit Makes The Power

Long-term Impact of FDI-Corruption Interaction on Domestic Investment in Nigeria

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Abstract

Over the past three decades, Nigeria has experienced unstable domestic investment and direct foreign investment inflows, and the country continues to face rising corruption and related problems. An ARDL technique has been adopted to explore long-term FDI impact on domestic investment including evaluating if FDI-domestic investment nexus is dependent on corruption level in Nigeria over this period. The bounds test result shows an evidence of a long-term relation amongst FDI, domestic investment and corruption (including GDP per capita, lending rate, exchange rate and oil price). We find that increasing inward FDI reduces (crowds-out) domestic investment and greater corruption control (lowering corruption level) leads to higher domestic investment in Nigeria over the long-term. Also, the influence of FDI on domestic investment depends on (or varies with) corruption level. FDI crowds-in domestic investment at greater corruption control than at lesser corruption control in the long-term. Other significant long-term influencers of domestic investment are exchange rate and oil price. Given these outcomes, we offer some recommendations to boost domestic investment in Nigeria.

Keywords: FDI, domestic investment, corruption, Nigeria
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1. Introduction

Over the past few decades, FDI has assumed a critical role in recipient/receiving countries' economic activities. Theoretically, FDI brings benefits including technology transfer and managerial skills, greater access to foreign markets, creation of employment opportunities, and helping to reduce the saving-gap, among others, to the host country (Nurudeen, 2009; Wang, 2010). Recognizing these benefits, various Nigerian governments (like other developing countries) embarked on several reforms to attract FDI. They included the signing of Bilateral Investment Treaties (BITs) and establishment of Nigeria Investment Promotion Commission (NIPC) in the early and late 1990s, respectively, creation of Export Processing Zones (EPZs), trade liberalization and privatization. In 2017, the government re-emphasized its commitments to create an investment-friendly environment to boost domestic and foreign investments. The measures were improving ease of doing business to attract and retain both foreign and domestic/local investors, creation of special economic zones which will make provision for state-of-the-art economic infrastructure to enhance productivity, including unifying the country's investment and trade policies, and related negotiations.

Despite the growth of FDI to developing nations since the 1990s, the debate on whether it is beneficial (or not) to the host countries' economy has continued to rage on. In fact, much of the debate has centred on the crowd-in or crowd-out effect of FDI. Some scholars believed that FDI stimulates (crowds-in) host countries' domestic investment (Ndikumana and Verick, 2008; Ang, 2009; Chang, 2010; Lean and Tan, 2011; Al-Sadig, 2012; Ali and Wang, 2018; Ngeendepi and Phiri, 2021; Younsi et al., 2021). Contrariwise, certain authors opined that FDI reduces (crowds-out) recipient countries' local investment (Adams, 2009; Kosová, 2010; Morrissey and Udomkerdmongkol, 2012; Pilbeam and Oboleviciute, 2012; Munemo, 2014; Eregha, 2015; Ivanović, 2015; Yahia et al., 2018; Yao and Drama, 2019).

In Nigeria, both FDI and domestic investment have shown an unimpressive performance over the years. For example, FDI inflows (as a % of GDP) fluctuated (declining in most years) during the past three decades (Figure 1). Also, domestic investment (measured by gross fixed capital formation as a % of GDP) exhibited patterns similar to FDI over same period (Figure 1). Although both economic variables exhibited declining and rising trends, we cannot say with utmost certainty that movements in FDI were responsible for the behaviour of domestic investment during those years. Thus, there is need for an empirical assessment to ascertain if changes in FDI were the cause of the behaviour of domestic investment over this period.

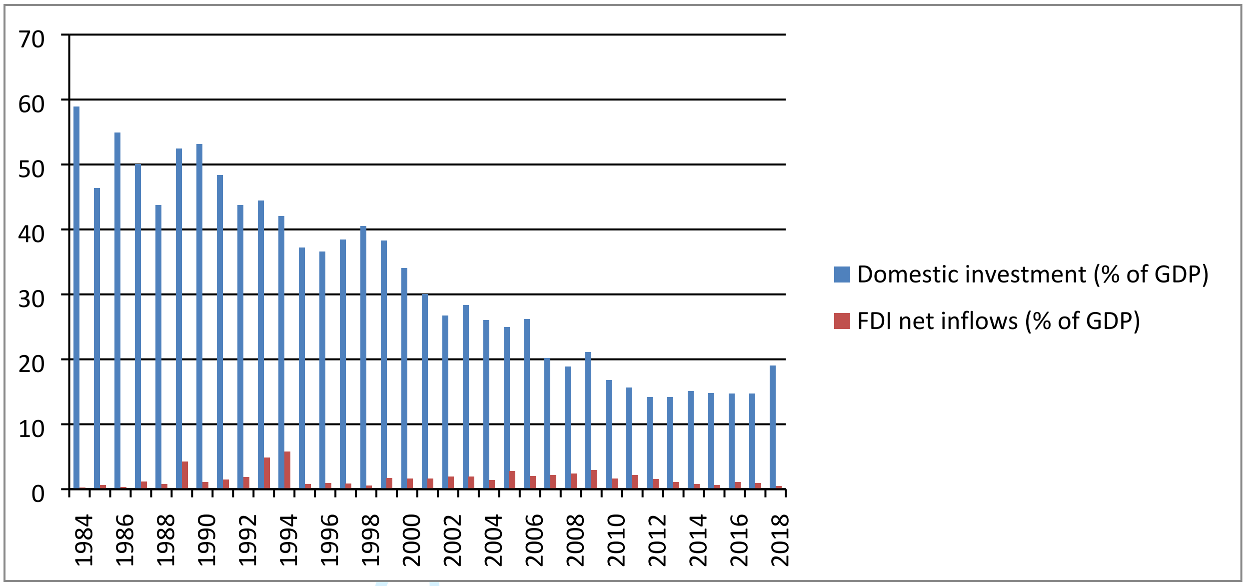

Figure 1: Plots of domestic investment and FDI as a percentage of GDP in Nigeria based on the data collected from World Banks Development Indicators.

Whereas an ample empirical research on FDI-domestic investment relation exists, not much has been done with respect to Nigeria. The few studies conducted to assess the influence of FDI on domestic investment reported mixed findings. Specifically, Adelegan (2000) found a crowd-out effect of FDI, Ditimi and Matthew (2014) observed a crowd-in effect, while Aigheyisi (2017) reported an insignificant impact of FDI on domestic investment in Nigeria.

Moreover, none of the research on Nigeria deemed it important to explore whether FDI's impact on domestic investment is dependent on corruption level. But it has been stated that FDI-domestic investment nexus can be influenced by host country's corruption level (Morrissey and Udomkerdmongkol, 2012; Farla et al., 2013; Yao and Drama, 2019). Given that FDI tends to influence domestic investment and FDI is in turn influenced by corruption, it implies that FDI's impact on domestic investment can be dampened or improved at certain corruption level. Therefore, this study extends the literature by exploring the influence of FDI on domestic investment including evaluating whether FDI's impact on domestic investment is dependent on corruption level in Nigeria.

The remainder of the paper is organized as follows. The review of past empirical research on FDI, domestic investment and corruption is done in the second section, while theoretical framework and model specification are done in the third section. The fourth section is for data and econometric methods, while the fifth section consists of results and discussion. The last section is for conclusion.

2. Review of Past Research on Domestic Investment, FDI and Corruption

Although FDI-domestic investment nexus has been adequately explored, only a few studies assessed whether FDI-domestic investment relation is dependent on receiving country's corruption level. Interestingly, most of the studies that examined FDI's effect on domestic investment concentrated on developing countries (using time series or panel dataset) and found that FDI crowds-in (promotes) domestic investment (Ndikumana and Verick, 2008; Ang, 2009; Chang, 2010; Lean and Tan, 2011; Al-Sadig, 2012; Abu and Karim, 2016; Ali and Wang, 2018; Ngeendepi and Phiri, 2021; Younsi et al., 2021). For example, Ndikumana and Verick (2008) explored the FDI-domestic investment relation in Sub-Saharan Africa (SSA) over the 1970-2005 period, using the Ordinary Least Squares (OLS) and Fixed Effects (FE) estimators. They found that FDI crowds-in domestic investment in the region. Also, Al-Sadig (2013) investigated FDI's influence on domestic investment in developing economies during the 1970-2000 period. Applying the Generalized Method of Moments (GMM) estimator, the author established a crowd-in effect of FDI. Furthermore, Ngeendepi and Phiri (2021) used the Pool Mean Group (PMG) approach to estimate relations amongst FDI, domestic private investment and government capital expenditure in the Southern African Development Community (SADC) for the 1991-2019 period. They submitted that FDI stimulates domestic investment.

At individual country level, Ang (2009) adopted multivariate cointegration technique to assess the influence of FDI on domestic investment in Malaysia from 1960 to 2003, and reported that FDI promotes domestic investment. Also, Chang (2010) employed to the threshold error correction method to evaluate the relations amongst FDI, domestic capital, and economic growth in the Taiwanese economy from 1981Q1 to 2008Q2. The empirical outcomes indicate that FDI crowds-in domestic investment. Similarly, Lean and Tan (2011) examined domestic investment, FDI and economic growth relationships in Malaysia from 1970 to 2009 using Johansen's multivariate cointegration approach and vector error correction method (VECM). The authors confirmed a positive impact of FDI on domestic investment. Moreover, Ali and Wang (2018) evaluated the impact of outbound FDI on Chinese domestic investment over the 1982-2015 period by utilizing the Autoregressive Distributed Lag (ARDL) method. The results reveal a crowd-in impact of FDI. Similarly, Yahia et al. (2018) investigated the effect of FDI on domestic investment in Sudan from 1976 to 2016 using the ARDL estimator. The authors confirmed a crowd-in impact of FDI.

However, other studies have discovered a crowd-out (displacement) influence of FDI on domestic investment in developing nations (Adams, 2009; Kosová, 2010; Morrissey and Udomkerdmongkol, 2012; Pilbeam and Oboleviciute, 2012; Munemo, 2014; Eregha, 2015; Ivanović, 2015; Yahia et al., 2018; Yao and Drama, 2019). For example, Adams (2009) studied the effects of domestic investment and FDI on SSA's economic growth from 1990 to 2003 using OLS and FE regression methods. The results suggest that FDI crowds-out domestic investment. In addition, Eregha (2015) evaluated the impact of FDI and its volatility on domestic investment in ECOWAS during the 1970-2008 period. The results of the Autoregressive Conditionally Heteroskedasticity (ARCH) and Generalized ARCH (GARCH) suggest a crowding-out impact of FDI. Moreover, Yao and Drama (2019) explored the influence of FDI on domestic private investment in the West Africa sub-region by applying the GMM estimator to panel data spanning the 2002-2015 period. The results depict a crowding-out effect of FDI.

On the other hand efforts have been made to look at FDI-domestic relation in developed nations. Pilbeam and Oboleviciute (2012) used the GMM regression technique to assess FDI's impact on domestic investment in European Union (EU) nations (excluding Luxembourg) from 1990 to 2008. The results show that FDI did not depress domestic investment in new EU nations, while there was an evidence of crowding-out in the older EU members in the long term. In the same vein, Kosová (2010) examined whether foreign firms crowd-in or crowd-out domestic firms in the Czech Republic from 1994 to 2001using firm level data. The author's findings illustrate evidence of crowding-out effect. Also, Ivanović (2015) used the Vector Autoregressive (VAR) method to assess FDI's impact on domestic investment in Croatia from 2001Q1 to 2014Q2. The empirical findings demonstrate that FDI crowds-out domestic investment.

Yet a few studies reported an insignificant (or neutral) impact of FDI on domestic investment. Wang (2010) investigated the impact of FDI on domestic investment across countries from 1970 to 2004. Employing the Instrumental Variable (IV) estimation method, the author discovered a neutral cumulative impact of FDI in developed economies. In Nigeria, Aigheyisi (2017) adopted the Dynamic OLS (DOLS) to evaluate the influence of FDI on domestic investment from 1981 to 2014. The empirical evidence illustrates an insignificant impact of FDI in the long term.

There are studies focusing on developing economies which suggested that the FDI-domestic investment nexus is contingent or dependent on host country's corruption level. For instance, Morrissey and Udomkerdmongkol (2012) assessed if FDI crowds-in or crowds-out domestic in the presence of governance across developing countries by applying the GMM estimator to data over the 1996-2009 period. The authors found an evidence of crowding-out effect of FDI which is higher with better control of corruption. Similarly, Farla et al. (2013) employed the GMM method to analyze the impact of FDI in interaction with governance indicators on domestic investment in a sample of consisting mainly developing economies. The results demonstrate that FDI crowds-in domestic investment, while the FDI-corruption interaction has a significant negative influence on domestic investment. Also, Yao and Drama (2019) explored the influence of FDI-governance (corruption and political stability inclusive) interaction on domestic investment in selected West African nations from 2002 to 2015 using the GMM estimation approach. The authors found a crowding out impact of FDI, and the substitution effect is stronger in the presence of high control of corruption. A summary of related researches is provided in Table 1.

Table 1. Summary of empirical literature review

Author(s)	Country(ies)/Period	Method/Model	Findings
Adelegan (2000)	Nigeria (1970-1995)	OLS	FDI crowds-out domestic investment.
Ditimi and Matthew (2014)	Nigeria (1970-2012)	VAR	FDI crowds-in domestic investment in the short-run.
Aigheyisi (2017)	Nigeria (1981-2014)	DOLS	FDI has an insignificant effect on domestic investment.
Kim and Seo (2003)	Korea	VAR/VECM	No evidence of crowd-out effect of FDI on domestic investment.
Ang (2009)	Malaysia (1960-2003)	VECM	FDI crowds-in domestic private investment.
Lean and Tan (2011)	Malaysia (1970-2009)	VECM	FDI crowds-in domestic investment.
Chang (2010)	China (1981Q1-2008Q2)	Threshold ECM	FDI crowds-in domestic investment.
Ali and Wang (2018)	China (1982-2015)	ARDL	FDI crowds-in domestic investment.
Kosová (2010)	Czech Republic (1994-2001)	FE/RE/Probit/ Tobit	FDI has a short-term crowding-out on domestic investment.
Prasanna (2010)	India (1991-2007)	Multiple Linear Regression	FDI crowds-in domestic investment.

Table 1. (Contd.)

Author(s)	Country(ies)/Period	Method/Model	Findings
Rath and Bal (2014)	India (1978-2010)	Structural VAR	FDI crowds-in domestic investment.
Ivanović (2015)	Croatia (2001Q1-2014Q4)	VAR	FDI crowds-out domestic investment.
Yahia et al. (2018)	Sudan (1976-2016)	ARDL	FDI crowds-out domestic investment.
Adams (2009)	SSA countries (1990-2003)	OLS/FE	FDI crowds-out domestic investment.
Ndikumana and Verick (2008)	SSA countries (1970-2005)	OLS/FE	FDI crowds-in domestic investment.
Abu and Karim (2016)	SSA countries (198-2011)	VAR	FDI crowds-in domestic investment.
Younsi et al. (2021)	African economies (1996-2016)	System-GMM	FDI crowds-in domestic investment.
Pilbeam and Oboleviciute (2012)	European Union (1990-2008)	GMM	FDI crowds-out domestic investment in older European Union member states.
Eregha (2015)	ECOWAS (1970-2008)	ARCH/GARCH	FDI crowds-out domestic investment.
Ali and Mna (2017)	Maghreb countries (1980-2014)	GMM	FDI has an insignificant effect on domestic investment.
Jude (2018)	Central and Eastern European nations (1995-2015)	GMM	FDI crowds-out domestic investment in the short-term, but crowd-in domestic investment in the long-term.
Ngeendepi and Phiri (2021)	SADC economies (1991-2019)	PMG	FDI crowds-in domestic investment.
Apergis et al. (2006)	Cross countries (1992-2002)	PMG	FDI crowds-in or crowds-out domestic investment depending on the region.
Agosin and Machado (2005)	Developing countries (1971-2000)	GMM	FDI crowds-out domestic investment in Latin America but promotes domestic investment in Africa and Asia.
Al-Sadig (2012)	Developing nations (1970-2000)	GMM	FDI crowds-in domestic private investment.
Ashraf and Herzer (2014)	Developing countries (2003-2011)	FE/GMM	Greenfield FDI has a strong crowding-out impact on domestic investment.
Göçer et al. (2014)	Developing economies (1992-2010)	GMM	FDI has both crowds-in and crowds-out impacts on domestic investment.
Wang (2010)	Cross country (1970-2004)	FE/RE/GMM	FDI crowds-in domestic investment in LDCs, but its impact is neutral in developed countries.

Table 1. (continued)

Author(s)	Country(ies)/Period	Method/Model	Findings
Munemo (2014)	Cross country (2000-2010)	GMM	FDI crowds-out domestic investment.
Abu and Karim (2021)	Nigeria (1996-2019)	ARDL/CCR/ DOLS/FMOLS	Very high corruption level hurts domestic investment.
Folorunso (2007)	Nigeria (1994-2005)	OLS	Corruption hinders domestic investment.
Bakare (2011)	Nigeria (1978-2008)	ECM	Corruption has an adverse impact on domestic investment.
Fabayo et al. (2011)	Nigeria (1996-2010)	OLS	Corruption discourages domestic investment.
Anoruo and Braha (2005)	African countries (1984-2000)	FMOLS	Corruption has a significant negative influence on domestic investment.
Baliamoune-Lutz and Ndikumana (2008)	African countries (1982-2001)	GMM	Corruption has a significant negative effect on domestic investment.
Gyimah-Brempong (2002)	African economies (1993-1999)	GMM	Corruption reduces investment in physical capital.
Yao and Drama (2019)	West African countries (2002-2015)	GMM	FDI crowds-out domestic investment, and FDI-corruption interaction has a negative impact on domestic investment.
Tanzi and Davoodi (1997)	Cross country (1980-1995)	OLS	Corruption raises public investment but decreases the quality of existing infrastructure.
Campos et al. (1999)	Cross country (1982-1994)	OLS	Corruption has adverse impact of domestic investment.
Mo (2001)	Cross country (1970-1985)	OLS	Corruption decreases private investment.
Méon and Sekkat (2005)	Cross country (1970-1998)	GLS	Corruption has a negative impact on investment.
Gyimah-Brempong and de Camacho (2006)	Cross country (1980-1998)	GMM	Less corruption is positively related to domestic investment.
Swaleheen (2007)	Cross country (1995-2004)	GMM	Corruption has a negative impact on domestic investment.
Morrissey and Udomkerdmongkol (2012)	Developing economies (1996-2009)	GMM	FDI crowds-out domestic investment. But the negative effect of FDI on domestic investment is less at lower level of corruption, and vice versa.
Farla et al. (2013)	Developing nations (1996-2009)	System-GMM	FDI crowds-in domestic investment, and FDI-governance interaction has a negative effect

			on domestic investment.

Note: ARCH=Autoregressive Conditionally Heteroskedasticity; GARCH=Generalized ARCH; ARDL= Autoregressive Distributed Lag; GMM=Generalized Method of Moments; ECM= Error Correction Method; VECM=Vector Error Correction Method; VAR=Vector Autoregressive; GLS=Generalized Least Squares; FE=Fixed Effects; RE=Random Effects; OLS=Ordinary Least Squares; CCR=Canonical Cointegrating Regression; DOLS=Dynamic OLS; FMOLS=Fully Modified OLS; PMG=Pooled Mean Group.

It is obvious that FDI-domestic investment nexus in Nigeria has been explored, but none of the studies deemed it important to explore if this relation is dependent on the country's corruption level. Thus, this research extends the literature, taking a cue from Morrissey and Udomkerdmongkol (2012), Farla et al. (2013), and Yao and Drama (2019), by assessing FDI-domestic investment linkage including evaluating if this relation depends on corruption level in Nigeria.

3. Theoretical Framework and Model

In specifying domestic investment model, this study follows the path of Markusen and Venables (1999) and Wang (2010). The authors theorized that the presence of multinational corporations (MNCs) brings two impacts on the host nation - namely the linkage impact and the competition impact. The presence of MNCs raises competition amongst existing firms in the finished product industry, leading to a reduction in profitability of local firms competing in the industry. The decline in profits soon forces some of these firms to leave the industry resulting in a decline in domestic investment (competition impact). Contrariwise, the presence of MNCs can raise the demand for intermediate inputs, causing an increase in number of local firms operating in that industry, and consequently, leading to higher domestic investment (linkage impact).

Contributing to the theoretical connection between FDI and domestic investment and toeing the path of Markusen and Venables (1999), Barrios et al. (2005) opined that the coming of MNCs might shrink the number of existing local firms initially before increasing it. They argued that when MNCs enter the host country, the number of firms operating in the finished product industry rises and consequently push down the price of the product. The reduced price is accompanied by falling profits for all firms and exiting of some domestic firms which are usually less productive compared to the MNCs (competition effect). Contrariwise, the entry of MNCs increases the number of domestic firms in the intermediate product industry and possibly lower production costs for both local firms and MNCs. The reduction in costs will eventually attract more domestic firms to the industry (Wang, 2010), the linkage effect.

The discussion above implies that FDI can either promote the growth of domestic firms (crowd-in effect) or stifle their performance (crowd-out effect). Thus, domestic investment (INV) is dependent on (FDI) as:

$$INV_t = \beta_0 + \beta_1 FDI_t + \mu_t \quad (1)$$

In addition, host/recipient country's corruption level can influence FDI's movement. The grabbing-hand hypothesis considers corruption an extra cost to MNCs and/or an arbitrary tax to investment. This impact negatively on firms' profitability and consequently deter MNCs from investing in very corrupt nations (Tanzi, 1988; Wei, 2000; Habib and Zurawicki, 2001; Habib and Zurawicki, 2002; Egger and Winner, 2005). However, the helping-hand hypothesis advocated by authors such as Leff (1964), Huntington (1968) and Lui (1985), suggests that existence of corruption (in form of offering/paying bribes to public officials) makes it easy to by-pass or circumvent high regulations including administrative controls which serve as obstacles or hindrances to growth of investment, leading to higher inward FDI. Thus, corruption (COR) can either foster or discourage foreign investment (FDI). Moreover, it is argued that FDI's impact on domestic investment can be supportive or disruptive at certain corruption level (Morrissey and Udomkerdmongkol, 2012). The argument suggests that since FDI tends to affect INV, and FDI is in turn influenced by COR, it implies that FDI's impact on INV can be determined by COR. Thus, the new investment model is:

$$INV_t = \beta_0 + \beta_1 FDI_t + \beta_2 COR_t + \beta_3 FDI * COR_t + \mu_t \tag{2}$$

Beside FDI and corruption, other potential influencers of domestic investment include exchange rate (Wang, 2010; Ashraf and Herzer, 2014; Yahia et al., 2018), lending rate (Wang, 2010; Ashraf and Herzer, 2014; Jude, 2018; Yahia et al., 2018; Ngeendepi and Phiri, 2021), GDP per capita (Campos et al., 1999; Wang, 2010; Munemo, 2014; Abu and Karim, 2021), and oil price (Abu and Karim, 2021; Stasavage, 2002). For instance, high GDP per capita ($GDPC$) signals increased capacity of a country and its citizenry to meet their consumption needs and raise domestic savings which in turn boosts domestic investment (Abu and Karim, 2021). In addition, high lending rate ($RATE$) increases borrowing costs which businessmen have to bear in order to access funds for investment purpose, thus, adding to cost of production. Consequently, domestic investment is reduced. Moreover, the presence of large natural resources such as oil (OIL) in an economy can attract huge levels of investment, resulting to an increase in aggregate domestic investment (Abu and Karim, 2021; Stasavage, 2002). Furthermore, exchange rate ($EXCH$) movement can affect domestic investment (Nurudeen, 2009; Wang, 2010; Ashraf and Herzer, 2014). Depreciation of domestic/local currency makes imports expensive and discourages the consumption of foreign products. This raises the demand for domestically produced goods and an increase in domestic investment as investors attempt to meet the rising demand for their products. Contrariwise, appreciation increases demand for foreign/imported products and lowers consumption of domestically produced goods. This reduces domestic investment.

If these issues and variables are considered, the new INV model is:

$$LINV_t = \beta_0 + \beta_1 LFDI_t + \beta_2 COR_t + \beta_3 LFDI * COR_t + \beta_4 LGDPC_t + \beta_5 RATE_t + \beta_6 LEXCH_t + \beta_7 LOIL_t + \mu_t \tag{3}$$

L signifies logarithm taken to reduce absolute values of variables to almost similar scale. Using the FDI and corruption interaction (i.e., $LFDI * COR$), the marginal influence of changes in FDI on domestic investment at varying corruption level can be calculated via partial derivative of model 3 with respect to FDI as:

$$\frac{\partial LINV_t}{\partial LFDI_t} = \beta_1 + \beta_3(COR_t) \tag{4}$$

4. Data and Econometric Methods

We use yearly data to estimate FDI, domestic investment and corruption nexus. The data were gathered from Political Risk Service's International Country Risk Guide (ICRG), World Bank's Development Indicators (WDI), International Energy Association and the Organization of Petroleum Exporting Countries (OPEC), and the Central Bank of Nigeria (CBN) databases. The data collected from WDI include INV, FDI, $RATE$, $GDPC$, and $EXCH$. The data on COR were collected from the ICRG, and OIL from OPEC.

INV is captured by gross fixed capital formation in constant 2010 US$, FDI by FDI net inflows (BoP, current US$), COR by control of corruption, $GDPC$ by GDP per capita (constant 2010 US$), $RATE$ by lending interest rate (in %), $EXCH$ by official exchange rate (i.e., Naira per US$), and OIL by average oil prices in US$.

4.1 Unit Root Test

It is a requirement to conduct unit root or stationarity test before estimating relationship amongst variables using yearly data to avoid generating meaningless results. To achieve this objective, Augmented Dicker-Fuller (ADF), Phillips-Perron (PP) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) tests are adopted. The ADF equation of Dickey and Fuller (1979) is:

$$\Delta y_t = \mathrm{a} + \rho y_{t-1} + \theta_1 \Delta y_{t-1} + \ldots + \theta_k \Delta y_{t-k} + \mu_t$$

y_t = series and while μ_t = error term. The equation tests H_0 (null hypothesis):

H_0: $\rho = 0$ (i.e., series is non-stationary/has unit root)

Against H_1 (alternative hypothesis):

H_1: $\rho < 0$ (i.e. series is stationary/has no unit root)

The PP test of Phillips and Perron (1988) is a complementary test to ADF test. Where PP/ADF test statistic is more than the critical value (1%, 5% or 10%), H_0 is not rejected. But if test statistic is less than the critical value, H_0 is rejected. In the case of the KPSS (1992) test, the H_0 states that the series is stationary against the H_1, i.e., series is non-stationary.

4.2 ARDL Estimation Technique

In evaluating domestic investment, FDI and corruption relation, the ARDL technique (Pesaran and Shin, 1999; Pesaran et al., 2001) is adopted. The approach is applicable to series integrated to order one [I(1)], or a mixture of [I(1)] and order zero [I(0)] series.

Besides, the approach is more appropriate when estimating relations involving small samples. Other advantages of the approach are - use of single equation to estimate both short- and long-term coefficients including permitting variables to have varying optimal lags (Abu et al., 2019; Abu and Staniewski, 2019; 2021). The ARDL model (p,k_1,k_2,k_3,k_4,k_5,k_6,k_7) to be estimated is specified as follows:

$$\Delta LINV_t = \alpha_0 + \sum_{i=1}^{p} \delta_1 \Delta LINV_{t-i} + \sum_{i=0}^{k_1} \delta_2 \Delta LFDI_{t-i} + \sum_{i=0}^{k_2} \delta_3 \Delta COR_{t-i} + \sum_{i=0}^{k_3} \delta_4 \Delta LFDI * COR_{t-i} + \sum_{i=0}^{k_4} \delta_5 \Delta LGDPC_{t-i} + \sum_{i=0}^{k_5} \delta_6 \Delta RATE_{t-i} + \sum_{i=0}^{k_6} \delta_7 \Delta LEXCH_{t-i} + \sum_{i=0}^{k_7} \delta_8 \Delta LOIL_{t-i} + \beta_1 LINV_{t-1} + \beta_2 COR_{t-1} + \beta_3 LFDI_{t-1} + \beta_4 LFDI * COR_{t-1} + \beta_5 LGDPC_{t-1} + \beta_6 RATE_{t-1} + \beta_7 LEXCH_{t-1} + \beta_8 LOIL_{t-1} + \mu_t \quad (3)$$

where α_0 = constant term, δ_1 - δ_8, and β_1 - β_8 imply coefficients. Executing ARDL approach starts with bounds test applied to test H_0 (i.e., null hypothesis) of no cointegration via the equation:

H_0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = \beta_8 = 0$

The hypothesis is tested by applying the modified Wald test (i.e. calculating the F-statistic) on joint significance of the coefficients. It is followed by comparing F-statistic with lower bound [I(0)] and upper bound [I(1)] critical values. If the I(0) is higher compared to F-statistic, H_0 (null hypothesis of no cointegration amongst the variables) is accepted. But if I(1) is lesser compared to F-statistic, H_0 is not accepted, implying existence of cointegration. Furthermore, if F-statistic falls within I(0) and I(1), the inference would be inconclusive.

Upon establishment of cointegration, the long-term parameters are estimated via the model:

$$LINV_t = \theta_0 + \theta_1 LFDI_t + \theta_2 COR_t + \theta_3 LFDI * COR_t + \theta_4 LGDPC_t + \theta_5 RATE_t + \theta_6 LEXCH_t + \theta_7 LOIL_t + \mu_t \quad (6)$$

Likewise, the short-term parameters are estimated using the model:

$$\Delta LINV_t = \Upsilon_0 + \sum_{i=1}^{p} \Upsilon_1 \Delta LINV_{t-i} + \sum_{i=0}^{k_1} \Upsilon_2 \Delta LFDI_{t-i} + \sum_{i=0}^{k_2} \Upsilon_3 \Delta COR_{t-i} + \sum_{i=0}^{k_3} \Upsilon_4 \Delta LFDI * COR_{t-i} + \sum_{i=0}^{k_4} \Upsilon_5 \Delta LGDPC_{t-i} + \sum_{i=0}^{k_5} \Upsilon_6 \Delta RATE_{t-i} + \sum_{i=0}^{k_6} \Upsilon_7 \Delta LEXCH_{t-i} + \sum_{i=0}^{k_7} \Upsilon_8 \Delta LOIL_{t-i} + \psi_1 ECT_{t-1} + \mu_t \quad (7)$$

ECT_{t-1} signifies one lagged period of error correction term. Its coefficient, ψ_1, signifies adjustment speed needed to restore long-term equilibrium after any shock. To estimate the ARDL model, an Akaike Information Criterion (AIC) is applied in the selection of optimal lags for respective variables. This follows Liew's (2004) view that AIC performs better than other lag selection criteria in small samples.

4.3 Diagnostic Tests

Diagnostic tests are carried out for the purpose of checking the generated results' validity. The Breusch-Godfrey (BG) serial-correlation Lagrange multiplier test is conducted to check whether residuals are serially correlated, while the Breusch-Pagan-Godfrey (BPG) heteroscedasticity test is to ascertain if error terms are homoscedastic. Moreover, the Ramsey RESET is executed to assess if the model is well specified, and Jarque-Bera (JB) test to evaluate the normality property.

4.4 Stability Tests

The estimated parameters and model are subject to stability tests using both the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMS). If the CUSUMS plots break outside the upper bound or the lower bound, the model and its parameters are considered not stable in the long-term (Greene, 2003).

5. Discussion of Results

5.1 Descriptive Statistics

The descriptive statistics are reported in Table 2. The mean log of investment ($LINV$) is 10.7262, while the average log of foreign direct investment ($LFDI$) is 9.2063. In addition, the mean corruption control (COR) 1.6000, while the average log of GDP per capita ($LGDPC$) is 3.2361. Furthermore, the mean average lending rate ($RATE$) is 18.4672, average log of exchange rate ($LEXCH$) is 1.6263, and log of oil price ($LOIL$) is 1.5200.

Table 2. Descriptive statistics

	$LINV$	$LFDI$	COR	$LGDPC$	$RATE$	$LEXCH$	$LOIL$
Mean	10.7262	9.2063	1.6000	3.2361	18.4672	1.6263	1.5200
Max.	10.8498	9.9465	2.0000	3.4089	31.6500	2.4858	2.0392
Min.	10.5765	8.2768	1.0000	3.1219	9.4333	-0.1154	1.0891
Std. Dev.	0.0741	0.5032	0.3620	0.1065	4.3515	0.7337	0.3031
Obs.	35	35	35	35	35	35	35

Source: Authors' calculation**.**

5.2 Results of Unit Root Test

The unit root test results reported in Table 3 show that some of the series (or variables) have a unit root or they are non-stationary. But the series became stationary after their first difference has been taken. The variables include $LINV$, $LFDI$, COR, $LGDPC$ and $LOIL$. Therefore, they are integrated to order one [i.e., I(1)].

Table 3. Results of unit root test

	ADF		PP		KPSS	
Variable	Level	1st diff.	Level	1st diff.	Level	1st diff.
$LINV$	-0.8007	-8.8008***	-1.5972	-9.9062***	0.7272	0.0445**
$LFDI$	-2.2867	-9.6922***	-2.1803	-9.6068***	0.5661	0.2148***
COR	-2.1968	-4.0059***	-1.4769	-4.0123***	0.3729	0.0986***
$LGDPC$	-0.3180	-3.8682***	-0.3136	-3.7974***	0.6070	0.1532***
$RATE$	-2.7569*	-	-2.7291*	-	0.1346***	-
$LEXCH$	-2.9356*	-	-3.7538***	-	0.6608*	-
$LOIL$	-0.9278	-5.4921***	-0.9518	-5.4872***	0.5342	0.1518***

Source: Authors' calculation. * and *** indicates a rejection of the null hypothesis of no unit root at 10% level and 1% level, respectively. *L* signifies logarithm.

However, both $RATE$ and $LEXCH$ do not have a unit root (i.e., they are stationary). Therefore, these series are integrated to order zero [i.e., 1(0)]. The confirmation that the series are a mixture of I(0) and I(1) provides the rationale for performing the bounds test to cointegration.

5.3 Results of ARDL Bounds Test to Cointegration

The bounds test to cointegration result (Table 4) signifies that calculated F-statistic (i.e., 7.4206) is larger than the upper critical bound (i.e., 3.90) at 1% level.

Table 4. Results of bounds test to cointegration

Function = f($LINV/LFDI$,COR,$LGDPC$,$RATE$, $LEXCH$,$LOIL$)			
	Critical values bounds		
F-stat. = 7.4206***		I(0)	I(1)
	10%	1.92	2.89
	5%	2.17	3.21
	1%	2.73	3.90

Source: Authors' calculation. *** denotes statistical significance at 1% level and a rejection of the null hypothesis of no cointegration. *L* signifies logarithm.

This outcome signifies that a long-term relation exists among the variables under consideration.

5.4 Results of ARDL Model Estimation

The results of estimation (Table 5) imply that optimum lag-length of the estimated model selected by the AIC is: 2,2,1,2,2,0,0,2. The results portray that higher FDI reduces (crowds-out) domestic investment in both long-term and short-term. A 1% increase in FDI lowers (crowds-out) domestic investment by 0.13% and 0.08% in long- and short-term, respectively, at the 1% level.

In addition, greater corruption control encourages domestic investment in long- and short-term. A 1 unit increase in the corruption control index (reducing corruption) leads to 0.12% and 0.11% increase in domestic investment in long- and short-term, respectively, at 1% level.

Also, FDI and corruption control interaction (i.e., $LFDI * COR$) has a positive impact on domestic investment in long- and short-term. The coefficient of the interaction term is 0.33% in the long-term at 5% level and 0.17% in the short-term at 1% level, indicating that at greater corruption control (lesser corruption level) FDI has a positive impact on (crowd-in) domestic investment.

Table 5. Results of the ARDL model estimation (D.V= $\Delta LINV$)

Short-run coefficients			Long-run coefficients		
Regressor	Coeff./Se	ρ-value	Regressor	Coeff./Se	ρ-value
$\Delta LINV_{-1}$	0.4402*** (0.1205)	0.0026	Constant	10.9770*** (0.4570)	0.0000
$\Delta LFDI$	-0.0830*** (0.0224)	0.0024	$LFDI$	-0.1317*** (0.0360)	0.0026
$\Delta LFDI_{-1}$	0.1470*** (0.0216)	0.0000	COR	0.1244*** (0.0367)	0.0044
ΔCOR	0.1147*** (0.0334)	0.0040	$LFDI * COR$	0.3309** (0.1134)	0.0113
$\Delta LFDI * COR$	0.1793*** (0.0601)	0.0099	$LGDPC$	0.1005 (0.1391)	0.4820
$\Delta LFDI * COR_{-1}$	-0.2865*** (0.0646)	0.0006	$RATE$	-0.0022 (0.0015)	0.1512
$\Delta LGDPC$	0.4012 (0.2877)	0.1849	$LEXCH$	0.1764*** (0.0279)	0.0000
$\Delta LGDPC_{-1}$	1.2726*** (0.2981)	0.0008	$LOIL$	0.1134* (0.0585)	0.0731
$\Delta LOIL$	0.0621 (0.0373)	0.1183			
$\Delta LOIL_{-1}$	-0.1248*** (0.0382)	0.0056			
ECT_{-1}	-1.6344*** (0.1595)	0.0000			
Model diagnostic tests					
Normality: Jarque Bera			0.4136[0.8131]		
Serial-correlation: χ^2			0.6764[0.7130]		
Heteroscedasticity: χ^2			12.8726[0.7991]		
Specification (Ramsey RESET): F-stat.			0.0061[0.9386]		

Source: Authors' calculation. Δ is the first difference operator. Values in ( ) and [] are standard errors and probability, respectively. *, ** and *** signifies significance at 10%, 5% and 1% levels, respectively. L denotes logarithm.

Furthermore, an increase in exchange rate (depreciation) raises domestic investment in the long-term. A 1% increase in exchange rate (depreciation of the local currency) raises domestic investment by 0.17% in the long-term at 1% level. Moreover, rising oil price boosts domestic investment in the long-term. A 1% increase in oil price leads to 0.11% in domestic investment in the long-term at 10% level.

The coefficient of ECT_{t-1} is negative and statistically significant and in between -1 and -2 (i.e., -1.63) at 1% level. Since the coefficient of the ECT_{-1} lies between -1 and -2, it suggests that the ECT_{t-1} produces dampening fluctuations in the dependent variable (i.e. domestic investment in our case) around the path to equilibrium (for example, see Narayan and Smyth, 2005). Thus, the coefficient's value of -1.63 demonstrates that rather than converging monotonically directly to the equilibrium path, the process of error correction fluctuates around the long-run value in a dampened manner. But upon completion of the error correction process, the convergence to equilibrium path becomes rapid.

The diagnostic tests' results imply that JB normality test statistic is 0.4136 with a probability of 0.8131. In addition, the BG serial-correlation test statistic is 0.6764 with a probability of 0.7130. Moreover, the BPG heteroscedasticity test statistic is 12.8726 and its probability is 0.7991. Furthermore, the Ramsey specification error test statistic is 0.0061 with a probability of 0.9386. These outcomes demonstrate that the estimated results are free from problems of serial-correlation, heteroscedasticity, specification error and non-normality.

The results of the CUSUM and CUSUMS tests (Figure 2 and Figure 3) show that the plots are within the boundaries, thus, implying that the model and estimated parameters are stable over the long-run.

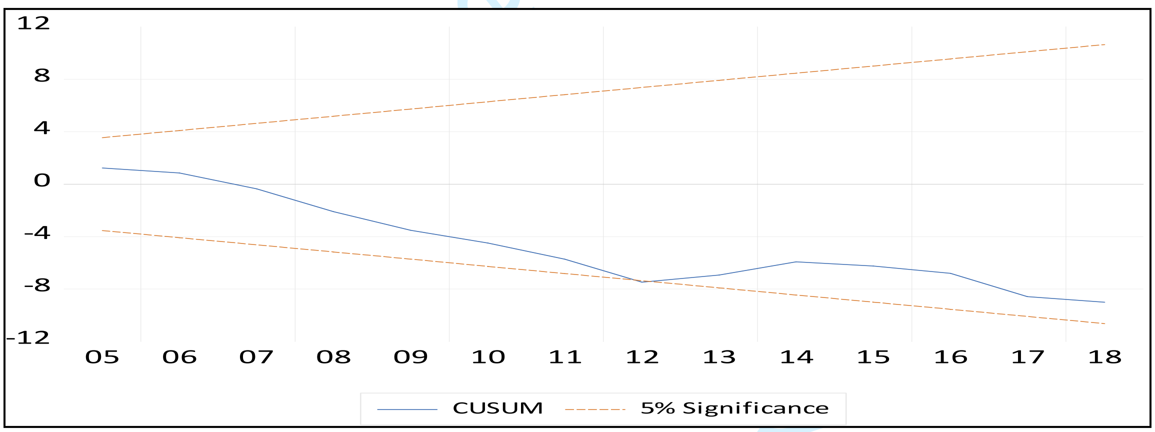

Figure 2: Plots of cumulative sum of recursive residuals (CUSUM)

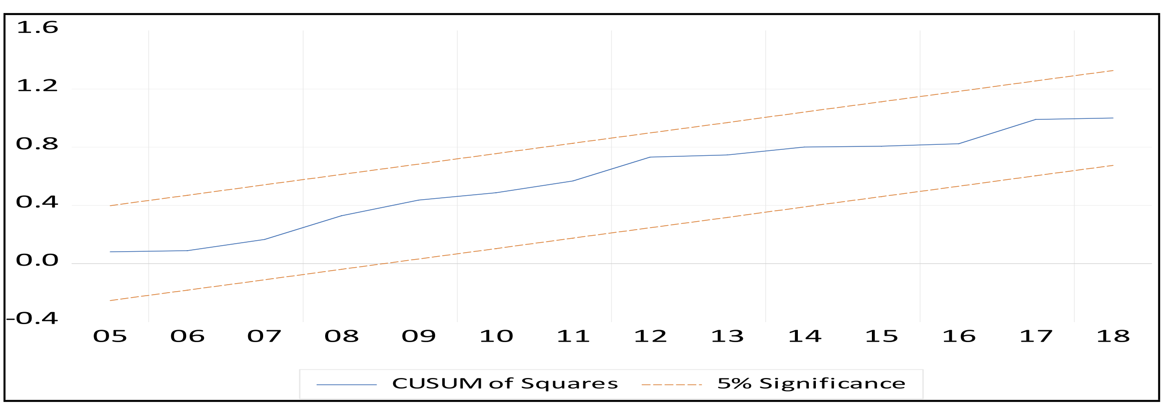

Figure 3: Plots of cumulative sum of squares of recursive residuals (CUSUMS)

5.6 Marginal Impact of FDI on Domestic Investment at Different Levels of Corruption

We proceeded with the analysis by computing the long-term impact of FDI on domestic investment at varying levels of corruption and reported the results in Table 6. The results reveal that the impact of FDI on domestic investment varies at different corruption level. Specifically, at the mean or average control of corruption (i.e. COR=1.6000), the marginal impact of FDI on domestic investment is 0.3977. In addition, at minimum (or less) control of corruption (i.e. COR=1.0000), the marginal impact of FDI on domestic investment is 0.1992. Also, at maximum (or high) control of corruption (i.e. COR=2.0000), the marginal impact of FDI on domestic investment is 0.5301. Thus, FDI has a higher crowd-in impact on domestic investment at greater control of corruption than at lesser control of corruption.

Table 6. Marginal effects of FDI on domestic investment at different levels of corruption

Level of corruption (corruption of corruption)	Marginal effect of FDI
Mean	0.3977
Minimum (high level of corruption)	0.1992
Maximum (low level of corruption)	0.5301

Source: Authors' calculation. Marginal effects of changes in FDI on domestic investment are calculated based on equation 4.

These empirical outcomes have some implications. The negative (crowd-out) impact of FDI on domestic investment lends credence to previous research on developing countries including Nigeria (Adelegan, 2000; Adams, 2009; Eregha, 2015; Yahia et al., 2018). For example, Adelegan (2000) confirmed that FDI displaces (crowds-out) domestic investment in Nigeria. Also, Adams (2009) discovered a crowd-out impact of FDI for SSA countries, Eregha (2015) for the ECOWAS region, and Yahia et al. (2018) in the case of Sudan. The crowing-out impact of FDI suggests that foreign capital or investment has encouraged consumption rather than promoting the production sector of the Nigerian economy (Adelegan, 2000; Abu and Karim, 2016).

In addition, the positive relation between greater corruption control and domestic investment is consistent with prior research (Mauro, 1995; Mo, 2001; Folorunso, 2007; Swaleheen, 2007; Al-Sadig, 2010; Fabayo et al., 2011; Abu and Karim, 2021). In fact, Folorunso (2007), Fabayo et al. (2011), and Abu and Karim (2021) reported a positive relation between less corruption and domestic investment in Nigeria. Similar result has been established for developing nations (Baliamoune-Lutz and Ndikumana, 2008; Gyimah-Brempong, 2002; Yao and Drama, 2019). Thus, lowering corruption level (wherein investors cease to offer bribes to government officials to conduct their legitimate business) reduces extra cost and/or arbitrary tax on investment, and consequently boosts domestic investment in Nigeria.

Furthermore, the positive impact of depreciation on domestic investment lends credence to past empirical research (Ashraf and Herzer, 2014; Wang, 2010). In particular, Ashraf and Herzer (2014) found depreciation to have a positive influence on domestic investment in developing countries, and Wang (2010) discovered same for a group of nations. Hence, if depreciation reduces imports of goods that domestic firms can produce, it will encourage the production sector of Nigeria and more domestic investment can be undertaken.

Moreover, the positive sign of the oil price coefficient is consistent with Stasavage (2002). This finding signifies that the presence of natural resources like oil (and rents that accrue from it) raises domestic investment in resource endowed countries including Nigeria. This empirical outcome aligns with the claim by Abu and Karim (2021) on the important role oil resources and proceeds from oil exports play on Nigeria's domestic investment.

The positive effect of FDI-corruption interaction on domestic investment demonstrates that at greater corruption control (lower corruption level), FDI crowds-in domestic investment. This finding implies that a less corrupt Nigeria can attract higher FDI as foreign investors' confidence is raised with assurances that they will not pay bribes to carry on legitimate business. The increased inflows of FDI will in turn boost domestic investment especially if it encourages local production of goods and services.

6. Conclusion

We applied ARDL method to assess if long-term FDI's influence on domestic investment depends on corruption level in Nigeria over the past three decades. The result of bounds test signifies that long-term relation exists amongst the variables. The estimation results imply that increasing inward FDI crowds-out/displaces domestic investment and lowering corruption level promotes domestic investment in Nigeria in long-term. In addition, we find evidence that the impact of FDI on domestic investment depends on (or varies with) corruption level. FDI has a stronger crowd-in impact on domestic investment at greater corruption control than at lower corruption control in the long-term. Given these empirical outcomes, we offer some recommendations.

First, government and policymakers are encouraged to employ measures to control (or reduce) corruption if the desired benefits of FDI on domestic investment are to be achieved. Thus, there is need for increased funding of anti-corruption agencies including the EFCC and ICPC to stem the tide of corruption in Nigeria. Second, is the urgent need for the establishment of special courts to speed up dispensation of justice including ensuring that corrupt individuals are punished or sanctioned accordingly. Also, government is advised to put in place mechanism for monitoring the activities of the agencies saddled with responsibility of detecting, arresting, and prosecuting individuals who engage in corrupt acts. Other measures which can be adopted include a further depreciation of the local currency which is considered overvalued by some experts and ensuring that current oil prices and production level are sustained to boost the nation's earnings from oil sales/exports to increase domestic investment over long-term.

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