

**PRIVATE INVESTMENT AND SUSTAINABLE ECONOMIC GROWTH IN ECONOMIC COMMUNITY OF WEST AFRICAN STATES (ECOWAS): PANEL DATA COINTEGRATION ANALYSIS (1986-2011)**

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**ABSTRACT**

The study examines the relations that exist between private investment and sustainable economic growth in Economic Community of West African States (ECOWAS) sub-region using Panel Data Cointegration technique involving panel unit root test, panel cointegration test and panel error correction estimation. The findings that emerged suggest that private investment did not impact significantly on economic growth to ensure sustainability. However, there are indications that the relation between private investment and economic growth suggests that if government deliberately increases the level of private investment in Economic Community of West African States (ECOWAS) sub-region, there would be high propensity for a rise in output level and people's standard of living. Governments are therefore advised to create an enabling and competitive environment for private investors to operate.

**Keywords:** Private Investment; Economic Growth; ECOWAS Countries; and Panel Data Cointegration, Sustainable Growth, Unit Root Test.

## INTRODUCTION

The positive impacts of sustainable economic growth on poverty level have been well documented in the literature. Based on this, any nation that must detach itself from the clutches of poverty must necessarily strive to ensure sustainable economic growth (Bhagwati 2001; Datt and Ravallion, 2002; Dollar and Kray, 2002; and Agrawal, 2008). However, there are indications of some underlying factors that determine the level of sustainable economic growth in an economy before being translated to poverty alleviation. The growth enhancing factors are varied and could embody pattern of public investment, financial structure, private investment, infrastructural development, corporate governance, good public policy, among others..

One of the crucial factors that have been identified in the literature capable of achieving sustainable economic growth and poverty reduction is private investment. This view is also in line with the identified strategy of increasing the “big push” in public investment to generate rapid increase in Africa underlying productivity aimed at achieving the United Nations Development MDGs Goals, (Sachmit, Bahadur, Faye and McCord,2004). Among the fundamental challenges that confront the Less developing countries (LDCs) is the eradication of extreme poverty and hunger aimed at halving the proportion of people who suffer from hunger (United Nations, 2006). To achieve the MDGs, it is imperative for such an economy to maintain a sustained increase in private investment

Area of infrastructural development has been identified for enhancing private sector participation in LDCs. Governments in LDCs have recognised and adapted some strategies to achieve private sector efficiency in service delivery in the area of infrastructure. The approaches range from service contracts to concession contracts divestitures. The former ensures that relatively few responsibilities and risks are assumed by the private sector, while the latter suggests that private sector will assume some pertinent commercial risks (UNHABITAT,2011).

Previous studies have examined the effects of some components of private investments like foreign direct investment on economic growth in some of the countries in ECOWAS sub-region (see Akinlo ,2004; Ayanwale 2007; Nkoro and Nko, 2012, among others). Erden and Holcombe (2005) examined the effect of public investment on private investment in developing economies while Adamu and Oriakhi (2010) examined the effects of foreign direct investment on growth in ECOWAS countries .The fact that emerged from the survey of empirical literature is that there is dearth of empirical literature on the effects of private investment on Economic growth in ECOWAS sub-region. The existing literatures have not sufficiently recognized the fact that foreign private investment could largely complement domestic private investment to enhance economic growth in ECOWAS sub-region. The present study fills this gap by treating both domestic private investment and foreign private investment as a complementary unit.

Furthermore, little attention has been paid to analyzing the effects of private investments on sustainable economic growth in ECOWAS countries probably because of undue emphasis placed on the role of public sector in ECOWAS countries. Also, the fact that the bulk of the economies in ECOWAS sub-region is not yet totally liberalised blurred the understanding of policy makers of the vital role that the private sector could play in the economic development of the sub-region.

The need to examine the effects of private investment on economic growth of ECOWAS sub-region emanated from the following bases: First, ECOWAS countries represent an integral part of the sub-Sahara African countries blessed with rich

natural resources such as gas, minerals, and other essential raw materials (United States Agency for International Development ,USAID, 2009). However, despite the rich potentials of ECOWAS countries, they are still challenged by varied problems ranging from political instability, poor governance, corruption, institutional management challenges, poor technical development, natural disasters, high prevalence of infectious diseases which include HIV/AIDS, and absence or poor private sector opportunities (USAID, 2009). The United Nations Human Development reports (2004) showed that of the thirty countries classified as “the least livable countries”, thirteen were from West African countries and out of the world’s twenty-two nations with the lowest human development indicators, ten of them are from West Africa (WDI, 2004).

It is also of value to examine the impact of private investment on economic growth given the recent agreement of the ECOWAS Heads of States on investment harmonisation in the sub-region. The proposal emphasized, among others, private driven economies with the protection of private sector rights. They aimed at achieving this through aligning of private investment to a single ECOWAS space, by ensuring the uniformity of the treatment of private investments in ECOWAS. This further calls for the empirical examination of the extant impact of private investment on economic growth in ECOWAS sub-region (ECOWAS Commission Investment Market, 2009)

The present study is divided into five sections. Apart from the introduction, section two addresses the theoretical and empirical literature. Section three presents the methodology while section four presents the data analysis. Section five concludes the paper.

## **THEORETICAL FRAMEWORK AND EMPIRICAL LITERATURE**

The theory that guides this study is the neoclassical growth model of Solow (1956) and Swan (1956). The model has been employed extensively in previous studies (Khan and Reinhart, 1990; Nazmi and Ramirez, 1997 and 2003) in developing economies to examine the impact of public and private investments on economic growth.

The neoclassical theoretical model explains the role of capital accumulation in achieving long run sustainable economic growth which is determined exogenously by the role of technical progress in total factor productivity that represents a crucial source of growth of output per worker; although theory does not explain the factors that engender the improvement. The model was built on the following assumptions: efficiency in the use of capital; and diminishing returns to capital and labour. Based on these assumptions, the production function assumes constant returns to scale, and the presence of smooth elasticity of substitution between inputs. The neoclassical model made the following predictions: that increase in capital induces economic growth; and that conditional convergence is a possibility i.e. that poor countries with less capital can grow faster than rich countries with much capital because each marginal investment generates a higher return to capital in poor countries than the rich countries. Also based on the assumption of diminishing returns to capital, the economies will eventually attain the steady state which represents a critical point where any increase in capital will no longer induce economic growth.

It should be noted that the convergence refers to is conditional because the steady state level of capital and output necessarily depends on the saving rate, the population growth rate, and the level of the production function. Thus in the long run, the accumulation of more and more capital ultimately produces less and less increase in output which eventually becomes zero..To attain higher growth rate requires technical progress and growth in the labour force. But in the short run, an

economy that could rapidly accumulate capital will attain higher output level.. Later version of the neoclassical model i.e. Mankiw, Romer and Weil (1992) added human capital accumulation as a determinant of the output level.

Overall, the neoclassical theory has shown that output growth is a function of labour, capital, and rate of technical change. An important inference from the neoclassical theory is that investment, i.e. private investment, is an important component of factors that determine economic growth. The inclusion of these variables and other relevant control variables will largely guide our model specification.

Bayai and Nyangara (2013) analysed the determinants of private investment after the introduction of the multi-currency system in Zimbabwe for the period 2009 to 2011. The study employed correlation and multiple regression. Variables identified for the study include political risk, GDP, national savings, inflation, interest rates, public investment, trade terms and debt servicing. The study identified political risk, interest rate, GDP, debt servicing and trade terms as key determinants of private investment over the study period. In a bid to foster economic growth and increase private investment, the study suggested the promotion of political stability,

the attraction of FDI, enabling a structured public-private dialogue and promoting Government investment in infrastructure development among others.

Isaac and Samwel (2012) investigated the effects of fiscal policy on private investment and economic growth in Kenya. The study employed a time series data from 1973 to 2009. Two stage Instrumental variable estimation method was employed to perform regression analysis. The results indicate that fiscal policy impacts on private investment and private investment plays a major role in the determination of the economic growth in Kenya. The study suggested re-examination of government spending to eventually make it complementary to investment, channeling more credit to the private sector, and finally designing appropriate policies that deal with the current high domestic public debt and budget deficit.

Jongwanich and Kohpaiboon (2008) examined patterns and determinants of private investment in an attempt to understand why levels of private investment in South East Asia have not yet fully recovered, using Thailand as a case study. The private investment equation was estimated using parsimonious estimate of the model during the period 1960–2005. They found that it was capital fund shortages rather than existing spare capacity that hindered short-run investment recovery. Private investment was found to positively respond to output growth both in the short and the long run. The study suggested that the health of the financial institutions must be kept in check, policy attention should be geared more toward credit availability to ensure that prudent investors can access credit adequately and accelerate investment recovery. In the long run, policy emphasis should be on promoting a conducive investment climate.

Yin (2011) empirically investigated the determinants for Malaysia's private domestic investment from 1975-2009. Using the Johansen cointegration techniques, the results indicated a long-run relationship between private domestic investment, economic output, domestic credit, interest rate, government spending and openness of the economy. In the short-run, private domestic investment decisions in Malaysia are determined by economic output, domestic credit, interest rate, government spending and openness of the economy. Investment responds fastest to changes of economic output. Government spending and openness of the economy leave significant positive impact. Credit supply has weak negative impact on investment

decisions, implying some short-term credit constraints. The study suggested improvement in the regulatory framework of Malaysia's financial institutions, government investment and further liberalization of the economy helps to revive domestic investment.

Anwer and Sampath (1999) assessed the relationship between investment and sustainable economic growth for 90 countries using data from World Bank for the period 1960-1992. The study employed unit root and cointegration technique and Granger causality test to determine the long run relationship and direction of causality between GDP growth and investment for 90 countries. They found that no cointegration between investment and GDP growth for 25 countries and cointegration for 25 countries. Evidence from Granger causality showed that causality existed in the short run for 15 countries and in the long run for 23 countries. Bi-directional causality was found for 10 countries, unidirectional causality from GDP growth to investment was found for 18 countries, and causality from investment to GDP growth was observed in 10 countries.

Jecheche (2010) empirically assessed the relationship between private investments and growth in Zimbabwe using annual data for 1990-2009. Short- and long-run behaviours of private investment and its link to growth were verified using SVAR and VECM econometric techniques. He found that the private investment was a critical determinant of growth and public investment appeared to provide long-run support for private investments and growth. The study also showed that adverse shocks (e.g., deteriorating terms of trade) could have long-lasting growth effects, while the impact of credit to the private sector was short-lived. There was thus significant potential for institutional reforms to improve the business environment, raise private investment, and invigorate growth. In a similar study carried out in Malaysia by Tan and Tang (2012), the dynamic interactions between private investment, user cost and economic growth were examined using Johansen cointegration method. Their findings showed the existence of long run relations among the three variables.

Sousa and Vansteenkiste (2009) evaluated the fundamental and financial factors impacts on the dynamics of private investment in emerging markets by relying on a panel of 31 emerging economies and quarterly frequency data for the period 1990:1-2008:3. They employed a panel Vector Auto regression (PVAR) approach to analyse the short-run adjustment of private investment to shocks to fundamental and financial factors. They found that: investment sluggishly adjusted to its own shock; GDP growth and equity price shocks had a positive and sizeable impact on private investment; unexpected variations in the cost of capital and the lending rate had a negative effect on private investment; and the response of private investment to credit market developments seemed to be driven by the demand side. The study therefore suggested that the boom of stock markets might have amplified private investment growth in emerging markets and that stock market bubbles might have encouraged real investment.

Bayraktar and Fofack (2011) examined the capital accumulation in sub-Saharan Africa involving income-group and sector differences with a sample of 23 SSA countries during structural adjustment era with data set from 1980-2004. The study employed regression analysis to estimate empirical specifications of private capital in the primary, industry and service sectors. The results indicated that the level of GDP per capita, quality of governance and public capital stock were found to be positive and significantly influence the private capital accumulation reflecting the complementary effects between public

and private investments. No statistically significant relationship existed between GDP per capita and private capital in the primary sector. The study also found private investment in both the primary sector and the industrial and service sector to be largely driven by public capital and profitability shock.

Ghura (1997) investigated empirically the factors that influenced sustainable economic growth in Cameroon during 1963-1996 via a Granger causality test and regression analysis. The results supported an endogenous-growth-type model that: the aggregate production type indicates increasing returns to scale. The impact of an increase in private investment on growth was large, significant, and robust; increase in public investment had significant impact on growth; and human capital development played important role in output expansion. Similar result was obtained in Kandenge (2006) in Namibia which examined the impact of public and private investment on economic growth between 1970-2005 using error correction methods. The findings showed that public investment and private investment and human capital, among other factors, were good determinants of economic growth. A similar study by Bouton and Sumlinsk (2000) that analysed the trends of private investment in developing countries found that private investment and economic growth were positively correlated than private investment and public investment in the long run,

Otker-Robe, Polanski and Vavra (2007) examined how some European countries had been coping with capital inflows. The findings from this study showed that as a country becomes more integrated with international financial markets, it becomes more difficult to regulate capital flows, they therefore recommended the need for financial deepening, supervision, and regulation,

In an empirical investigation by Fan, Jitsuchon and Methakunnavut (2004), the effects of different types of public expenditure on agricultural growth and rural poverty in Thailand was examined. The findings showed that government investment had positive impact on agricultural growth and rural poverty in Thailand. Arising from the findings was that there were variations in the impact of public expenditure on agricultural growth and rural poverty

Kumar and Pradhan (2002) investigated the relationship among FDI, domestic investment, and economic growth for a sample of 107 developing countries between 1980 and 1999 using panel analysis. The findings showed that FDI had a dynamic effect on domestic investment with initial negative impact and subsequent positive impact for the entire panel and for the individual countries. The results are however mixed as FDI largely crowded out domestic investment for the entire panel, but on country basis, FDI appeared to complement domestic investment.

The gap in the literatures reviewed is that existing empirical studies have not extensively examined the issue of the impact of private investment on sustainable economic growth in ECOWAS sub-region. The present study will contribute to literature in this area.

## METHODOLOGY

### Models

The specification of a standard neoclassical production function is of the form:

$$Y = f(A, K, L, Z) \dots \dots \dots (1)$$

Where A is the level of technology, K is stock of capital, L is the labour quantity and Y is the output level, while Z is the vector of other factors affecting economic growth. Assume that the production function is twice differentiable and that the technical change is Hicks-neutral, and subject to constant returns to scale.

Solve for the time derivative of the function and divide by Y and then rearrange to arrive at this form:

$$\frac{\dot{Y}}{Y} = \frac{\dot{A}}{A} + (f_K \frac{K}{Y}) \cdot (\frac{\dot{K}}{K}) + (f_L \frac{L}{Y}) \cdot (\frac{\dot{L}}{L}) + (f_Z \frac{Z}{Y}) \cdot (\frac{\dot{Z}}{Z}) \dots \dots \dots (2)$$

Here,  $\frac{\dot{Y}}{Y}$  is the continuous time rate of output growth.  $\frac{\dot{K}}{K}$  is the capital stock rate of growth and  $\frac{\dot{L}}{L}$  is the growth rate of

labour force.  $f_K$ ,  $f_L$  and  $f_Z$  are marginal products of capital, labour and other explanatory variables respectively.  $\frac{\dot{A}}{A}$

Implies the Hicks-neutral rate of change of technical progress. The Solow model specification above (equation 1) shows the output growth as a function of technical growth, labour force growth, and the growth of other factors capable of influencing economic growth.

Furthermore, the Augmented Solow growth model improved on the standard Solow growth model by including other factors as the determinants of economic growth apart from the technical change, labour, and capital. Other policy variables that are relevant determinants of growth are: trade, fiscal policy, and monetary variables (Easterly and Levine, 2001; Mankiw et al, 1992; and Barro, 1991).

The present study suggests an expanded model of this form:

$$\ln GDP_{it} = \alpha_0 + \alpha_1 \ln CE\_GDPPERC_{it} + \alpha_2 \ln PRIVINV_{it} + \alpha_3 \ln DOMCRD_{it} + \alpha_4 \ln PUBINV_{it} + \alpha_5 \ln GRSAV\_GDPPERC_{it} + \alpha_6 \ln INFL_{it} + \alpha_7 \ln POPGR_{it} + \alpha_8 \ln LABF_{it} + \alpha_9 \ln OPN_{it} + E_{it} \dots \dots \dots (3)$$

Where lnGDP is the log of gross domestic product which is a proxy for sustainable economic growth; LnCE\_GDPPEC is the log of consumption expenditure as a percentage of GDP; LnDOMCRD is the log of domestic credit; LnPUBINV is the log of public investment; GRSAV\_GDPPERC is the gross savings as a percentage of GDP; INFL is the inflation rate; POPGR is

the population growth, LABF is the labour force ; LnOPN is the log of openness; LnPRIVINV is the log of private investment. The  $\alpha$ 's are the parameters to be estimated and the subscript "it" indicates the panel data dimension embodying cross sectional and time dimensions.

It is expected that the elasticity parameters  $\alpha_0, \alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_8, \alpha_9$  are all greater than zero, while  $\alpha_6$  and  $\alpha_7 \lessgtr 0$  ( either greater or less than zero). Thereafter, the specification of a general panel error correction model (PECM) of the aggregated production function is expressed as

$$\begin{aligned} \ln GDP_{it} = & \alpha_0 + \alpha_{1i} \sum_{i=0}^n \Delta \ln CE\_GDPPERC_{it-i} + \alpha_{2i} \sum_{i=0}^n \Delta \ln PRIVINV + \alpha_{3i} \sum_{i=0}^n \Delta \ln DOMCRD_{it} \\ & + \alpha_{4i} \sum_{i=0}^n \Delta \ln PUBINV_{it} + \alpha_{5i} \sum_{i=0}^n \Delta \ln GRSAV\_GDPPERC_{it} + \alpha_{6i} \sum_{i=0}^n \Delta \ln INFL_{it} + \alpha_{7i} \sum_{i=0}^n \Delta \ln POPGR_{it} \\ & + \alpha_{8i} \sum_{i=0}^n \Delta \ln LABF_{it} + \alpha_{9i} \sum_{i=0}^n \Delta \ln OPN_{it} + \alpha_{11i} \sum_{i=1}^n \Delta \ln GDP_{it} + \alpha_{12} PECM_{t-1} \dots\dots \\ & \dots\dots\dots(2) \end{aligned}$$

Where PECM<sub>t-1</sub> is the panel error correction term lagged by a period.  $\Delta$  is the first difference of each of the variables. Here, the lags of the GDP variable are included in the expanded model to capture the inertia response of GDP variable to its previous values. The parameters are expected to be positive in values.

**Sources of Data**

The data for the study were sourced from the United Nations Statistics online data base and the World Development Indicators online database for the period 1986 to 2011. 15 countries were selected in the ECOWAS region as follows: Benin , Cote D’voire, Gambia, Niger, Nigeria, Mali, Senegal, Sierra-Leone, Togo, Burkina Faso, Cape Verde, Ghana, Guinea , Guinea-Bissau, and Liberia.

**Definition and Measurement of Data Variables**

The Gross domestic product (GDP) is defined as real GDP measured by dividing the nominal GDP by the consumer price index. Consumption Expenditure percentage of GDP is measured by dividing gross consumption expenditure by real GDP. Private Investment is proxied as the gross fixed capital formation of the private sector as a percentage of GDP. Domestic Credit to the private sector is measured as a percentage of GDP. Public Investment is the value of public investment as a percentage of GDP. The gross saving as a percentage of GDP is measured by dividing gross savings by real GDP and the percentage calculated. Inflation rate is measured by the log difference of consumer price index. Population growth rate measures the changes in the population over time and is calculated as log difference in population overtime. The value of



productive human resource available in an economy is measured by labour force derived from the entire population. Openness growth rate of the economy to outside world is measured as import plus export divided by GDP multiplied by 100 per cent.

### **Techniques of Data Analysis**

In order to set the objective of examining the effects of private investment on economic growth in ECOWAS countries, both the descriptive and econometric techniques were employed on Panel data series obtained from ECOWAS countries. The descriptive method entails the use of tables. The econometric technique employed unit root test to ascertain the stationarity of data series. Thereafter, cointegration tests were conducted among variables to establish long run relations among them. As cointegration was established to exist, Panel Error Correction model estimation was performed.

## **ANALYSIS OF DATA**

### **Descriptive Analysis of Data**

It is conventional to first examine the characteristics of data series used in the analysis to give a sound basis for the data employed in the analysis. This is presented in table 1 below.

**Table 1: Descriptive Analysis of Panel Data Seies**

	CE_GDPP		DOMCR		GRSAV_G			PHE_GD			PRI
	ERC	D	EXPT	GDP	DPPER	INFL	LABFF	MS2	PPER	POPGR	V_I
											NV
Mean	96.01	15.92	150.28	3497.00	15.68	8.54	3.71	32.75	3.17	2.57	12.7
Median	93.41	13.82	114.51	2395.02	12.30	4.55	3.24	26.51	2.76	2.66	11.9
Maximum	187.53	62.12	476.39	11596.84	90.79	59.46	10.36	88.21	8.96	5.08	35.0
Minimum	73.30	2.96	31.55	200.55	-14.56	-3.10	0.13	6.54	0.81	0.86	3
Std. Dev.	17.11	11.94	87.09	3255.09	15.51	11.60	2.89	18.93	1.70	0.77	0.70
Skewness	3.14	2.02	1.530	1.24	2.69	2.38	0.54	1.47	1.14	0.32	6.46
Kurtosis	14.80	7.45	5.20	3.32	12.69	8.81	2.23	4.46	4.56	3.82	0.94
Jarque-Bera	865.13	175.62	68.85	30.31	594.37	273.12	8.59	52.54	37.33	5.34	24.6
Probability	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.06	8
Sum	11137.21	1847.44	17432.48	405652.9	1819.16	991.29	431.36	3799.69	368.04	298.14	1475
Sum Sq. Dev.	33692.08	16418.28	872390.1	1.22E+09	27674.92	15480.89	961.53	41233.67	332.43	68.53	4804
Observations	116	116	116	116	116	116	116	116	116	116	116

Source: The data for the calculation were obtained from World development Indicators.

The descriptive statistics' of the series show that the variables display a high level of consistency as their mean and median fall persistently within the maximum and the minimum bounds of these series. The relatively low values of the standard deviation for most of the series imply that their mean deviations from the actual mean values are very small. For virtually all the data series, it is observed that the values of mean and median and mode are very close suggesting that the distribution is near symmetry. Also, the probability that the Jarque-Bera statistics exceed the observed values is averagely low for all the data series, thus the hypothesis of normality is rejected at 5 per cent significance level.

### Average Private Investment GDP growth and Average GDP Growth

The results of Private Investment GDP growth in percentage and GDP growth in ECOWAS countries are presented below in figure 1. The graphs show the magnitudes of Private investment to GDP in percent; and GDP growth rate in each ECOWAS countries.

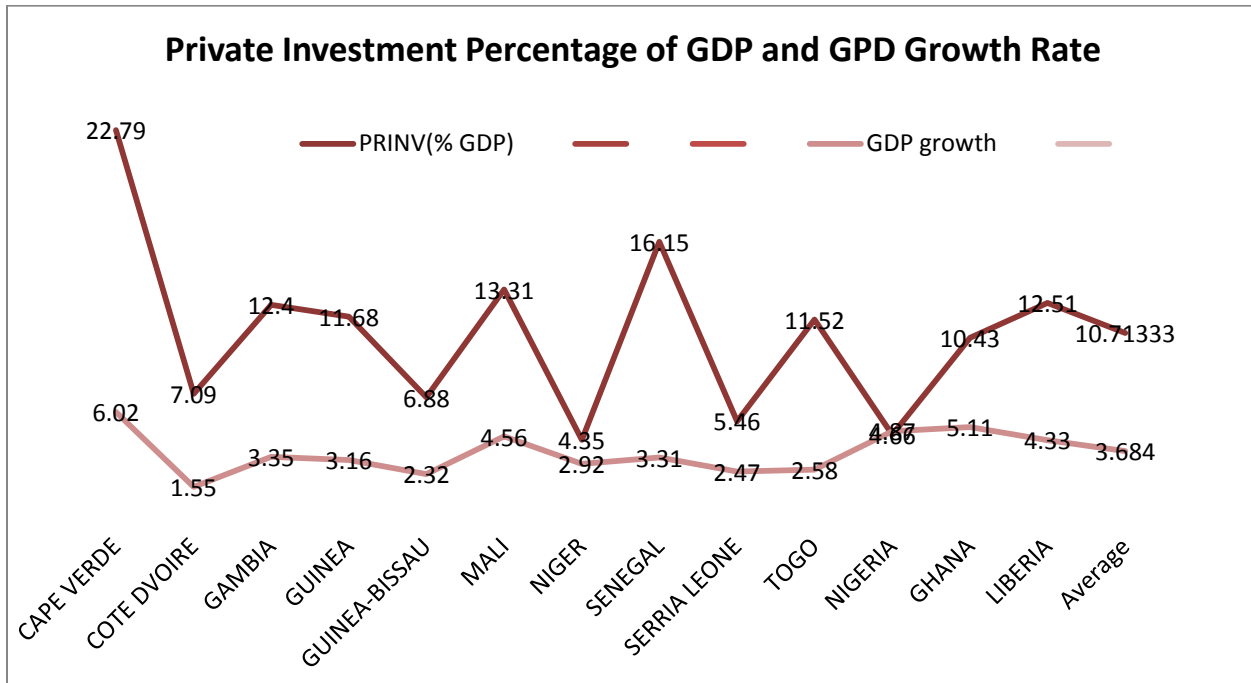


Figure 1 : Average Private Investment GDP Percentage and Average GDP Growth Rate in ECOWAS countries

Source: Data for the line graphs were obtained from the World Development Indicators

As observed from figure 1 and table 2 in the appendix, the average GDP growth is positively low in almost all the ECOWAS countries. The average GDP growth is 3.7 per cent which is considered on the average very low, while the average for private investment as a percentage of GDP was 10.7 percent. The private investment as a percentage of GDP is everywhere above the GDP growth rate except for Nigeria where they intercepted. Overall, it appears that private investment growth largely determines the GDP growth in almost all ECOWAS countries.

## EMPIRICAL RESULTS

### Unit Root Analysis

The result of unit root analysis using Levin Lin Chu, Breitung and HADRI tests are presented in table 3 below:

Table 3: **Unit Root Tests of panel Data Series**

Tests		Levin, Lin and Chu	Breitung	HADRI
Variable		Decision	Decision	Decision
LN(CE_GDPPERC)	Level	-0.123	0.073	5.802
	1st Diff.	-8.025 <i>I(1)</i>	-3.095 <i>I(1)</i>	15.432 <i>I(1)</i>
LN(DOMCRD)	Level	0.851	3.647	8.001
	1st Diff.	-3.57 <i>I(1)</i>	-1.323 <i>I(1)</i>	2.743 <i>I(1)</i>
OPNGROW	Level	-2.491 <i>I(0)</i>	-6.33 <i>I(0)</i>	3.938 <i>I(0)</i>
LN(GDP)	Level	-0.598	2.817	7.651
	1st Diff.	-2.516 <i>I(1)</i>	1.319 <i>I(1)</i>	2.939 <i>I(1)</i>
LNGRSAV_GDPPEERC	Level	1.204	-0.614	11.668
	1st Diff.	-4.894 <i>I(1)</i>	-3.201 <i>I(1)</i>	7.712 <i>I(1)</i>
INFL	Level	-5.862 <i>I(0)</i>	-4.874 <i>I(0)</i>	6.475 <i>I(0)</i>
	Level	0.071	2.835	6.603
LN(LABFF)	1st Diff.	-4.694 <i>I(1)</i>	-0.568 <i>I(1)</i>	4.056 <i>I(1)</i>
LNPUBLINV	Level	0.503	-0.725	5.339
	1st Diff.	-4.017 <i>I(1)</i>	-3.399 <i>I(1)</i>	11.106 <i>I(1)</i>
POP	Level	-16.818	1.411	2.764
	1st Diff.	-16.903 <i>I(1)</i>	-9.839 <i>I(1)</i>	2.156 <i>I(1)</i>
LNPRIV_INV	Level	-0.023	-1.289	5.299
	1st Diff.	-5.343 <i>I(1)</i>	-2.211 <i>I(1)</i>	5.225 <i>I(1)</i>
	2nd Diff.			

Note: The Null hypotheses for Levin, Lin and Chu, and Breitung are stated as indicating the presence of unit roots while for Hadri the null hypothesis connotes the presence of stationarity.

The panel unit root tests show that all the variables except inflation rate (INFL) and openness growth (OPNGROWTH) are integrated of order one using Levin, Lin and Chu , Breitung and Hadri tests at 5 percent significance. That the two variables

are  $I(0)$  at level is not unexpected because they are in their first difference already, thus they could be treated as  $I(1)$  variables.

The next step taken was to test for cointegration of the integrated series using Fisher panel co integration test and Kao Residual cointegration test. The results of the cointegration tests are presented in tables 4 and 5 below.

Table 4: **Johansen Fisher Panel Cointegration Test**

Trend assumption: Linear deterministic trend				
Lags interval (in first differences): 1 1				
Unrestricted Cointegration Rank Test (Trace and Maximum Eigenvalue)				
Hypothesized	Fisher Stat.*	Fisher Stat.*		
		(from max-		
No. of CE(s)	(from trace test)	Prob.	eigen test)	Prob.
None	5.54	0.69	5.54	0.69
At most 1	5.54	0.69	5.54	0.69
At most 2	2.77	0.94	39.61	0.01
At most 3	0.00	1.01	73.68	0.01
At most 4	0.00	1.02	73.68	0.02
At most 5	73.68	0.03	73.68	0.01
At most 6	49.85	0.02	47.59	0.01
At most 7	13.24	0.13	13.24	0.13

\* Probabilities are computed using asymptotic Chi-square distribution.

Table 5:

**Kao Residual Cointegration Test**

	For the Entire Panel	Panel without Nigeria	Panel Without Ghana
Null Hypothesis:	Ho-No Cintegration	Ho: No Cointegration	Ho: No Cointegration
ADF-t Statistic	-2.778	-3.112	-4.02
Prob.	0.002	0.005	0.044
Decision	Cointegrated	Cointegrated	Cointegrated

- Note: The test was conducted at 5 per cent significance level with the assumptions of no deterministic

In tables 4 and 5, the results of Johansen Fisher Panel Cointegration test and Kao Residual Cointegration test were presented respectively. Using cointegration rank test and applying the trace test, the cointegrating equation of at most 4 was rejected while the alternative hypothesis of at most 5 cointegrating equation was accepted. Also using the

maximum eigenvalue test, a cointegrating equation of at most 1 cointegrating equation was rejected while the alternative hypothesis of at most 2 cointegrating equation was accepted. Overall, Johansen panel Fisher cointegration indicates the presence of cointegration among the variables

The result of Kao Residual cointegration test in table 5 shows that for the entire panel, there is cointegration among the variables as shown in the second column. The third and the fourth columns are presented to show the robustness of our result to the sizes of countries like Nigeria and Ghana. The result shows the existence of elements of cointegration without Nigeria or Ghana.

### **Result of Panel parsimonious Model**

The result of the parsimonious model is presented in table 6 below. It shows the log difference of GDP as the dependent variable and the log differences of all other variables as the independent variables.

**Table 6: Panel Parsimonious Model of Economic Growth.**

Dependent Variable: DLN(GDP)				
Method: Panel Least Squares				
Total panel (balanced).				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.462	14.816	0.706	0.482
DLN(GDP(-1))	0.644	0.085	7.565	0.001
DLN(CE_GDPPEREC)	-3.292	2.152	-1.529	0.129
DLN(CE_GDPPEREC(-1))	-1.327	1.522	-0.872	0.385
DLN(GRSAV_GDPPEREC)	-2.177	1.726	-1.261	0.21
D(INFL(-1))	0.717	0.869	0.825	0.411
DLN(LABFF)	8.86	4.638	1.91	0.058
DLN(LABFF(-1))	-5.969	4.698	-1.271	0.206
D(OPNGROWTG)	0.746	0.267	2.795	0.006
D(OPNGROWTG(-1))	0.315	0.259	1.216	0.226
D(POPGR)	2.086	1.642	1.269	0.206
D(POPGR(-1))	-1.152	1.176	-0.979	0.329
DLN(PRIV_INV)	3.203	2.318	1.381	0.171
DLN(PRIV_INV(-1))	-2.76	2.417	-1.142	0.256
DLN(PUBLINV(-1))	4.217	3.199	1.318	0.19
RESID2	-0.112	0.038	-2.927	0.004
R-squared	0.56	Mean dependent var		108.058
Adjusted R-squared	0.498	S.D. dependent var		133.817
S.E. of regression	94.8	Akaike info criterion		12.063
Sum squared resid	952635	Schwarz criterion		12.43
Log likelihood	-719.85	Hannan-Quinn criter.		12.212
F-statistic	9.001	Durbin-Watson stat		2.287
Prob(F-statistic)	0.001			

In order to establish the validity of the model specification, the values of the Schwarz Criterion and Akaike Information Criterion derived from the parsimonious model must reduce in values compared with those of overparameterised model<sup>1</sup>. This was established in the parsimonious model estimated (table 6). The  $R^2$  and adjusted  $R^2$  improved in the process of transformation from general to specific model. The residual tests carried out shows that the standardised residual graph presented in the appendix (fig. 2) appears to be considerably normal in distribution. Also the fitted residual (fig.4) appears to

<sup>1</sup> See appendix in table7 that shows the overparameterised model result to confirm this. The value of Schwarz Criterion and Akaike Information Criterion reduced from 12.65 and 12.16 to 12.43 and 12.06 respectively.

adequately track the actual residual. All these attest to the fact that the parsimonious model interpreted is a better model than the overparameterised model.

The result shows that the one-year period lagged GDP is positively related to the contemporaneous GDP suggesting some inertia response of GDP to its lag. Thus the economic growth of last year could significantly systematically impact on that of this year. Its coefficient value of 0.6 implies that one percent increase in previous year GDP would lead to 0.6 per cent increase in GDP in the current year. The variable coefficient is however significant.

In the case of Labour force variable, it has the expected positive sign with a high coefficient value of 8.7, implying that one per cent increase in the labour force would lead to 8.7 per cent increase in GDP (economic growth). Also, the Consumption expenditure of GDP percentage is negatively related to GDP but not significant at both the current and a period lag. This probably suggests that the high level of poverty experienced by the people largely negatively impacted on their potentials to contribute to national output. A similar result was obtained in respect of Gross Savings GDP percentage which is negatively signed reflecting further still the high level of poverty in the economy that culminated in low aggregate savings. The fact that consumption expenditure per GDP is low coupled with low Gross Savings GDP per cent is a pointer to the high poverty level manifesting in low standard of living of the people. In addition, inflation variable is positively signed although not significant. This probably reflects the tendency for inflation to nominally increase the value of GDP.

An important variable identified in the results is the openness growth that depicts the extent of exposure of ECOWAS countries to the rest of the world. The current openness variable has positive sign and is significant at 5 per cent level. The magnitude of the coefficient which is 0.7 suggests that one per cent increase in openness growth led to 0.7 per cent increase in GDP (Economic Growth). This appears to suggest that the current economic liberalisation embraced by ECOWAS could potentially benefit them.

Private investment, which is the variable of interest in this study, contemporaneously bears the expected positive sign. The variable coefficient is however not significant at 5 per cent level. The one-period lagged private investment variable did not have the expected positive sign and was also not significant at 5 per cent. The coefficients of both current and a period lag of private investment are considerably large at 3.2 and 2.7 respectively implying that one per cent increase in the current value of private investment would lead to an increase in GDP by 3.2 per cent while an increase of one per cent in the lagged value of private investment would generate a reduction of GDP by 2.7 per cent. Although it is established that the private investment variables are not significantly different from zero, the fact that variable is positively signed and of reasonable large value suggests that it is potentially an important factor capable of propelling economic growth. However its insignificant value makes its contribution currently of less importance. This appears to contradict the position of Jecheche (2010), Ghura (1997), Bouton and Sumlinsk (2000) among others, who found that private investment is crucial for economic growth.

The effects of population growth variable follow the same pattern like that of private investment. Its contemporaneous variable is positively signed but its one-year period lag has negative sign. The coefficients are however not significant at 5 per cent. On the part of public expenditure, it has the expected positive sign but not significant at 5 per cent. Although the



value of the coefficient is sizeable at 4.2, the insignificant coefficient of the public expenditure renders it less potent enhancer of growth in ECOWAS countries.

The panel error correction term has the expected negative sign and it is highly significant at 5 per cent level. This further lends credence to the good model specification of the parsimonious model. The coefficient of the panel error correction term is 0.112. This implies that 11.2 per cent of the disequilibrium in GDP (economic growth) is corrected the following year. This value appears to be considerable enough to ensure speedy output convergence among the ECOWAS countries.

## **CONCLUSION AND POLICY RECOMMENDATIONS**

The conclusion that emerged from the findings shows that the contribution of private investment to sustainable economic growth in ECOWAS countries is still very insignificant. Also, it is noted that private investment could have perverse effects on ECOWAS economies if not well managed. Furthermore, the results confirmed that the openness of the economy represents a crucial factor capable of enhancing sustainable economic growth in ECOWAS countries. In addition, labour force development is equally a potent factor that could enhance sustainable economic growth.

On the basis of the above findings, the following policy implications are pertinent: First, for the economy to reap maximum benefits from private investment, the private sector development programmes should be vigorously pursued. Although most ECOWAS governments have initiated some laudable programmes, more vigour must be put into them to ensure their success. For example, government could ensure accessibility of private investors to affordable land, and loan facilities, among others, and ensure good enabling environment for private sector operations. On this note, the issue of poor infrastructural development in most ECOWAS countries should be seriously addressed. For example, there is need for provision of regular and adequate electricity and other energy sources to alleviate the costs of operations of the private investors. .

The economy should be more liberalised to create an easy opportunity for foreign private investors to invest in the ECOWAS economies. However, such foreign investments need to be thoroughly monitored to ensure that they are not inimical to economic growth of ECOWAS economies and could enhance the welfare of the people both in the short and long run.

In addition, to ensure local participation in private investment that will build local capacity and thus enhance economic growth, appropriate labour force with sufficient human capital development should be encouraged. This borders on provision of necessary and relevant education that is amenable to changes in technology and innovations.

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APPENDIX

Table 7: Result of Panel Data Overparametarised Model

Dependent Variable: LGDP				
Method: Panel Least Squares				
Cross-sections included: 15				
Total panel (balanced).				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	243.1111	499.6078	0.486604	0.6274
LNCE_GDPPERC	-7.94773	4.504608	-1.76436	0.0801
LNDOMCRD	11.72061	4.296652	2.727846	0.0073
LNRSVAV_GDPPER				
C	-0.00449	4.013869	-0.00112	0.9991
INFL	-1.91251	3.034814	-0.63019	0.5297
LNLABFF	1010.071	41.58069	24.29183	0
OPNGROWTG	1.041925	0.841353	1.238392	0.2179
LNPOP	88.36632	72.85004	1.212989	0.2274
LNPRIV_INV	0.124481	7.134678	0.017447	0.9861
LNPUBLINV	-19.9278	9.216543	-2.16218	0.0325
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.992848	Mean dependent var		3221.166
Adjusted R-squared	0.99177	S.D. dependent var		3134.822
S.E. of regression	284.3974	Akaike info criterion		14.26527
Sum squared resid	10191119	Schwarz criterion		14.67398
Log likelihood	-1021.37	Hannan-Quinn criter.		14.43134
F-statistic	920.6016	Durbin-Watson stat		0.26265
Prob(F-statistic)	0			

Table 8 Result of Overparameterised model

Dependent Variable: D(GDP)				
Method: Panel Least Squares				
Sample (adjusted): 1992 2010				
Periods included: 19				
Cross-sections included:15				
Total panel (balanced)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.756369	16.33048	0.597433	0.5516
D(GDP(-1))	0.642857	0.090035	7.140075	0
D(CE_GDPPEREC)	-3.530506	2.492629	-1.416379	0.1598
D(CE_GDPPEREC(-1))	-1.384822	2.09175	-0.66204	0.5095
D(DOMCRD)	0.682646	4.151768	0.164423	0.8697
D(DOMCRD(-1))	0.824951	3.995732	0.206458	0.8369
D(GRSAV_GDPPEREC)	-2.022777	2.468636	-0.819391	0.4145
D(GRSAV_GDPPEREC(-1))	-0.236387	2.193707	-0.107757	0.9144
D(INFL)	0.329606	1.091094	0.302088	0.7632
D(INFL(-1))	0.948699	0.979851	0.968208	0.3353
D(LABFF)	884.5736	496.1054	1.783036	0.0776
D(LABFF(-1))	-588.0425	507.0535	-1.159725	0.249
D(OPNGROWTG)	0.72622	0.289702	2.50678	0.0138
D(OPNGROWTG(-1))	0.299078	0.286184	1.045056	0.2985
D(POPGR)	234.3795	215.7757	1.086218	0.28
D(POPGR(-1))	-125.4227	165.6245	-0.757271	0.4507
D(PRIV_INV)	2.751499	2.668673	1.031036	0.305
D(PRIV_INV(-1))	-3.13002	2.635364	-1.187699	0.2378
D(PUBLINV)	-2.129038	4.143965	-0.513768	0.6086
D(PUBLINV(-1))	3.819182	3.90857	0.97713	0.3309
RESID2	-0.109543	0.04049	-2.705466	0.008
R-squared	0.559022	Mean dependent var		109.5586
Adjusted R-squared	0.469936	S.D. dependent var		134.3544
S.E. of regression	97.81739	Akaike info criterion		12.16171
Sum squared resid	947255.9	Schwarz criterion		12.64952
Log likelihood	-708.7026	Hannan-Quinn criter.		12.35981
F-statistic	6.275058	Durbin-Watson stat		2.272482
Prob(F-statistic)	0			

Table 9: Result of Coefficient Bound Test

## Coefficient Confidence Intervals

Date: 05/19/13 Time: 12:48

Sample: 1986 2011

Variable	Coefficient	90% CI		95% CI		99% CI	
		Low	High	Low	High	Low	High
C	0.670235	-0.515031	1.855500	-0.748003	2.088472	-1.212964	2.553433
D(PRIV_INV(-1))	0.147483	-0.078658	0.373623	-0.123107	0.418072	-0.211818	0.506784
D(CE_GDPPERC)	-0.022315	-0.204951	0.160322	-0.240850	0.196220	-0.312495	0.267865
D(CE_GDPPERC(-1))	-0.071739	-0.225513	0.082035	-0.255738	0.112260	-0.316061	0.172583
D(DOMCRD)	0.588879	0.339427	0.838331	0.290396	0.887362	0.192540	0.985218
D(DOMCRD(-1))	-0.269894	-0.530542	-0.009245	-0.581774	0.041987	-0.684022	0.144235
D(EXPT)	-0.016208	-0.028517	-0.003900	-0.030937	-0.001480	-0.035765	0.003348
D(EXPT(-1))	0.002290	-0.012683	0.017262	-0.015626	0.020205	-0.021499	0.026079
D(GDP)	0.002119	-0.003161	0.007399	-0.004199	0.008437	-0.006270	0.010508
D(GDP(-1))	-0.001837	-0.007088	0.003415	-0.008120	0.004447	-0.010181	0.006507
D(GRSAV_GDPPERC)	0.091690	-0.092399	0.275779	-0.128583	0.311963	-0.200799	0.384178
D(GRSAV_GDPPERC(-1))	0.018195	-0.165972	0.202361	-0.202171	0.238560	-0.274416	0.310805
D(INFL)	0.124663	0.027158	0.222168	0.007992	0.241334	-0.030257	0.279583
D(INFL(-1))	-0.090343	-0.190654	0.009969	-0.210371	0.029685	-0.249722	0.069036
D(LABFF)	-12.48060	-42.69013	17.72892	-48.62802	23.66681	-60.47874	35.51753
D(LABFF(-1))	11.11312	-18.23073	40.45698	-23.99846	46.22471	-35.50960	57.73584
D(MS2)	0.021063	-0.148691	0.190817	-0.182058	0.224183	-0.248649	0.290775
D(MS2(-1))	-0.026507	-0.224657	0.171644	-0.263605	0.210592	-0.341336	0.288323
D(PHE_GDPPERC)	-0.333184	-1.616323	0.949955	-1.868533	1.202164	-2.371888	1.705519
D(PHE_GDPPERC(-1))	0.964799	-0.116491	2.046090	-0.329026	2.258625	-0.753200	2.682798
D(POPGR)	3.364800	-12.77248	19.50208	-15.94437	22.67397	-22.27477	29.00437
D(POPGR(-1))	1.312158	-11.17672	13.80103	-13.63149	16.25581	-18.53068	21.15500
PECM(-1)	-0.937618	-1.237298	-0.637938	-1.296202	-0.579034	-1.413762	0.461474

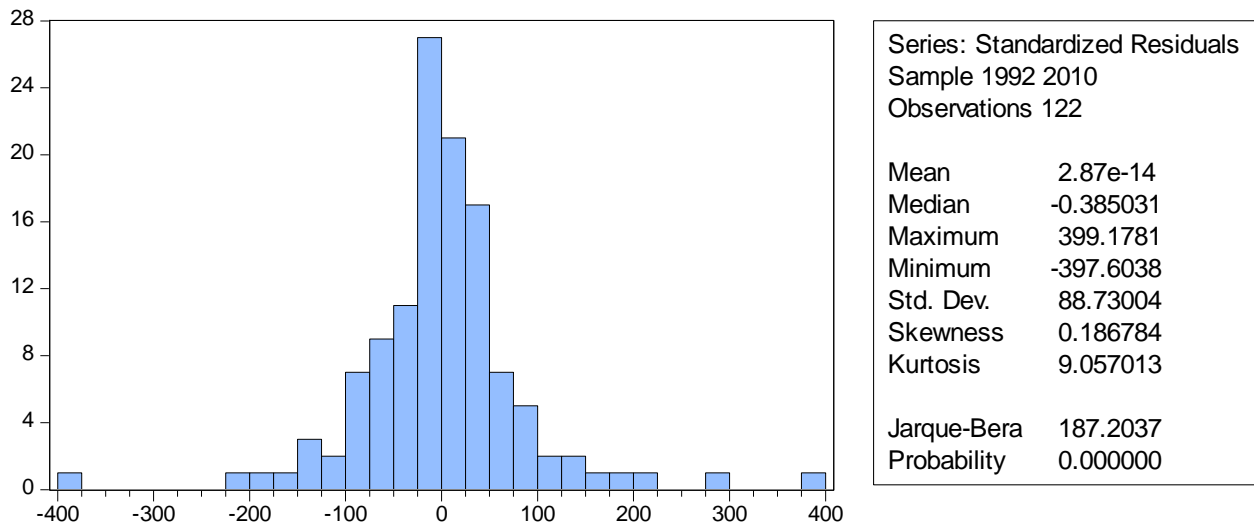


Fig. 2: Standardised Residual Test

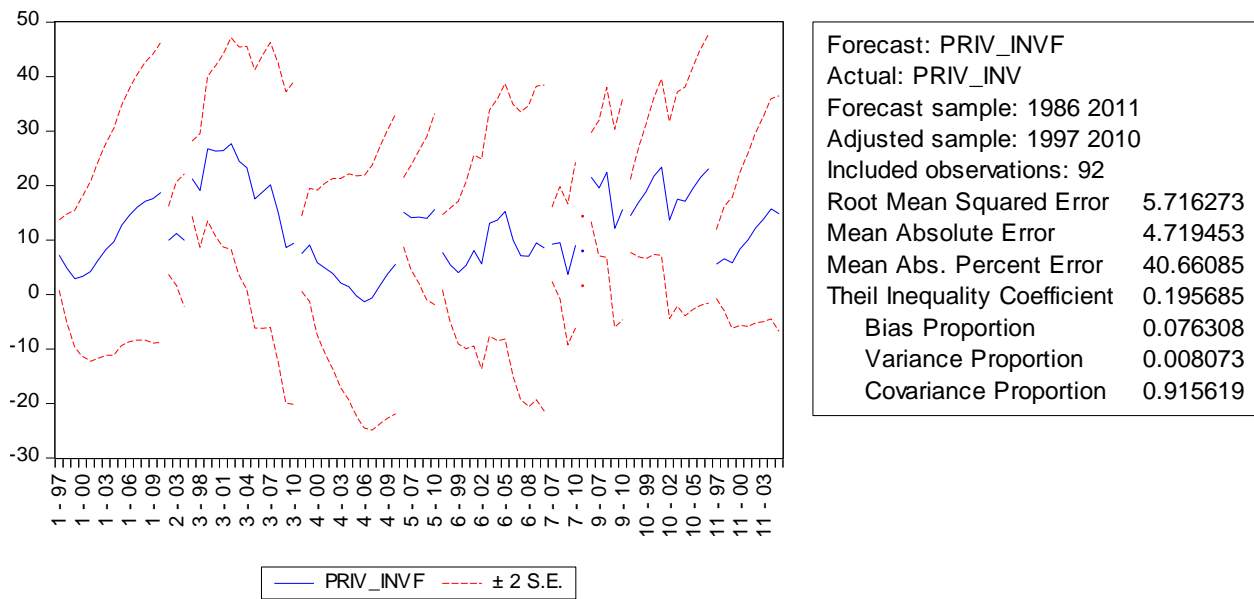
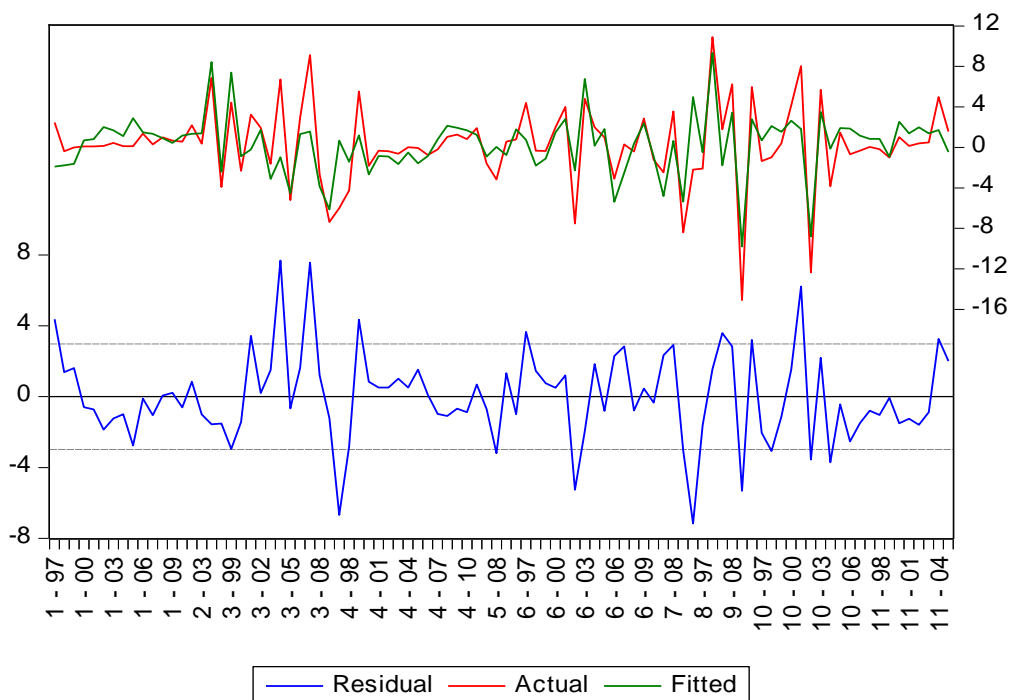


Fig.3: Forecast of Private Investment Serie



:Fig. 4: Residual, Actual and Fitted Graphs

Table 10: Average Value of Private Investment percentage of GDP and GDP Growth Rate (1986-2011)

	PRINV(% GDP)	GDP growth
BENIN	10.32	3.73
BURKINA FASO	11.15	4.98
CAPE VERDE	22.79	6.02
COTE DVOIRE	7.09	1.55
GAMBIA	12.4	3.35
GUINEA	11.68	3.16
GUINEA-BISSAU	6.88	2.32
MALI	13.31	4.56
NIGER	4.35	2.92
SENEGAL	16.15	3.31
SERRIA LEONE	5.46	2.47
TOGO	11.52	2.58
NIGERIA	4.66	4.87
GHANA	10.43	5.11
LIBERIA	12.51	4.33
Average	10.71333	3.684