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PUBLIC AND PRIVATE INVESTMENTS AND ECONOMIC GROWTH IN GHANA AND KENYA

Naftaly Mose[1], Michael Provide Fumey[2]

Abstract

A general conception is that investment induces economic growth, but there is still debate over which type of investment contributes more to economic growth. The disaggregation of investment into public and private components allows estimation of the impact of the two types of investments on economic growth. This research, therefore, empirically estimates the relationship between each investment component against economic growth by constructing panel data for Ghana and Kenya from 1991 to 2022. The empirical strategy adopted in this study can be divided into three major stages. First, the LLC unit root test in the panel series is undertaken. Second, if integrated in the same order, a Kao co-integration test is conducted. Finally, if the series is co-integrated, the vector of cointegration in the long run is estimated using the dynamic ordinary least squares (DOLS) method. Our estimation results, based on the panel cointegration approach confirm a long-run relationship between the study variables. Further analysis shows that public investment can promote economic growth in the long run. In contrast, the results indicate that private investment can obstruct growth. The study has shown that private investment did not always increase economic growth in Ghana and Kenya. The study findings indicate that public investment is more efficiently allocated in Ghana and Kenya than private investment, suggesting the best economic strategy is for private investment to be complementary and promote higher public investment to improve public sector productivity. Therefore, policymakers should focus on creating a favourable investment climate, providing fiscal stimulus and promoting public-private partnerships to enhance infrastructure development and stimulate private -sector investment, which can sustain long-term economic growth.

JEL classification: E22, O47, R42

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[1] University of Eldoret, Kenya, e-mail: ngmoce@yahoo.com, ORCID: https://orcid.org/0000-0003-0467-235X.

[2] Northwestern Polytechnical University, China, e-mail: fumeymichael3@gmail.com, ORCID: https://orcid.org/0009-0000-3213- 2233.

Introduction

Investment is crucial in economic development, contributing to job creation, technological advancement, skill development, and productivity improvements (Abdulkarim, 2023). The evolution of investment project financing has led to a more holistic view that considers the role of the private sector in achieving global financial and economic goals (Reichelt et al., 2023). Measures for organizing favourable investment, financial, and economic conditions include economic stimulation, harmonization of business law, and access to markets (Sibirskaya et al., 2015). Public financial resources alone are insufficient to address sustainable change, so public actors are considering how to redirect private sector investment toward sustainable economic-related activities (Vydobora, 2022).

Public and private investments contribute to economic growth, with public investment having a more substantial positive impact (Ezzahid & Rafik, 2023). The impact of public investment on economic growth may vary depending on the level of development and the degree of private-public capital substitutability (Farhadi, 2015). The empirical literature provides contradictory results, with some studies showing a positive impact of public investment on growth (Ocolișanu et al., 2022), while others find a detrimental effect (Merga, 2022). In the case of emerging European Union and Central European countries, the long-term impact of a public capital shock on Gross Domestic Product (GDP) is estimated to be negative (Merga, 2022). In advanced economies, public investment spending may have a relatively counterproductive effect on GDP growth due to high levels of crowding out (Ocolișanu et al., 2022). This is likely because of the advanced position of these countries in terms of transitional dynamics (Ari & Koc, 2020). Private investment positively influences economic growth in developing countries, as evidenced by multiple empirical studies (Merga, 2022).

In Africa, public investment directly impacts output and contributes to the growth of total factor productivity (Ezzahid & Rafik, 2023). However, the effectiveness of public investment in stimulating growth can be influenced by various factors. The quality of institutions is an important determinant, as improvements in institutional quality can positively influence public investment and crowd-in private investment (Adeosun et al., 2020). Additionally, the level and stability of public investment are key factors. High and stable levels of public investment are more likely to promote economic growth, while low levels and high volatility can hinder growth (Wasike, 2022). On the other hand, private investment has been found to positively impact economic growth in both the short and long run (Ghani & Din, 2006). While public investment is essential for economic growth in Africa, it needs to be accompanied by institutional improvements and stability to maximize its effectiveness. It is important to note that public investment can have a crowding-in effect on private investment in the long run, stimulating economic growth indirectly.

Supplementing private and public investments with foreign direct investment (FDI), technology, human capital, and public consumption is essential for economic growth. Gross capital formation, labour growth, FDI and government expenditure explain economic growth in most developing countries (Yaremenko, 2022). FDI brings in external capital and expertise, stimulating economic activity and creating jobs (Popescu, 2014; Sirbulescu et al., 2022). It is essential for developing countries, with foreign direct investment (FDI) being a significant capital inflow. FDI has been found to positively impact economic growth and development, improving macroeconomic indicators and the country's image on the world stage (Sirbulescu et al., 2022). High institutional quality, including robust governance, transparent regulatory frameworks, effective legal systems, and reduced corruption levels, is crucial in attracting FDI (Lan et al., 2011). At the same time, public expenditure has mixed effects on economic growth. In most African countries, government consumption, and public investment do not positively influence economic growth in most cases (Ndiaye, 2018). According to Aydin and Demiröz (2023), human capital has been associated with long-term productivity gains, with a more significant effect from quality improvements.

The two countries under consideration, Ghana and Kenya, albeit being in Sub-Saharan Africa, have somewhat diverse economic systems and policies. Upper-middle-class Kenya is a growing market with a more diverse economy and a robust manufacturing and tourism industry; Ghana has a large agricultural sector and a burgeoning services sector. Concerning trade policies, Ghana has often maintained a more protectionist stance with slightly higher tariff barriers. In contrast, Kenya has adopted a more open trade policy, mainly due to its membership in regional economic bodies like the East African Community (EAC) (Wasike, 2022). Notwithstanding these differences, both countries have recently implemented fiscal stimulus programs and public investment plans to promote economic growth and development. While Ghana's government has focused on infrastructure development, particularly in the energy and transportation sectors, Kenya has made large expenditures in various areas, including housing, roads, and healthcare facilities (Ndiaye, 2018). These two countries were chosen for panel analysis because reliable data were available and because they had diverse economic strategies and developmental stages within the same geographic context.

Literature review

The first hypothesis builds on the Keynesian view, it argues that the regulation of economic activities by the government passes through countercyclical processes. This leads the government to be involved in the market by supporting the agent activities when the demand is depressed and to slow activities when inflation fears set in. In the short run, government expenditure can be employed to stimulate aggregate demand and stimulate growth (Yovo, 2017). The argument in favour of public investment is that some expenditures, especially public investment, such as electricity, roads, sewers, street lights, water systems, education and health generate externalities that enhance the productivity of private factors and thus boost economic growth (Blejer & Khan, 1984; Aschauer, 1989; Calderón & Servén, 2010; Yovo, 2017). The theory suggests that countries can foster sustainable and long-term economic growth by investing in education, health, and research and development (Alam et al., 2021). The model argues that productivity decline had been caused by a decline in public expenditure on infrastructure (Aschauer, 1989).

The second hypothesis based on the neoclassical view, argues that accelerated public expenditure are harmful to economic growth in the long run. The recovery policies by public expenditure may even have a depressive impact on the economy mainly because of the crowding-out effects they exert on investment and private consumption. As a result, these negative effects influence economic agents' anticipation of future consequences of fiscal policy and lead them to adjust their behaviour accordingly to consumption and savings thus making fiscal policy tools impotent (Barro, 1990; Yovo, 2017).

Ricardian equivalence theory says that financing government spending out of current or future taxes and deficits will have equivalent effects on the overall economy. The impact of public expenditure on growth depends on the source of funds by the national government. If public investment is financed by higher direct tax, the net effect on economic growth may be negative despite a positive effect of marginal productivity of private capital. If public investment is financed by borrowing or debt, the economic agents will save the extra income due to non-taxation of today, to pay future taxes, and thus depress consumption (Gupta, 2020). Thus, increased government expenditure is offset by the low level of consumption and the impact of fiscal policy reduction (Yovo, 2017). According to Gupta (2020), an increase in income tax revenue can be utilized to finance investment in public capital, positively affecting the endogenous growth rate and the rate of savings. It also emphasizes the role of institutions, government policies, and incentives in promoting and supporting these endogenous factors.

The Investment-led growth theory, as proposed by Harrod (1956), emphasizes the importance of investment in stimulating growth. It suggests that higher levels of investment, particularly in innovation, can contribute to both short-term recovery and long-term structural transformation. The main themes and assumptions of the investment-led growth theory can be summarized as follows. First, capital growth theory focuses on studying optimal financial investments for long-term growth (Evstigneev et al., 2015). Second, infrastructural investment is considered a necessary but insufficient condition for economic recovery and industrial growth. Third, the model emphasizes the conditions for capital growth and its relationship to other long-run investment models (Li & Hoi, 2014). Fourth, the impact of gross and foreign investments on economic growth is analyzed, with a positive correlation between investment and GDP growth (Bjelić, 2021).

Table 1 presents the summary of empirical studies on the impact of investment components on economic growth across the globe.

Table 1: Review of Investment-Growth literature

References	Country (Period)	Methods	Results
Khan & Reinhart (1990)	Developing countries (1970-1979)	OLS	Public investment has no impact Private investment is beneficial
Ghani & Din (2006)	Pakistan (1973-2004)	VAR	Public investment has no impact Private investment is beneficial
Makuyana & Odhiambo (2018)	South Africa (1970-2017)	ARDL	Public investment is harmful Private investment is beneficial
Nguyen & Trinh (2018)	Vietnam (1990-2016)	ARDL	Public investment has no impact Private investment is beneficial
Doménech & Sicilia (2021)	OECD countries (1960-2017)	Descriptive	Public and private investments are beneficial
Ahamed (2022)	Developing countries (1990-2019)	ARDL	Public and private investments are beneficial

References	Country (Period)	Methods	Results
Jahan et al. (2022)	Asian countries (2020)	ANOVA	Public investment has no impact Private investment is harmful
Abdulkarim (2023)	Nigeria (1981-2020)	ARDL	Public investment is harmful Private investment is beneficial

Notes: Autoregressive Distributed Lag (ARDL); Ordinary Least Squares regression (OLS); Vector autoregression (VAR)
Source: Author's own work.

The empirical literature review in Table 1 has confirmed that the relationship between investment components and economic growth is varied and inconclusive. Furthermore, very few studies have been carried out in Kenya and Ghana using the dynamic OLS (DOLS) estimation approach and the above studies have used different estimation methods and sample sizes.

Research methodology

Research design

The current study will adopt a quantitative research design to analyze the trend and role of different types of investments on economic growth in Ghana and Kenya for the period 1991-2022. The period has been chosen since the two countries faced several investment challenges after the financial meltdown of 2007-2008 and the COVID-19 pandemic period of 2020-2023 (Mose, 2021). Furthermore, Kenya and Ghana have experienced low economic growth rates and insufficient investment project financing to stimulate infrastructure development. The study used the dynamic ordinary least squares (DOLS) estimation technique during analysis. The secondary data was obtained from the World Bank online database (World Development Indicators). The dependent variable, economic growth, was measured as real Gross Domestic Product (GDP) per capita, whereas the independent variables were private and public investments. Table 2 shows the description of the variables used in the current study.

Table 2: Description of study variables

Variable	Measure	Proxy	Data source	Expected sign
Dependent variable				
Economic growth (GDP)	Constant US Dollar (2015)	GDP per capita	WDI	Not predicted Abdulkarim (2023)
Independent variables				
Public investment (PUB)	Percent	Gross capital formation (% GDP)	WDI	Positive (Ahamed, 2022)
Private investment (PRV)	Percent	Domestic credit to private sector (% GDP)	WDI	Positive (Ahamed, 2022)
Foreign direct investment (FDI)	Percent	Foreign direct investment, net inflows (% GDP)	WDI	Positive (Nguyen & Trinh, 2018)
Public consumption (PC)	Percent	Government consumption expenditure (% GDP)	WDI	Negative (Ghani & Din, 2006)
Human capital (HC)	Number	Labor force (total)	WDI	Positive (Makuyana & Odhiambo, 2018)

Source: Author's own work.

Model specification

According to the neoclassical growth model of Solow output depends on capital and labour inputs (Solow, 1956). As hypothesized by Solow, an extension developed by Aschauer (1989); Barro (1990) as well as Yovo (2017) in the empirical literature is adopted. In the current study, it is hypothesized that economic growth depends on the investment used for the capital stock and on the labour force. The study adopts the empirical work of Yovo (2017) as well as Makuyana and Odhiambo (2018) to build a simple theoretical baseline estimation growth model as presented below.

$$GDP = f(PUB, PRV, FDI, PC, HC) \quad (1)$$

The econometric baseline model measuring the effect of selected variables on economic growth is rewritten as follows.

$$GDP_{i,t} = \beta_0 + \beta_1 PUB_{i,t} + \beta_2 PRV_{i,t} + \beta_3 FDI_{i,t} + \beta_4 PC_{i,t} + \beta_5 HC_{i,t} + \varepsilon_{i,t} \quad (2)$$

Where: $GDP_{i,t}$ - Economic growth, measured by GDP per capita growth, $PUB_{i,t}$ - Public investment, measured by gross capital formation, $PRV_{i,t}$ - Private investment, measured by domestic credit to the private sector,

$FDI_{i,t}$ - Foreign direct investment, measured by foreign direct investment net inflow, $PC_{i,t}$ - Public consumption, measured by government consumption expenditure, $HC_{i,t}$ - Human capital, measured by Labour growth rate, β - the regression coefficient, $\varepsilon_{i,t}$ - is the error term and the subscripts i and t represent country and time dimensions respectively.

The econometric baseline model was rewritten in logarithm form (ln), to increase variance stability and remove outliers, as shown below.

$$lnGDP_{i,t} = \beta_0 + \beta_1 lnPUB_{i,t} + \beta_2 lnPRV_{i,t} + \beta_3 lnFDI_{i,t} + \beta_4 lnPC_{i,t} + \beta_5 lnHC_{i,t} + \varepsilon_{i,t} \quad (3)$$

To analyze the long-run effect of investment variables on economic growth using DOLS equation 3, above, was utilized during regression analysis.

Panel data analysis

Vector autoregression (VAR) lag selection criteria were applied to confirm the lag length and best model estimator. The selection criteria are essential in reducing residual correlation problems. Countries like Ghana and Kenya can interact through imports, exports, human capital transfer, and economic integration, thus creating cross-sectional dependence by experiencing standard shocks. Therefore, this study's cross-sectional dependence test is essential to check if the data exhibit cross-sectional dependency (CD). The study adopted the Pesaran CD developed by Pesaran (2004) to check for cross-sectional dependency. Panel data series are usually characterized by stochastic trends that are easily removed through differencing. The selection of the unit root test depends upon cross-sectional dependence (Phillips & Sul, 2003). Various panel unit root tests, such as IPS, ADF, Phillips Perron, and Levin-Lin-Chu (LLC) tests, are available. LLC unit root test is commonly used in cross-sectional dependence (Levin-Lin-Chu 2002). If the unit root of the panel series is integrated in the same order, a cointegration test is performed. Hausman (1987) test was conducted to support the long-run estimation method used in the study based on OLS when combined with Fixed or Random effect. In this study, two cointegration tests have been suggested for use in investigating the long-run relationship. The first test is Pedroni (2001), and the second test is Kao (1999), which is based on the Engel-Granger approach and controls for homogeneity on units in the panel set (Alam et al., 2021). If the cointegration is confirmed, this will suggest that the selected variables share the same stochastic trend, and thus, they can be combined in the long run. If the series is co-integrated, the panel vector error correction model is conducted to confirm the long-run causality or convergence of the target variables. In the analysis, the error correction term (ECT) value is expected to be negative and significant at 1%. Once the panel series is tested for causality using the vector of cointegration, the model is estimated using DOLS to check for long-run relationships between coefficients.

In analysis, several estimation options are available when using panel data or between group data, for instance, panel ordinary least squares (POLS), pooled mean group (PMG), fully-modified OLS (FMOLS), and dynamic OLS (DOLS) estimation technique (Pedroni, 2001). The panel ordinary least squares (POLS) estimation technique is the most common analysis approach when combined with fixed or random effects. One advantage of POLS is that it can confirm the presence of convergence in panel data; however, sometimes POLS leads to biased estimates. Thus, to confirm the estimates that are not biased, the study can conduct analysis using FMOLS or DOLS estimation that favours small sample data. The DOLS model is robust to various departures from standard regression assumptions in terms of residual correlation, heteroscedasticity, misspecification of functional form and non-normality of residuals (Stock & Watson, 1993). Therefore, this study utilized the DOLS estimator pioneered by Stock and Watson (1993) to estimate the long-run relationship. Post-estimation panel diagnostic tests (heteroscedasticity, autocorrelation, cross-sectional dependence, and normality) were conducted during the regression analysis to avoid misleading inferences.

Results and discussion

Optimal lag selection

Vector autoregression (VAR) lag selection criteria were applied to determine the lag length and best model estimator. The result of the VAR selection criteria is presented in Table 3.

Table 3: Lag length selection criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	249.3659	NA	6.77e-12	-8.691639	-8.474637	-8.607508
1	443.7425	340.15910	2.38e-14	-14.347950	-12.828930	-13.759030
2	775.4439	509.39850	6.46e-19	-24.908710	-22.087680*	-23.815000*
3	816.4799	54.2262*	6.06e-19*	-25.088570*	-20.965530	-23.490080
4	850.4569	37.61733	8.26e-19	-25.016320	-19.591270	-22.913040

Note: * = lag order selected by the criterion; SIC = Schwarz information criterion; AIC = Akaike information criterion; HQ: Hannan-Quinn information criterion; FPE: Final prediction error; LR: sequential modified LR test statistic (each test at 5% level)

Source: Author's own work.

According to the various lag length selection criteria, such as AIC and SIC, a lag of 4 is chosen for the VAR as it reported the minimum value. A lag of four was chosen to reduce the serial correlation problem. In addition, the AIC estimation model was preferred since it had the lowest value (-25.01632) compared to other estimation criteria.

Cross-sectional Dependence Test

To check if the data exhibit cross-sectional dependence (CD), the Pesaran CD test developed by Pesaran (2004) was adopted by the study. The Pesaran CD result is reported in Table 4 below.

Table 4: Pesaran CD result

Test	Statistic	Df	Prob
Breusch-Pagan LM	2.797984	1	0.0944
Pesaran scaled LM	1.271367	-	0.2036
Bias-corrected scaled LM	1.239109	-	0.2153
Pesaran CD	-1.672718	-	0.0944

Source: Author's own work.

Table 4 reports our Pesaran CD result; the test indicates the absence of cross-sectional dependence in our regression variables, confirmed by the P-value 0.0944 > 0.0500. Since the p-value of 0.0944 for the Z-statistic is more than 0.05, the null hypothesis should not be rejected. This confirms that cross-sectional dependence is not a problem. As a result, the study applied the Levin-Lin-Chu (LLC) test in unit root analysis.

Stationary test

A unit root test was conducted to ascertain the order of integration and avoid spurious correlations in DOLS estimation. The study investigated the stationarity of study variables using the Levin-Lin-Chu (LLC) test. The stationarity result is reported in Table 5.

Table 5: Stationarity Test

Variables	LLC at Level		Order	LLC at first difference		Order
	Statistic	Prob.		Statistic	Prob.	
GDP	4.88497	1.0000	I(1)	-4.09049***	0.0000	I(0)
PUB	-0.01595	0.4936	I(1)	-7.86468***	0.0000	I(0)
PRV	0.82469	0.7952	I(1)	-6.33159***	0.0000	I(0)
FDI	0.62478	0.7339	I(1)	-2.48678***	0.0064	I(0)
PC	-0.63709	0.2620	I(1)	-6.91668***	0.0000	I(0)
HC	68.57610	1.0000	I(1)	-25.40740***	0.0000	I(0)

Note: *** Denotes significance at a 1% level of significance, H_0: Panels contain unit roots, GDP - Economic growth; PUB - Public investment; PRV - Private investment; FDI - Foreign direct investment; PC - Public consumption; HC - Human consumption

Source: Author's own work.

Based on the results presented in Table 5, economic growth, public investment, private investment, foreign direct investment, public consumption, and human capital were all non-stationary and integrated in the order I(1). However, they were transformed by the first difference to become stationary. The LLC test has confirmed that the variables are integrated in the same order and contain unit root. This validity offers the route to test for several cointegration relationships. To carry out a cointegration analysis based on OLS estimation, the Hausman test was conducted to choose between a fixed or random effect model. The Hausman test result is shown in Table 6 below.

Table 6: Hausman Test output

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	26.729513***	5	0.0001

Note: * * * Denotes significance at a 1% level of significance

Source: Auhtor's own work.

The Hausman test result supported using the fixed effect estimation method over the random method as reinforced by p-value (0.0001 < 0.0500). The fixed effect model is accepted because the chi-square statistic of the Hausman test rejected the null hypothesis of random effect. The panel data was estimated using the fixed effect model of the panel estimation technique, which is geared at controlling for time-invariant and unobservable country effects.

Panel Cointegration Test

Since all selected variables were integrated into the order I(1), a non-stationary cointegration test was performed to ascertain the long-run equilibrium and several cointegration relationships. Granger (1988) submits that if factors are integrated, the residuals will be integrated at the level, and if not, then first-order integration will be found. The study adopted the Kao cointegration test to check for the long-run relationships between selected variables. The fixed effect model is used during cointegration analysis. Table 7 shows the Kao cointegration test results.

Table 7: Kao Residual Cointegration Test

	t - Statistic	Prob.
ADF	2.369214	0.0089
Residual variance	0.001695	-
HAC variance	0.000182	-

Source: Author's own work.

Table 7 confirms the cointegration relationship since the ADF statistic is significant at a 1 % significance level. Hence, we reject the null hypothesis. Once the long-run relationship was confirmed, the study checked for long-run causality using vector error correction models.

Panel VECM estimation

The estimation of the vector error correction model (VECM) was to ascertain the direction of causation and adjust it towards the equilibrium. VECM is conducted to check for the long-run causality or convergence of the target variables. Table 8 shows the VECM analysis coefficients.

Table 8: Value of coefficients

ECT	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.846009	0.210856	-4.012263	0.0015
C(2)	-2.037543	0.491794	-4.143087	0.0012
C(3)	0.042720	0.831401	0.051383	0.9598
C(4)	-0.161763	0.203908	-0.793312	0.4418
C(5)	-0.214576	0.149145	-1.438708	0.1739
C(6)	1.900558	0.631102	3.011490	0.0100
C(7)	1.016450	0.494544	2.055329	0.0605
C(8)	0.388778	0.517284	0.751575	0.4657
C(9)	-0.033721	0.506931	-0.066520	0.9480
C(10)	0.106619	0.079259	1.345198	0.2016
C(11)	-0.088031	0.054159	-1.625418	0.1281
C(12)	0.226852	0.672490	0.337332	0.7413
C(13)	-0.494261	0.743985	-0.664343	0.5181
C(14)	-97.035220	44.565890	-2.177343	0.0485
C(15)	-96.836900	46.206620	-2.095737	0.0562
C(16)	1.343803	0.628481	2.138177	0.0521

Source: Author's own work.

Based on the result in Table 8, the error correction term (ECT) is negative and significant at 1 % (-0.846). This confirms the convergence; the economy can recover by 84.6% during the current year. The negative and significant result also confirms long-run causality between investment components and economic growth. Moving forward, the study estimated the DOLS model to obtain the long-run coefficients

Regression results

Once cointegration is confirmed among the selected variables, the study used the panel DOLS estimation technique to identify the long-run relationship between private investment, public investment, and economic growth. Table 9 presents the long-run estimate coefficients.

Table 9: DOLS Regression coefficients

Variable	Coefficient	Standard error	t-Statistics	p-value
PUB	0.098096	0.045578	2.152270	0.0405**
PRV	-0.252063	0.042296	-5.959449	0.0000***
FDI	0.041242	0.013686	3.013395	0.0056***
PC	-0.282784	0.062964	-4.491214	0.0001***
HC	0.904220	0.058087	15.566760	0.0000***
Goodness of Fit	R^2 = 0.985673		Adjusted R^2 = 0.969223	
	F = 44.557460		P-value(F) = 0.000000	
Breusch-Pagan	F = 0.861208		Prob > F = 0.523759	
Breusch-Godfrey	χ2 = 3.733390		Prob > χ2 = 0.058310	
Pesaran CD	Z = - 1.672718		Prob > Z = 0.094400	
Jarque-Bera	χ2 = 0.955339		P-value(χ2) = 0.620227	
Durbin-Watson	DW = 2.111040		-	

Note: * p < 0.1, ** p < 0.05, *** p < 0.01 are significance levels in which the null hypothesis is rejected. GDP - Economic growth; PUB - Public investment; PRV - Private investment; FDI - Foreign direct investment; PC - Public consumption; HC - Human consumption

Source: Author's own work.

Based on the result of Table 9, the coefficient of public investment is positive and statistically significant at a 5 percent significance level, as per the p-value of the coefficient. Since the p-value of 0.0405 for the t-statistic is less than 0.05, the null hypothesis should be rejected, suggesting the variable is significant. It means that a 1 percent increase in public investment will lead to about a 0.09 percent increase in economic growth, as expected in Ghana and Kenya. This implies that public investment enables economic growth in both countries through increased efficiency and productivity. Investment in core infrastructure stimulates total factor productivity growth in core sectors and private sector organizations, thus promoting growth (Aschauer, 1989). Both countries have different budgetary allocations towards government expenditure, but considering both have excess labour supply, the ability of the public sector to influence growth is higher than that of the private sector. According to macroeconomic literature, public investment can stimulate economic activities via short-term effects on aggregate demand by raising the productivity of the private sector (Ghani & Din, 2006). Most developing countries employ expansionary fiscal policy tools and fiscal stimulus packages to grow the public sector and thus encourage productivity and efficiency (Doménech & Sicilia, 2021). Public investment generates positive spillover by providing public goods such as education, health, and infrastructure development (Ghani & Din, 2006; Calderón & Servén, 2010). The empirical literature provides contradictory results, with some studies showing a positive impact of public investment on growth (Ari & Koc, 2020; Ahamed 2022), while others find a detrimental effect (Makuyana & Odhiambo, 2018; Nguyen & Trinh, 2018). The study findings support the similar study by Ghani and Din (2006) in Pakistan and Ahamed (2022) for developing countries, where the studies argued the significance of public investment in inducing growth through positive spillover to the private sector (Ari & Koc, 2020). However, these findings contradict Makuyana and Odhiambo's (2018) empirical study in South Africa, where the study reported a negative relationship between public investment and growth. This was attributed to the crowding effect of private investment by public investment. Finally, Nguyen and Trinh (2018) found the relationship insignificant in Vietnam.

The effect of private investment on growth is negative and significant at a 1 percent significance level. This means that a 1 percent increase in private investment will cause economic growth to decline by 0.25 percent. Based on the empirical result, private investment slows economic growth in Ghana and Kenya. This is against theoretical expectations, where private investment influences growth by exhibiting increasing returns to scale (Doménech & Sicilia, 2021). Sometimes, public investment can crowd out private investment, thus compromising growth in developing countries. Furthermore, negative results could be attributed

to COVID-19 slowing business investment and general consumption and thus impeding economic growth. This study's findings agree with the result of Jahan et al. (2022) in 14 Asian countries. Jahan et al. (2022) attributed the negative result to the COVID-19 pandemic, which was detrimental to private investment globally and was occasioned by slowed consumption and general growth. According to Malick (2016), public investment has a crowding-out effect on private investment growth in developing countries like Ghana and Kenya, mainly due to the preference for a high non-infrastructural public investment component. In most developing countries, government budgetary decisions are inefficient and thus encourage overspending and borrowing from private sectors (Ahmed, 2022). Although public investment might boost the economy in the near term, excessive or ineffective expenditure can take funds away from more profitable private investment prospects, which would have a detrimental effect on growth over time. In contrast, Khan and Reinhart (1990), Makuyana and Odhiambo (2018) as well as Ahamed (2022) reported a positive relationship between private investment and growth in South Africa and developing nations, respectively, attributed to increasing returns. Private investment helps to stimulate economic growth by providing the necessary funds for businesses to expand, create jobs, and develop new technologies (Turan et al., 2021). It also contributes to an economy's overall productivity and competitiveness (Abdulkarim, 2023).

Foreign direct investment (FDI) is positive to economic growth and statistically significant at one percent as expected. This means that the economy will experience positive returns as FDI net inflow increases. This suggests that a 1 percent increase in FDI will translate to a 0.04 percent increase in economic activities. FDI brings in external capital and expertise, stimulating economic activity and creating jobs (Popescu, 2014). Higher economic development in Ghana and Kenya is linked with reduced trade barriers, increased capital inflow and better integration with international markets, according to the positive and significant coefficient of the FDI variable. This result is consistent with economic theory, in which more commerce and FDI inflow may encourage specialization, access to more significant markets, and the spread of technology and knowledge, all of which improve output. More open trade may help these two nations sell products and services, draw in foreign capital, and promote knowledge sharing with more developed economies (Popescu, 2014; Turan et al., 2021). FDI has been a topic of debate about economic growth. Some studies suggest that FDI positively impacts economic growth, as it helps mitigate the saving-investment imbalance, provides technology for production, and contributes to the diversification of the economy (Kipchirchir & Mose, 2024). Most studies argue that FDI inflow creates a growth multiplier through human capital formation, technology transfer, increased knowledge skills, and vertical and horizontal spillovers (Kipchirchir & Mose, 2024). The finding is consistent with the results of Nguyen and Trinh (2018) in Vietnam and Kipchirchir and Mose (2024) in Kenya, which are attributed to technological transfer growth and knowledge skills growth. In contrast, Ahamed (2022) indicated that FDI is negatively related to economic growth in developing countries, attributed to crowding out private investment and increasing dependency and vulnerability by the host country.

As expected, the effect of public consumption is negative and significant at 1 percent. A percentage increase in government consumption will cause the economy to decline by 0.28. An increase in public consumption can negatively affect private investment, slowing economic growth via the crowding out effect. In the countries of sub-Saharan Africa, public consumption did not positively affect economic growth in most cases (Ndiaye, 2018). It is generally argued that public consumption can either promote or impede economic growth depending on the nature of such expenditures. For instance, expenditure on the provision of public goods would foster growth only if it does not divert resources from other productive uses. Most developing countries have high spending on recurrent than capital spending, thus retarding their economic growth. The finding is consistent with Mose's (2021) empirical study of East African countries, supported by high recurrent spending in the member countries. In contrast, Ahamed (2022) reported a positive relationship between government consumption and growth, which has recently been attributed to high infrastructure spending in most developing economies.

The coefficient of human capital is positive and statistically significant, as expected. This implies that an increase in human capital by 1 percent will promote economic growth by 0.9 percent. This is possible through expanding knowledge and skills of its population and knowledge spillover effects as captured in the Solow growth model (Solow, 1956). Accumulating personal human capital leads to individual economic growth, and at the national level, human capital contributes to overall economic growth (Ahamed, 2022). The finding is consistent with Ahamed's (2022) findings that human capital accumulation will stimulate economic progress by providing necessary human capital, increasing knowledge stock, and encouraging innovation and competition. The finding contradicts Makuyana and Odhiambo's (2018) conclusion, which argued that labour growth retards economic progress in South Africa. This can be attributed to the poor quality of the labour force and inadequate investment in the education sector in most sub-Saharan countries.

The adjusted R-squared is 0.96, which indicates that the model-independent variables explain 96 percent of systematic variation in economic growth. The high r-squared value reflects the significance of investment components on GDP per capita. Based on the F-value of the model (44.5) and probability value of 0.0000, estimators are non-zero and, therefore, are simultaneously significant at a 1 percent significance level. This indicates that the overall statistical effect of covariates on economic progress is significant. Post-estimation panel diagnostic tests were conducted during the study to avoid misleading inferences. Based on Table 9 results, the study passed all the diagnostic tests, implying heteroscedasticity, autocorrelation and cross-sectional dependence were not a problem and data was normally distributed.

Conclusion

In this study, we examined the panel co-integration relationship between components of investment and economic growth in Ghana and Kenya between 1991 and 2022. Overall, the result from the DOLS model analysis indicates that in Ghana and Kenya, public investment, foreign direct investment, and human capital have a positive impact on growth in the long run. However, private investment and public consumption were found to obstruct economic growth. The regression result implies that public investment contributes more to economic growth in Ghana and Kenya than private investment. Both countries have different budgetary allocations toward government outlay, but considering both have excess labour supply, the ability of a public investment to influence growth is higher than that of a private investment. The study has identified that public investment promotes economic growth by increasing total productivity, especially in providing core infrastructure. In contrast, private investment impedes economic growth through crowding out effect on public investment. The study has shown that private investment did not always increase economic growth in Kenya and Ghana. Private investment has a negative and significant impact on growth, raising some concerns about the efficiency of private investment. Furthermore, negative results could be attributed to COVID-19 slowing business investment and general consumption and crowding effect, thus impeding economic growth.

The policy recommendation is to improve upon this factor (private investment) to achieve positive economic growth. The study findings support the need to improve the public sector's productivity and efficiency and implement policies to stimulate private investment. The study findings indicate that public investment is more efficiently allocated in Ghana and Kenya than private investment, suggesting the best strategy is for private investment to be complementary to promote higher public investment and improve total productivity and efficiency to induce economic growth. The policy may include increasing budgetary allocation towards core infrastructures like roads, airports, railways, and dams and using expansionary fiscal policy tools. Furthermore, policymakers should focus on creating a favourable investment climate and promoting public-private partnerships to enhance infrastructure development and stimulate private-sector investment, which can sustain long-run growth. Public investment might boost the economy in the near term, excessive or ineffective expenditure can take funds away from more profitable private investment prospects, which would have a detrimental effect on growth over time. This emphasizes the need for efficient public investment management and regulations in these nations to optimize the possible gains while reducing distortions and guaranteeing that investments are made in profitable projects with high returns. Other policies may include improving the quality of skilled labour, physical and human capital accumulation, ensuring macroeconomic conditions are friendly and induce competitiveness, and putting in place policies that attract FDI to both countries. Attracting foreign direct investment inflow to complement domestic investment will induce economic growth and diversify the economy away from economic shocks. Finally, facilitating and fostering private sector growth will lead to sustainable growth. The policy may include stimulating private sector growth by providing fiscal stimulus via fiscal policy tools to private sectors, especially in economic shocks like the COVID-19 pandemic, distributing credit to the private sector, and supplying a skilled workforce. When conditions are favourable, domestic and foreign investors can inject more capital, start new projects, employ, innovate, and increase productivity within the host country.

The economic consequences of this research go beyond the particular circumstances of Ghana and Kenya. Although there was a varying correlation between public investment and growth in these two cases, the effect of such policies may differ based on elements like the degree of economic development, institutional quality, and effectiveness of public spending in various countries in the Sub-Saharan African region and beyond. For example, carefully focused public investment programs may provide more significant returns and more successfully spur development in less developed countries with significant infrastructure gaps. On the other hand, the marginal advantages of more significant public investment might decrease in more developed countries with well-established infrastructure, and the emphasis should move to increasing the efficiency of current capital assets. Though the influence of public investment is the focus of this research, it is recognized that this variable includes several elements

and subcategories, including infrastructure expenditure and human capital investment. A more thorough breakdown of public investment would be beneficial for future studies to evaluate the possibly differing impacts of its constituent components in Ghana and Kenya.

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