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DOMESTIC INVESTMENT AND ECONOMIC GROWTH NEXUS: DOES ABSORPTIVE CAPACITY MATTER IN THE AFRICAN COUNTRIES?

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Abstract: This study empirically examined the role of the country's absorptive capacity on the impact of domestic investment on economic growth in the selected five African countries over the study period of 1970 to 2019. In specific, the study examined the impact of domestic investment on economic growth from two models, without the country's absorptive capacity and with the country's absorptive capacity. Further, a robust linear ordinary least squares (OLS) methodology including static panel OLS and panel cointegration estimators was employed. The study found that only changes in financial development and infrastructures positively cause changes in the domestic investment-economic growth nexus in the short run while in the long run, trade openness enhances the positive impact of domestic investment on economic growth in African countries. In addition, the study found that domestic investment retards economic growth without the country's absorptive capacity in the short run and long run respectively in African countries. Therefore, the study recommended that policymakers should invest heavily in infrastructure and financial development systems as

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well as encourages trade openness for a stable domestic investment-economic growth nexus in African countries.

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JEL Codes: F20, F21, F43, 055.

1. Background to the Study

Investment is widely accepted in the literature as the main driver of economic growth in both developed and developing countries (Ribaj & Mexhuani, 2021). The different magnitudes and types of capital investment among different economies of the world including the African economies have resulted in increasing economic growth divergence which has generated numerous attention in the literature.

Since the early 1990s, Africa is one of the developing continents that have enjoyed massive FDI inflows. Between 1991 and 2008, the developing economies share of total FDI inflows grew from 29 percent to 80 percent but it is worrisome that the share of FDI inflow to the World as well as the share of FDI inflow to developing economies remains the lowest percent when compared with other developing continents between 1991 and 2016 (UNCTAD, 2018), and Table 1 displays the share of FDI inflow in the world and developing economies.

Table 1 Share of FDI inflow in the World and Developing Economies

	% Share of World FDI			% Share of Developing Countries FDI		
Period	Africa	LA & CA	Asia	Africa	LA & CA	Asia
1990-1994	2%	8%	21%	7%	25%	67%
1995-1999	1%	10%	17%	5%	36%	59%
2000-2004	2%	8%	17%	4%	13%	61%
2005-2009	4%	7%	23%	4%	14%	67%
2010-2014	5%	12%	29%	8%	15%	63%
2015-2016	3%	9%	27%	10%	14%	69%
Average	3%	9%	22%	6%	20%	64%

Note: LA&CA= Latin America and Caribbean

Source: Computed by a Researcher from UNCTAD (2018).

Although, it is apparent that FDI inflow remains volatile in all developing economies between 1990 and 2016 as shown in Table 1, however, the share of FDI as a percent of GDP to Africa of 2.05% remains the lowest when compared to Asia and Latin America of 52% and 3.45% respectively between 1991 and 2015 (UNCTAD, 2018). Following the low FDI inflows to Africa, low share of FDI inflow to GDP in Africa,

and increasing capital investment deficiency when compared to Africa's investment requirements in the past four decades, the African Union summit in January 2012 acknowledged the need for domestic investment as an alternative capital investment to achieve sustainable economic growth (UNCTAD, 2013).

Theoretically, domestic investment as opined by development economists is an organic and non-volatile investment when compared with foreign direct investment (FDI) that is influenced by falling commodity prices, unstable foreign currency, and weak global economic growth. Interestingly, African domestic investment has recently been associated with increasing demand in terms of Africa's growing population, intra-African trade, increasing private consumption, and government consumption (mainly public infrastructure investment), all play a critical role in the recent increasing GDP growth rate in the African continent. Remarkably, between 2015 and 2016, African domestic investment grew from 1.7 percent to 3.2 percent due to Africa's economic potential. Growth declined by more than half from 3.4 percent to 1.6 percent due to a corresponding fall of 15 percent in the share of the world FDI inflows to the African continent (UNCTAD, 2015; UNECA, 2017). On a contrary, the Harrod-Domar theory (1939, 1946) advocates that domestic savings be linked to capital investment, devoid of foreign investment will stimulate a country's economic growth.

In line with the Harrod-Domar theory of positive association between domestic investment and economic growth as well as the prevailing negative trend between domestic investment and economic growth in many African countries, except southern Africa has consistently recorded an upward association between domestic investment and economic growth from 21.5% in 1990-1995 to 23.3% in 2010-2016. These variations in the domestic investment and economic growth performance between African regions and within African countries have raised reasons for many empirical studies to fill the gap in the literature. Although, a number of studies (Oyedokun and Ajose, 2018; Emeka, Idenyi & Nweze, 2017) have attempted to examine the impact of domestic investment on economic growth within African countries, despite the deficient domestic savings attributed to African economies which is contrary to the assumptions of Harrod-Domar Two gap theory. Fortunately, both studies, Oyedokun and Ajose (2018) and Emeka, Idenyi & Nweze (2017) found a positive impact of domestic investment on economic growth in the short run and long run respectively. However, fewer or no studies have considered the country's absorptive capacity that could absorb the domestic investment for optimum economic growth performance, but a study by Ahamed (2020) on the impact of public and private investment on the economic growth of developing countries attests that public investment has a greater impact on economic growth than both private investment while the foreign investment proxy as FDI inflow investment has a negative impact on economic growth. Besides the theoretical gap, their estimation

methodologies were not robust enough to compare the impact of domestic investment on economic growth and with absorptive capacities from short-run and long-run perspectives. In addition, none of the earlier studies consider the five African regions' domestic investment behavior's impact on economic growth vis-a-vis heterogeneous countries' absorptive capacities; hence, this study considers five African countries from the five African regions as a study sample.

In this foregoing, this study is motivated to empirically examine the role of absorptive capacity on the impact of domestic investment on economic growth in selected five African countries from five African regions for the period from 1970 to 2019. The selected five African countries within the study periods are South Africa from Southern Africa, Egypt from North Africa, Congo from Central Africa, Tanzania from East Africa, and Nigeria from West Africa, which is attributed to the highest demand economy from each African region. Importantly, this study contributes to empirical literature in three-fold. First, this study fills the gap in the role of a country's absorptive capacities on the causal relationship between domestic investment and economic growth using five countries' absorptive capacities, unlike previous studies that have not considered the role of a country's absorptive capacity. Second, it employed a robust econometric methodology of static panel and panel cointegration estimations that estimate short and long-run impacts without the country's absorptive capacity and with the country's absorptive capacities. Third, the findings from this study suggest policies that will aid the greater impact of domestic investment on economic growth through the presence of absorptive capacities in African countries. The rest of the paper is structured as follows. Section two discusses the relevant literature review. Section three presents the theoretical framework and methodology of this study. In section four and five results and discussions of findings are presented respectively and finally, section 6 outlines the conclusion, policy recommendations, and future directions of the paper.

2. Literature review

The economic growth theories vis-à-vis domestic investments are drawn from the modernization growth theories. The modernization growth theories are those growth theories that recognize the importance of capital investment, total factor productivity and the recent technological progress to achieve a long-run economic growth for any nation (Adams, 2009; Masoud, 2014). Although, the first two strands of modernization growth theories, Harrod-Domar, and neoclassical growth theories acknowledge physical capital investment as a determinant of economic growth. Specifically, the former which is solemnly called the Two factors gap (savings and physical capital accumulation and later advanced by Chenery and Strout (1966) that savings equal physical investment (savings-investment gap) without international capital investment flows (i.e FDI inflow) and no government intervention are the

conditions for economic growth. Unfortunately, the unrealistic Harrod-Domar growth theory paved way for the neoclassical growth theory pioneered by Solow, popularly called the Solow-Swan growth (1956) with the introduction of exogenous (technological progress) factors that cause long-run economic growth and economic growth differences among nations of the world (Nowbutsing, 2009; Ali, 2011). Similarly, the unrealistic assumptions of constant returns, non-specific technology progress for long-run economic growth, and no recognition of capital investment movement across nations to reduce the economic growth divergence accounted for the drawbacks of Solow-growth in favor of the endogenous growth in this study (Masoud, 2014; Ali, 2011; Tella, 2016). Basically, in line with the main objective of this study, the endogenous growth theories developed by Paul Romer in his 1986 article and others including Lucas (1988) and Rebelo (1991), recognize not only the decomposition of capital investment into physical and human investment but also the endogeneity technological changes which are attributed to the country's absorptive capacities as main determinants of long–run economic growth, especially in developing economies including African countries (Masoud, 2014; Ali, 2011).

In line with the theoretical underpinning of the modified Solow growth theory of Mankiw, Romer & Weil (1992) and the endogenous growth theories, a number of empirical studies have investigated the causal relationship between domestic investment and economic growth in different countries using different estimation methodologies and with varying findings and conclusions, but fewer or no studies viewed the causal relationship between domestic investment and economic growth from the technology progress term as absorptive capacities in this study.

A number of earlier studies of the nexus between domestic investment and economic growth have considered a not only domestic investment but also decomposed domestic investment into public and private investment as a determinant of economic growth as underpinned in Mankiw, Romer & Weil (1992) and later, the endogenous growth theories consider other endogeneity factors with the inclusion of foreign direct investment, capital formation, and others as determinants of economic growth. In the study of Ramirez and Nazmi (2003) in nine Latin American countries, they found that both public and private investment positively impact GDP growth. Similarly, Le and Suruga (2005) considered 105 developed and developing countries to investigate the impact of public investment and foreign direct investment (FDI) on economic growth from 1970-2009. Their study revealed that both public investment and FDI positively impact economic growth. In addition, they found that public investment has a higher impact on economic growth than FDI because public investment exceeds the threshold of 9%. Further, Zou (2006) performs a study on the interaction between public and private investment on economic growth in the United States of America (USA) and Japan. He found that both public and private investments have a significant impact on Japanese economic growth while private

investment is the contrary. Also, Tang, Seventh, and Selvanathan (2008) investigated the causal link between foreign direct investment, domestic investment and economic growth for the period 1988-2003 in China, using a multivariate VAR system and error correction model (ECM). Their findings show that domestic investment and economic growth are positively correlated and importantly, China's change in domestic investment spurs a greater change in economic growth impact, while in the long run, China's domestic investment does not have a higher impact on economic growth than FDI inflows. In African studies, Adams (2009) examined the impact of foreign direct investment (FDI) and domestic investment on economic growth in 42 SSA, using OLS and FE for the period 1990-2003. His findings revealed that domestic investment has a positive significant impact on economic growth in African countries. In a single-country study, Emeka, Idenyi & Nweze (2017), their study domestic investment, capital formation and economic growth in Nigeria, using the vector error correction model (VECM). Their results found that domestic investment has a positive and significant impact on economic growth in the short run and long run respectively. Similarly, Oyedokun and Ajose (2018) empirically investigated the relationship between domestic investment and economic growth in Nigeria. Their study employed the vector error correction model (VECM) and Granger causality test and found that domestic investment positively enhances economic growth in the short run and long run, although, domestic investment has a greater impact on economic growth in the long run than in the short run.

Meanwhile, many studies on the nexus between domestic investment and economic growth in developing economies including Africa found consistent positive associations; yet, none of these studies consider the role of a country's absorptive capacity as preconditions or endogeneity factors as postulated in the endogenous growth theories to absorb domestic investment and FDI inflows for optimum economic growth in the literature. Although, a number of studies (Ahamed, 2020; Saleem & Zaheer, 2018; Oyedokun& Ajose, 2018) have recommended the presence of infrastructure, stable macroeconomic policies, and human capital development, among others as an essential stimulus to domestic investment for a greater economic growth impact, yet, there are no empirical interactive effects of domestic investment-economic growth nexus, and thus, this study fills the empirical gap in the literature.

3. Theoretical Framework and Methodology

3.1. Theoretical Framework

In achieving the role of absorptive capacities on the nexus between domestic investment and economic growth in African countries, this study draws its model specification from the extended Solow growth model, popularly known as the Mankiw, Romer and Weil (1992), expressed in an augmented Cobb-Douglas production function as:

$$Y_t = A_t K_t^{\alpha} H_t^{\beta} L_t^{\gamma} \quad (1)$$

Where Y_t, K_t, H_t and L denote respectively as output, physical capital, human capital and labor; and A is an index of the level of technology. Dividing by L and taking logs, equation (1) becomes equation (2) as:

$$\log(\frac{Y}{L})_t = \log A_t + (\alpha + \beta + \gamma - 1)\log L_t + \alpha \log(\frac{K}{L})_t + \beta \log(\frac{H}{L})_t \quad (2)$$

Where $\alpha + \beta + \gamma$ indicates the degree of returns to scale for all production factors. Now, the endogenous growth theories represented by A as the level of technology or country's absorptive capacity and the set of control variables that are included as determinants of growth is represented by Ω.
The Logs of Y/L K/L and H/L are denoted by y, k, and h and expressed in equation 3 as:

$$y_t = \log A_o + (\alpha + \beta + \gamma - 1)\log L + \alpha K_t + \beta h_t + \phi \log \Omega_i \quad (3)$$

Where A_o is a set of the country's initial absorptive capacity and $\Omega_i$are also a set of control variables included as determinants of economic growth. Therefore, equation (3) represents the extended neoclassical growth framework, known as endogenous growth theories used to achieve the objective of this study. And the implicit function under without absorptive capacities is expressed in the linear panel and linear time series OLS equations in equations (4) and (5) as:

$$RGDPCG_{it} = \beta_{i0} + \beta_1 DI_{it} + \beta_2 HC_{it} + \beta_3 G_{it} + \beta_4 DOP_{it} + \beta_5 MS_{it} + \beta_6 GDSR_{it} + \phi_{it} + \varepsilon_{it} \quad (4)$$

$$RGDPCG_t = \beta_0 + \beta_1 DI_t + \beta_2 HC_t + \beta_3 G_t + \beta_4 DOP_t + \beta_5 MS_t + \beta_6 GDSR_t + \varepsilon_t \quad (5)$$

Further, the implicit functions for absorptive capacity models in linear panel OLS equations are expressed in equation (6) as:

$$RGDPCG_{it} = \beta_0 + \beta_1 DI_{it} + \beta_2 HC_{it} + \beta_3 G_{it} + \beta_4 DOP_{it} + \beta_5 MS_{it} + \beta_6 GDSR_{it} + \beta_7 (DI * DOP)_{it} + \beta_8 (DI * HC)_{it} + \beta_9 (DI * INFR)_{it} + \beta_{10} (DI * IQ)_{it} + \beta_{11} (DI * MS)_{it} + \emptyset_{it} + \varepsilon_{it} \quad (6)$$

In equation (6), *RGDPCG* is the real GDP per capita growth rate for selected African countries *i* in year *t* represent the dependent variable in this study. β_0 is the constant term, β_is are the coefficients to be estimated. Domestic investment is the main variable. Also, equations (4) – (5) contain the set of controlling variables derived from the macroeconomic variables and are indicated as human capital (HC), initial_RGDPC, degree of openness (DOP), broad money (MS) and gross domestic saving rate (GSDR) in this study. Further, equation (6) expressed the set of absorptive capacities that are derived from the endogenous growth theories of technical progress and index as interaction terms in this study, and the five absorptive capacity factors represented as the following interaction terms are trade development (DI*DOP), financial system development (DI*MS), human capital development (DI*K), quality of institutions (DI*IQ) and infrastructural (DI* INF). φ_i represents the unobserved country-specific factor, which is assumed to be time-invariant in equations (4) and (6) and e_{it} and e_t are the classical disturbance error component. Finally, the *i* and *t* represent a number of sample countries, $i = 5$ and *t* is the time series period in annual year, which ranges from 1970-2019, amounting to 49 annual years for the time series and 245 observations for panel periods in this study.

3.2 Methodology

This study employed annual time series and panel datasets for the selected five (5) African countries over the period 1970-2019. Table 1 shows the summary of the variables description used in this study.

Table 2 Summary of Variable Description

Variable	Symbol	Source of Data
Real GDP per capita growth rate (%)	RGDPCG	WDI (2020), ASY (2020)
FDI Inflow share in GDP (%)	FDI	UNCTAD (2020)
Human Capital (%)	HC	WDI (2020) & ASY (2020)
Log (Initial RGDP)	Initial_RGDP	WDI (2020) & ASY (2020)
Gross Domestic Savings share in GDP (%)	GDSR	WDI (2020)
Trade share in GDP (%)	DOP	WDI (2020) & ASY (2020)
Broad Money in GDP (%)	MS	WDI (2020)
Trade development	DI*DOP	Author Computation
Financial system development	DI*MS	Author Computation
Human capital development	DI*HC	Author Computation
Institutional Quality development.	DI*IQ	Author Computation
Infrastructural development	DI*INFR	Author Computation

WDI represents World Development Indicators; UNCTAD represents United Nations Conference on Trade and Development; and ASY represents African Statistical Yearbook.
Source: Authors' compilation, 2022.

Further, in order to estimate the objective of this study, the estimation techniques employed are static panel and panel cointegration methods. In this study, the static panel methods employed pooled OLS, fixed effects (FE) and random effects (RE) while the Hausman test was conducted to adjudge the superior estimate between fixed effects (FE) and random effects (RE). Although, the static panel data technique is superior to the time series technique because the former has adequate informative data, data variability, less collinearity among the variables and more degree of freedom as well as more efficiency of the estimates (Asteriou and Stephen, 2007; Gujarati, 2004; George and Ajayi, 2016; Gichamo, 2012; Barbi and Jose da Costa Jr, 2016). However, the static panel technique is limited to estimating the short and long-run impacts, hence, the study unlike previous studies (Adams, 2009; Adeniyi et al., 2015) employed a robust panel cointegration technique like Ijirshar, Anjande, Fefa& Mile (2019) that comprises of panel pooled mean group (PMG), panel fully modified OLS (FMOLS) and panel dynamic OLS (DOLS) to estimate short and long-run relationship. Importantly, the choice of panel cointegration over other dynamic panel techniques like a generalized moment of methods (GMM), Two-stage least squares (2SLS), among others was due to a small number of cross sections (N) and a large number of annual time series (T) in this study. In specific, the panel pooled mean group (PMG) drawn from the autoregressive distributed lags (ARDL) model was considered due to a mixture of unit root levels of integrated order of zero, I(0) and integrated order of one, I(1) and it is advantageous over other cointegration estimators for it uses the optimal lag length test to eliminate unbiased estimates for short-run and long-run relationship. Unlike PMG, the panel FMOLS and panel DOLS specifically estimate only long-run OLS which provides a robustness check for the long-run relationship in this study. In addition, both panel FMOLS and panel DOLS are long-run heterogeneous panel estimators which relate to the selected five highest demanding countries from the five African regions with different economic environments, among others, unlike the PMG that assumed long-run homogeneous panel estimator and the short-run heterogeneous panel estimates because the selected five countries despite from the common attributes of the highest demanding economy, yet, the five Africa regions are heterogeneous with changing economic environments and others in this study.

4. Results

4.1. Descriptive Analysis

Table 3 result presented the panel descriptive statistics for the study variable of five African countries over the study period 1970-2019. First, the generalized average economic growth is 0.013 with a standard deviation value of 0.04. This implied that low economic growth rates prevailed among the selected five African countries but a low variation confirmed insignificant differences in the economic growth rates

among the selected African countries in this study. On the other hand, the panel average and standard deviation of domestic investment are 25.54 and 13.47, which implied that there is a high domestic investment rate, however; is a significant difference in the domestic investment performance among the selected African countries. Besides the main variables, the macroeconomics and interaction term study variables all have different average values and high standard deviations. Further, the skewness values confirmed asymmetrical distributions for all the study variables. Lastly, the Jarque –Bera test results also indicated that the null hypothesis of the normal distribution is statistically rejected, hence, all panel study variables are not normally distributed in this study.

Table 3 Panel Descriptive Statistics, 1970-2019

Variable	Mean	Std. Dev.	Minimum	Maximum	Skewness	JB	Observations
RGDPCG	0.013	0.04	-0.15	0.12	-0.97	84.75 (0.00)	122
DI	25.54	13.47	10.15	89.39	2.47	408.18 (0.00)	122
HC	49.26	31.65	3.58	109.44	0.06	8.27 (0.02)	122
GDSR	24.46	18.77	-3.15	88.39	1.26	39.09 (0.00)	122
Initial GDP	2758.13	2105.41	476.53	7582.70	1.18	28.22 (0.00)	122
MS	47.11	28.90	10.45	98.14	0.18	13.60 (0.00)	122
DOP	54.02	26.58	9.14	156.86	1.55	99.82 (0.00)	122
DI*DOP	1466.73	1579.08	0.00	10275.12	2.66	1166.37 (0.00)	250
DI*HC	548.51	700.47	0.00	2222.93	0.86	37.70 (0.00)	250
DI*INFR	128.56	77.86	0.00	465.98	0.69	80.52 (0.00)	250
DI*IQ	-8.76	17.49	-105.26	0.00	-2.79	1143.57 (0.00)	250
DI*MS	849.30	673.23	0.00	3022.06	0.78	25.16 (0.00)	250

Note: JB test represents the Jarque-bera statistics test which tests the normality of the data distribution. The null hypothesis is accepted when the data is normally distributed at p-value greater than 5 percent level and the parentheses are the probability values; std. dev.; Min., and Max., represent standard deviation, minimum, and maximum respectively.

Source: Authors' computation from EViews 9 Extract, 2022.

4.2. Correlation Matrix

Table 4 reports panel correlation coefficients for all the study variables. First, the correlation coefficients for all study variables are mixed and their degrees of association is negative and positive. In specific, there is a low negative correlation between domestic investment and economic growth among the five African countries during the study period from 1970 to 2019.

Table 4 Correlation Matrix

	RGDPCG	HC	DOP	MS	Initial Growth	DI	DI * DOP	DI * HC	DI * INFR	DI * IQ	DI * MS	GDSR
RGDPCG	1.00											
HC	0.18	1.00										
DOP	0.002	0.28	1.00									
MS	0.20	0.83	-0.08	1.00								
Initial Growth	-0.14	0.60	0.17	0.30	1.00							
DI	-0.37	-0.38	-0.13	-0.37	-0.27	1.00						
DI * DOP	-0.04	-0.42	0.82	-0.22	-0.03	0.34	1.00					
DI * HC	0.06	0.81	-0.39	0.70	0.39	0.15	-0.30	1.00				
DI * INFR	-0.33	-0.14	-0.31	-0.19	-0.17	0.94	0.14	0.39	1.00			
DI * IQ	-0.14	0.35	-0.25	0.38	0.18	-0.40	-0.53	0.22	-0.31	1.00		
DI * MS	0.15	0.59	-0.03	0.85	0.10	0.04	0.04	0.75	0.17	0.24	1.00	
GDSR	-0.29	-0.46	0.15	-0.58	-0.04	0.75	0.42	-0.11	0.65	-0.56	-0.30	1.00

Source: Authors' Computation from EViews 9 Extract, 2022.

4.4. Panel Unit Root Tests

In order to avoid spurious causal relationships, it is imperative to conduct stationarity tests to determine the study variables' order of integration in this study.

Table 5 Panel Unit Root Tests Results for Five African Countries, 1970-2019

Variable	Panel Specification	Unit Root Test	Levels	1st Difference	Order of Integration
RGDPCG	Common	LLC	3.27***	7.94***	
	(pooled) effects	IPS	3.57***	11.96***	I(0)
	Individual effects	Fisher-ADF	32.40***	125.56**	
DI	Common	LLC	2.62***	7.50***	
	Individual	IPS	1.71**	7.49***	I(0)
		ADF	20.05**	72.87***	
HC	Common	LLC	11.06	2.88	
	Individual	IPS	5.53	2.42***	I(1)

		ADF	11.20	34.4***	
GDSR	Common	LLC	1.44*	7.05***	
	Individual	IPS	0.57	0.98***	I(1)
		ADF	10.79	90.06***	
Initial_ RGDPC	Common	LLC	1.89	3.19***	
	Individual	IPS	2.60	3.80***	I(1)
		ADF	5.53	36.50***	
MS	Common	LLC	0.80	5.05***	
	Individual	IPS	0.93	6.79***	I(1)
		ADF	13.33	66.20***	
DOP	Common	LLC	1.38*	6.35***	
	Individual	IPS	2.47***	8.07***	I(0)
		ADF	21.80**	82.40***	
DI*DOP	Common	LLC	1.38*	8.60***	
	Individual	IPS	1.88**	8.46***	I(0)
		ADF	18.55**	84.96***	
DI*HC	Common	LLC	2.19**	4.99***	
	Individual	IPS	13.46***	11.36***	I(0)
		ADF	30.26***	121.30***	
DI*INFR	Common	LLC	1.70**	10.52***	
	Individual	IPS	2.19***	9.49***	I(0)
		ADF	20.89**	98.03***	
DI*IQ	Common	LLC	0.81	7.93***	
	Individual	IPS	0.02	8.12***	I(1)
		ADF	7.43	74.14***	
DI*MS	Common	LLC	1.64**	7.57***	
	Individual	IPS	1.98**	7.25***	I(0)
		ADF	18.82*	71.56***	

*Note: Unit root tests abbreviation LLC, IPS, and Fisher-ADF represents as Levin, Lin &Chu, IM, Pesaram, Shin and Fisher –Augumented Dick Fuller(ADF); *, **, *** denotes rejection of the null hypothesis that series has a unit root at 10%, 5% & 1% Statistical significance levels respectively, I(0) and I(1) indicates integrated order of zero and integrated order of one respectively.*

Source: Authors' Computation from EViews 9 Extract, 2022.

As shown in Table 5, all study variables are stationary at levels except for human capital (HC), gross domestic saving rate (GDSR), initial economic growth, money supply, and interaction of domestic investment and institutional quality (DI*IQ) which are stationary at the first difference order. This affirmed that all included variables are either stationary at levels or at the first difference, hence, a mix of stationary at integrated of order zero, I(0) and order one, I(1) prevailed in this study.

4.5. Panel Cointegration Tests Results

Now that each panel study variable is stable over study periods as shown in Table 5, the panel cointegration test is conducted to ascertain the co-movement or joint long-run relationship among the study variables. This study employed the Pedroni cointegration test (2004) to test long-run equilibrium among the variables of the five selected heterogeneous African countries from five African regions.

Table 6 Panel Cointegration Test Results for the African Countries

		Pedroni Co-integration Test	
Variables	Test Statistics	Panel (Within Dimensions) Without ABS and with ABS	Group (With Dimension) Without ABS and with ABS
ALL	V	0.725	
	Rho	-0.041	1.274
	PP	-4.028***	-3.951*
	ADF	-0.231	1.264

*Notes: *, **, *** denote rejection of the null hypothesis of no co-integration at 10%, 5% and 1% statistical sisignificant levels respectively. Also ALL represents log(rgdp_pc), DI, DOP, HC, INF, log(initial_gdp), MS, INFR, GDSR, DI*DOP, DI*INFR, DI*HC, and DI*MS*

Source: Authors' computation from EViews 9 Extract, 2022.

Importantly, the Pedroni cointegration test found that all the included variables have a long-run relationship at within and with dimensions without absorptive capacities and with absorptive capacities in this study.

4.8. Panel Estimations Results

Table 7 presents the static and panel cointegration estimation results of the relationship between domestic investment and economic growth over the study period 1970-2019 under the absorptive capacity model. Results from POLS and FE under the static panel show that domestic investment has a negative and significant impact on economic growth in the selected African countries. Similarly, of the three cointegration estimators, fully modified OLS (FMOLS) and dynamic OLS (DOLS) found that domestic investment significantly slump economic growth by 0.002% and 0.002% among the five African countries without the presence of absorptive capacity variables. On the macroeconomic determinants, the human capital and one-year lag real GDP have a constituent impact on Africa's economic growth as shown in the static panel while in the panel cointegration estimators, money supply and real GDP contribute to economic growth in the long run among five selected African countries. Importantly, the diagnostic tests of the static panel results revealed that both POLS and FE estimates violate the OLS assumptions. Lastly, the PGM estimates confirmed the existence of long-run economic growth and the speed of adjustment through the error correction coefficient (ECT) of -0.037whicht is negative and statistically

significant at 5%. While evidence from PGM short run revealed that change in domestic investment retards economic growth but only changes in human capital (HC) and gross domestic saving rate (GDSR) positively induce economic growth in the short run.

Meanwhile, the coefficient of determination (R) of 40% and 41% from FMOLS and DOLS under without absorptive capacity revealed that about 60% and 59% variations in the long-run economic growth are caused by unobserved variables in this study. This result inferred that the five African countries' economic growth determinants were fragile over the study period 1970-2019, hence, the need to consider the interaction of domestic investment and absorptive capacity variables matters in this study.

Table 7 Static and Panel cointegration Estimations for Africa under Without Absorptive Capacity, 1970-2019

Dependent Variable: Real GDP *per Capita* Growth					
	Static Panel		**Panel Cointegration**		
Variables	**POLS**	**FE**	**PMG SR LR**	**FMOLS (LR)**	**DOLS (LR)**
DI	-0.002*** (-3.86)	-0.002*** (-2.97)	0.003*** (2.96)	-0.002*** (-3.46)	-0.002*** (-4.00)
Ms	-0.0003 (-1.11)	-0.0003 (-0.70)	-0.001* (-1.91)	0.0004 (1.90)	0.001* (1.70)
DOP	0.0004** (1.97)	0.0003 (1.40)			
GDSR	0.001** (1.90)	0.001 (1.35)	-0.001 (-1.11)	0.0004 (0.82)	0.0005 (0.90)
HC	0.001*** (2.83)	0.001* (1.76)	0.0002 (0.40)	-2.26E-05 (-0.05)	0.0003 (0.47)
Initial RGDPC	-1.57E-05*** (-5.63)	-1.60E-05*** (-4.45)		-3.10E-05*** (-3.29)	-4.17E-05*** (-3.84)
C	0.02 (1.63)	0.03 (1.60)			
R^2	0.34	0.61		0.40	0.41
F-Stat.	8035***	1.96***			
DW	0.99	1.19			
Diagnostic tests: Normality		39.91***			
BGLM			12.27	14.31	6.62
PSLM			-0.61	-0.15	-1.87*
BCSLM			-0.68	-0.22	-1.93**

PCD			0.07	0.07	1.25
No. Of countries		5	5	5	5
NO. Of observations			102	102	102
Ect(-1)			-0. 037** (-2.03)		
D(DI)			-0.003 (-0.99)		
D(MS)			-0.002*** (-0.99)		
D(GDSR)			0.003 (1.22)		
D(HC)			0.01 (1.14)		
C			0.001 (0.09)		

*Note: *,**,*** indicate statistical significance at 10 percent, 5 percent and 1 percent levels respectively. Student t-statistical values are in parentheses and the probability values are in brackets. POLS, FE, PMG, FMOLS, and DOLS represent pooled OLS, Fixed Effects, pooled mean group, fully modified OLS, and Dynamic OLS respectively. DW, BGLM, PSLM. BCSLM, and PCD tests represent Durbin Waston, Breusch-Pagan LM, Pesaran scaled LM, Biased Corrected Scaled LM, Pesaran Cross Section Dependence respectively. D and C represent change and constant.*

Source: Authors' computation from EViews 9 Extract, 2022.

Table 8 presents the pooled OLS, FE, and RE OLS regression results under the absorptive capacity model that estimated the causal relationship between domestic investment and economic growth among five selected African countries from 1970 to 2019. Evidence from POLS and FE found that the addition of five absorptive capacity variables have mixed contributions to the main and control variables changes in this study. In specific, the direct interactive effects found that all the study interactive variables, except the interaction of domestic investment and infrastructure as well as the interaction of domestic investment and institutional quality, have a negative impact on economic growth. This implied that the presence of trade openness, human capital development, and financial development significantly absorbed domestic investment, leading to positive economic growth in African countries.

Table 8 Static Panel Estimations for Absorptive Capacity, 1970-2019

Dependent Variable: Real GDP per Capital										
Variable	Trade Development POLS	FE	Human Dev. POLS	FE	Infrastructure POLS	FE	Financial Dev. POLS	FE	Institutional Quality POLS	FE
DI	-0.003*** (-5.92)	-0.004*** (-6.44)	-0.003*** (-4.57)	-0.002*** (-2.87)	-0.001 (-1.35)	0.001 (0.35)	-0.003*** (-5.54)	-0.002*** (-4.08)	-0.002*** (-4.21)	-0.003*** (-5.24)
MS	-0.0002 (-0.68)	-0.0004 (-1.19)	-0.001* (-1.86)	-0.0003 (-0.65)	-0.0003 (-1.10)	-0.003 (-0.80)	-0.002*** (-3.77)	-0.001*** (-2.67)	-0.0001 (-0.37)	-0.0002 (-0.66)
DOP	-0.001** (-2.66)	-0.001*** (-3.79)	0.0004** (2.43)	0.0003 (1.19)	0.0003* (1.77)	0.0002 (0.80)	0.0003 (1.54)	4.78E-05 (0.19)	0.0001 (0.73)	2.97E-05 (0.14)
GDSR	0.001*** (2.88)	0.001*** (3.05)	0.001* (1.61)	0.0004 (0.95)	0.001* (1.90)	0.0006 (1.49)	0.001** (2.26)	0.001 (1.29)	0.0003 (0.93)	0.0002 (0.61)
HC	0.001*** (2.50)	0.001** (2.32)	0.0001 (0.71)	0.0002 (0.260)	0.001*** (2.77)	0.001** (1.98)	0.001** (3.77)	0.001 (1.52)	0.001** (2.00)	0.001 (1.61)
INF	0.0002** (2.36)	0.0004*** (4.06)	0.0001 (1.45)	0.0002* (1.84)	0.002*** (2.04)	0.0003*** (2.87)	0.0001 (1.49)	0.0002 (1.60)	0.0002** (2.096)	0.0003*** (3.47)
Initial RGDPC	-1.41E-05*** (-5.36)	-1.50E-05*** (-4.99)	-1.48E-05*** (-5.36)	-1.39E05*** (-3.21)	-1.58E-05*** (-5.61)	-1.78E-05*** (-4.38)	-1.48E05*** (-5.58)	-1.16E-05*** (-3.03)	-1.24E-05** (-4.41)	-1.13E-05*** (-3.63)
DI*DOP	3.63E-05*** (4.27)	5.27E-05*** (5.52)								

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DI*HC			4.36E-05** (2.45)	2.60E-05 (0.87)						
DI*INFR					-4.04E05 (-0.20)	-0.001 (-0.97)				
DI*MS							5.39E-05*** (3.83)	5.48E05*** (3.03)		
DI*IQ									-0.001*** (-3.60)	-0.002*** (-5.46)
C	0.07*** (4.03)		0.04*** (2.64)	0.04* (1.77)	0.02 (1.63)	0.03* (1.71)	0.05 (3.34)	0.06*** (3.01)	0.03** (2.41)	0.06*** (3.71)
R^2.	0.43	0.73	0.37	0.61	0.34	0.62	0.41	0.66	0.41	0.73
F-Stat	10.69***	3.32***	8.38***	1.93***	7.25***	1.94***	10.02***	2.32***	9.80***	3.29***
DW	1.21	1.71	1.02	1.17	0.98	1.22	1.10	1.24	1.17	1.61
No. Of Countries.	5	5	5	5	5	5	5	5	5	5
No of Obs.	122	122	122	122	122	122	122	122	122	122

*Note: *,**,*** indicate statistical significance at 10 percent, 5 percent and 1 percent levels respectively. Student t-statistical values are in parentheses and the probability values are in brackets. D and C stand for change and constant.*

Source: Authors' Computation from EViews 9 Extract, 2022.

Table 9 Panel Cointegration Estimation for African Countries under Absorptive Capacity, 1970-2019

Dependent Variable: Real GDP *per capita* Growth															
Variable	**Trade Devt.**				**Human Capital Devt.**				**Infrastructure**				**Financial Development**		
	PMG		**FMOLS**	**DOLS**	**PMG**		**FMOLS**	**DOLS**	**PMG**		**FMOLS**	**DOLS**	**PMG**	**FMOLS**	**DOLS**
	SR	**LR**	**LR**	**LR**	**SR**	**LR**	**LR**	**LR**	**SR**	**LR**	**LR**	**LR**	**SR**	**LR**	**LR**
DI		-0.002***	-0.002***	-0.002***		-0.003***	-0.002***	-0.002***		0.002	-0.0002	-0.0002	-0.004**	-0.003***	-0.003***
		(-4.05)	(5.37)	(-6.43)		(-7.57)	(-5.72)	(-3.83)		(0.93)	(-0.18)	(-0.19)	(-2.38)	(-6.20)	(-5.87)
HC		9.87E-05	-0.001	0.001						-					
		(0.14)	(-1.22)	(-1.12)											
MS		-0.001	-5.53E-05	-3.98E-05		0.001***	8.85E-05	5.78E-05		0.001***	0.0002	0.0002*	0.001	-0.001	-0.001
		(-1.25)	(-0.13))	(0.05)		(2.30)	(0.30)	(0.16)		(2.68)	(0.62)	(0.53)	(0.98)	(-1.52)	(-1.22)
INF		0.001***	0.004***	0.0004***		0.0001	8.32E-05	-8.15E-05		5.30E-05	-0.001**	4.00E-05	0.002	0.001**	0.0001
		(5.96)	(2.84)	(2.47)		(1.48)	(0.80)	(-0.31)		(0.88)	(0.77)	(0.37)	(1.23)	(1.64)	(1.28)
GDSR						0.002***	-0.002	-0.002***		0.002***	0.002***	0.001***	0.003***	0.001***	0.001***
						(8.05)	(4.36)	(1.57)		(8.35)	(4.76)	(3.32)	(2.55)	(4.98)	(3.50)
Initial RGDPC															

DI*DOP		5.89E-05*** (3.99)	2.80E-05*** (4.41)	2.44E-05*** (4.51)											
DI*HC						-1.02E-06 (-0.22)	4.62E-07 (0.09)	1.37E-05 (1.57)							
DI*INFR										-0.001** (-2.19)	-0.0004* (-1.72)	-0.0004 (-1.44)			
DI*MS													8.58E-06 (0.41)	2.61E-05** (2.21)	4.09E*** (2.68)
C	0.01** (1.91)				0.0004 (0.05)				-0.004 (-0.26)				0.01 (0.57)		
ECT	-0.40*** (-3.70)				-0.67*** (-5.09)				-0.71*** (-5.53)				-0.62*** (-3.23)		
D(DI)	-0.003 (-1.38)				0.001 (0.80)				-0.005 (-0.92)				0.002 (0.72)		
D(HC)	0.007 (1.27)														
D(MS)	-0.002 (-1.48)				0.001 (0.48)				0.0003 (0.25)				-0.001 (0.76)		
D(INF)	-0.003 (-2.26)				-0.001 (-1.22)				-0.001 (-1.46)				-0.0005 (-0.61)		
D(GDSR)					0.0004 (0.37)				0.0003 (0.37)						

D(Initial RGDPC)															
D(DI*DOP)	-1.39E-05 (-0.49)														
D(DI*HC)					-3.09E-06 (-0.92)										
D(DI*INFR)									0.0003 (0.37)						
D(DI*MS)													9.31E-07 (0.02)		
BPLM		13.11	11.70	0.31				20.75	14.18	21.95*	18.42*	13.06	9.60*	20.5**	17.58*
PSLM		-0.42	-0.74	-1.94**				1.29	-0.18	1.55	0.76	-0.43	1.03	1.25	0.58
BCSLM		-0.49	-0.80	-2.00**				1.23	-0.24	1.50	0.71	-0.49	0.98	1.19	0.52
PCD		-0.55	0.26	-0.11				1.63	0.41	1.49	1.45	1.50	1.14	1.91	1.81
R^2			0.36	0.41						0.29	0.34			0.36	0.42

Note: *,**,*** indicate statistical significance at 10 percent, 5 percent and 1 percent levels respectively. Student t-statistical values are in parentheses and the probability values are in brackets. D and C stand for change and constant.

Source: Authors' Computation from EViews 9 Extract, 2022.

Table 9 presented the three-panel cointegration estimators – the pooled mean group (PMG), fully modified OLS (FMOLS), and dynamic OLS (DOLS) for the five selected African countries under absorptive capacity. In the PMG short run, the error correction coefficients for the four absorptive capacity variables are negative and statistically significant at 1% and thus, it confirmed the existence of a long-run relationship between domestic investment and economic growth under the presence of trade development, human capital, infrastructure and financial development in the five African Countries. Importantly, evidence from the PMG short-run found that only a change in the interaction of domestic investment and infrastructure and a change in the interaction of domestic investment and financial development do positively enhance a change in economic growth by 0.0003% and 0.000000931 percent respectively in this study. Meanwhile, the long-run estimators revealed that domestic investment has a persistent negative influence on economic growth despite the presence of the four interaction variables, except in the infrastructure absorptive capacity under PMG estimator that positively enhances long-run economic growth, when all the five African countries are homogeneous over the study period 1970-2019. Lastly, the diagnostic tests coefficients for Breush-Pagan LM, Pesaran Scaled LM, Biased Correlated scaled LM and Pesaram cross-section dependence cannot reject the null hypothesis of no serial correlation and no cross-section dependence among the five African countries, hence, the PMG, FMOLS and DOLS results are statistically reliable for inference in this study.

Table 10 Individual Country PMG Short Run Estimation

Dependent Variable: D(RGDPCG), 1970-2019							
Country	ECT	D(DI)	D(HC)	D(DOP)	D(GDSR)	D(Initial_RGDP)	D(MS)
Nigeria	0.001 (0.34)	-0.004*** (-2318.03)	0.002*** (760.28)	-0.003*** (-10751.46)	-6.38E-15*** (-120.17)	-0.005*** (-110.17)	-0.002*** (-372.52)
South Africa	-0.67*** (-20.28)	0.01*** (673.25)	-0.001*** (-682.17)	-0.01*** (4007.23)	0.01** (2018.25)	0.03** (113. 0)	-0.002*** (-1354.16)
Egypt	-0.85*** (-33.06)	-0.002*** (-1501.80)	-7.96E-05*** (-54.80)	0.0003*** (840.81)	0.004 (1155.93)	0.02*** (41.7)	-5.46E-06E** (-10.59)

Tanzania	-0.43*** (-71.70)	-0.01*** (-26110.71)	0.005*** (10696.95)	0.003*** (9919.20)	-0.0005*** (-5281.71)	-0.05 (-1138.82)	-0.003*** (-31231.2)
Congo	0.09 (1.55)	0.01*** (-2907.84)	0.05*** (534.80)	0.001*** (274.06)	-0.001** (-1288.90)	0.01*** (135.04)	-0.002*** (-167.99)

*Note: *,**,*** indicate statistical significance at 10 percent, 5 percent and 1 percent levels respectively. Student t-statistical values are in parentheses and the probability values are in brackets. D and C stand for change and constant.*

Source: Authors' Computation from EViews 9 Extract, 2022

Table 10 displays the individual country PMG short-run results for the five African countries from 1970 to 2019. Importantly, all error correction coefficients are negative and statistically significant at 1%, which confirmed a long-run relationship between domestic investment and economic growth in the five African countries. In specific, all except South Africa's changes in domestic investment positively induce economic growth changes by 0.01 percent in this study.

5. Discussion of Findings

The findings from POLS and FE showed that domestic investment without absorptive capacity significantly declines economic growth in African countries from 1970 to 2019. This finding is similar to Ndikumana and Verica (2008) for 38 SSA, however, Ali (2011) for 24 African countries contradicts this finding. In the same vein, the results from POLS and FE with absorptive capacity presence revealed that domestic investment also retards economic growth except for the presence of human capital and trade development in selected African countries. This finding reaffirmed that domestic investment has no automatic positive drive for economic growth. On a contrary, the results from the panel cointegration methods without absorptive capacity showed that domestic investment positively and negatively influence long-run and short-run economic growth in PMG respectively while results from FMOLS and DOLS found that domestic investment retards long-run economic growth. The finding of PMG long-run result is supported by Ijirshar, Anjande, Fefa, and Mile (2019) but, the same authors, Ijirshar, Anjande, Fefa, and Mile (2019), were in contrast to the PMG short-run results of this study. Further, results in Table 4 under absorptive capacity found that domestic investment retards long-run economic growth despite the presence of the five absorptive capacities in African countries under the PMG method, except the interaction of domestic investment and trade

openness and the interaction of domestic investment and financial development that positively stimulate long-run economic growth in selected African countries. While in the short run, the change in the interaction of domestic investment and financial development has a positive change in economic growth in selected African countries. Finally, the results from a country study in Table 10 found that only Nigeria and Congo domestic countries enhance long-run economic growth, whereas only South Africa's domestic investment promotes economic growth in the short run.

6. Conclusions

In view of the empirical results, this study concluded that the country's absorptive capacity matters in the causal relationship between domestic investment and economic growth in selected five African countries from 1970 to 2019. In specific, the study concluded that the presence of infrastructure and financial development caused a positive impact of domestic investment on economic growth for the heterogeneous African countries in the short run whereas only trade openness has a positive and significant domestic investment-economic growth nexus in the long run. In line with the aforementioned inference, the recommendations are as follows: First, the changes in financial development and infrastructure policies such as financial inclusions, financial technology, access to credits, as well as massive investment in transportation, power, water, telecommunication, and other basic utilities, among others should be strengthened to absorb the impact of domestic investment on economic growth positively in the short run for African countries. Second, the study recommends other types of capital investment such as foreign direct investment (FDI) inflow, foreign portfolio investment (FPI), remittance among others to augment the domestic investment that has weak stimulus on economic growth in the short run and long run of the African countries. Lastly, the policymakers should consistently formulate and implement macroeconomic policies through the country's absorptive capacities presence that matter for a stable domestic-economic growth nexus in the African countries.

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Author Contributions

Oluwatosin Ogunyomi-Oluyomi and Emmanuel George conceived the study and were responsible for the design and development of the data analysis. Oluwatosin Ogunyomi-Oluyomi, Olukayode Maku and Oluwaseyi Adelowokan were responsible for data collection and analysis and also for data interpretation. Oluwatosin Ogunyomi-Oluyomi was responsible for the literature review section.

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