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The Combined Effects of Public and Private Investments on Economic Growth in the CEMAC Zone

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ARTICLE INFO

Article history

Received: 23 July 2019

Accepted: 20 September 2019

Published Online: 31 December 2019

Keywords:

Public-private investment

Economic growth

ABSTRACT

This study evaluates the simultaneous impact of public and private investments on economic growth in the CEMAC zone between 1984 and 2017. To attain this aim, we use the Vector Error Correction Model (VECM) to test the direction of causality between the three variables above at the level of each country. We find that the direction of causality is not the same in all the countries both in the short as in long-run. We then develop an ideal model going from the Cobb Douglas production function which we quantitatively validate using panel data estimation through the method of *Pool Mean Group* which takes into account individual specificities. It arises that contrary to economic theory, private sector investments have positive and significant effects in short-run. However, the impact of public investments is negative and significant. In the long-run, the effects are reversed and call on the authorities of the CEMAC zone to reinforce the political risk to strengthen the public-private partnership in the process of sustainable growth.

1. Introduction

The analysis of the effects of public expenditure on private sector investments and growth is not new in economics and has been the subject of many controversies. It has been the subject of a lively debate between the classical, neo-classical and Keynesian economists. According to Keynes, the State budget is one of the decision variables having a significant effect on the economic growth of a country. In fact, during periods of recession, the government can increase government investment expenditure which is an important component of aggregate demand. Consequently, there will be an increase in the aggregate demand which will stimulate the activity of the private sector and growth through a multiplier

effect. On the other hand, the classical and neo-classic economists believe that all measures to boost the economy through an increase in government spending is financed by the domestic debt and crowds out private sector investment. The fact that the governments borrow on the internal market increases interest rates and leads to a fall in consumption and private sector investment. This will have as a result, a reduction in real economic growth.

Some recent studies highlight the effect of public spending composition on economic growth. Among others, we have Olulu and al.^[62], Fouopi and al.^[34,35], Bayraktar and Moreno-Dodson^[14], Obad and Jamal^[60], Dikeogu and al.^[26], Iheanacho^[46], Moussavou^[56], Ashwani and Sheera^[7], Siefu and al.^[74], and Kouassi^[53]. Other research shows the indirect effect of public investment

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on economic growth using private investment: Foye [36] in Nigeria showed that public investment is motivation of private investment growth. Dreger and Reimers [30] have studied the crowd in effect of public investment on private investment in the euro area, and indicated that the lack of public investment may have restricted private investment and thus GDP growth in the euro area. Canh and Phong [21] use PVAR model combined with GMM to assess the impact of public investment on private investment and economic growth based on data from 22 economic industries over a 27-year period (1990-2016). The findings show that public investment affects private investment as well as has a spillover effect on GDP across most industries with varying effects cyclically and over time.

In Central Africa as shown in Figure 1, the real GDP growth rate of 1,1% in 2017 to 2,2% in 2018, below the average rate of Africa (3,5%). Despite this improvement in 2018, growth in Central African countries remains well below the 5% recorded between 2011 and 2013. Indeed, the rise in raw material exports and agricultural production has favored public investments in infrastructure, fueling growth. The good performance of Cameroon, the Central Africa Republic and the Democratic Republic of Congo in 2018 offset the recession in Equatorial Guinea. In Cameroon, the region’s second largest economy, real GDP growth was estimated at 3,8% in 2018, compared to 3,5% in 2017. The security and humanitarian crises and the current socio-political crisis in the North-West regions and southwest did not allow the government to sustain the pace of growth. The Central African Republic’s economy continued to recover after a slowdown due to the socio-political and institutional crisis. Real GDP growth, estimated at 4,3% in 2018 compared to 4% in 2017, was supported by the construction and public works sector, despite a difficult and volatile security situation. In the Democratic Republic of Congo, the region’s largest economy accounting for one-third of regional GDP, the growth rate reached 4% in 2018, compared to 3,7% in 2017 and 1,7% in 2016.

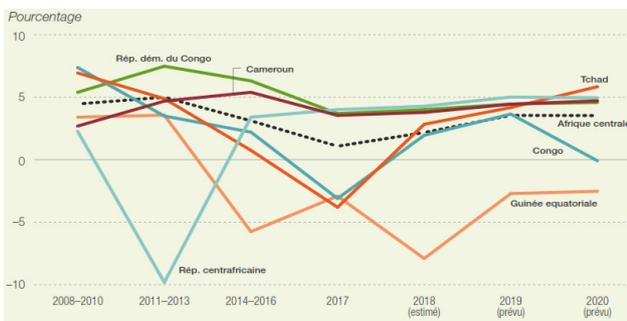


Figure 1. Real GDP growth in Central Africa, by country, 2008-2020

Source: African Development Bank statistics [3]

Figure 2 below shows that the share of public spending in nominal GDP in Central Africa also decreased from 14% in 2016 to 12% in 2018. This is due to the decline in public investment, often interrupted in full swing when, for example, the fall in oil prices imposes a reorientation of public spending. The 2018 rate is also below the average for all of Africa (14%). In fact, the share of public expenditure in GDP in 2018 varied from 7% in the Democratic Republic of Congo to 24% in Congo. Gross fixed capital formation accounted for 22% of GDP in 2018, compared with 31% in 2015, mainly due to lower mining investments. In addition, security constraints have dampened investment and hindered private entrepreneurship. In 2018, investments contributed 0,7 point to real GDP growth, up from 1,6 points in 2017.



Figure 2. Contributions to real GDP growth in Central Africa on the demand side, by country, 2014-2018

Source: African Development Bank statistics (2019) [3]

Public investment in infrastructures and services has spillover effects on the private sector and supports an inclusive growth. However, it can also be subjected to political interests likely to reduce its efficiency. Badly conceived, under-financed, delayed or badly executed public investment projects have little impact on real economic activity. This is a major challenge for many developing countries, particularly for Central African countries. Certain countries do not have a capacity of absorption to carry out their limited investment budget while others do not have a portfolio of “ready to launch” projects which can be used to stimulate the economy [67]. In this context, the question of the productivity of public capital is the topic of a lively debate¹. The crucial role that can be played by a well conceived and efficiently implemented infrastructural investments by contributing to reduce the lack of access to services and support the potential increase in the GDP is emphasized by Bom and Ligthart [17], and Calderón and al. [20]. What are the combined effects of government capital

1 See Sturm, Kuper and De Hann [75] and Romp and De Hann [70] for an in-depth analysis of the available literature.

expenditure and private sector investments on growth in the CEMAC zone? Within the framework of this study, we have as objective to analyze the combined effects of government capital expenditure and private sector investments on growth in the CEMAC zone while taking into account the nature of institutions. Helpman and Grossman^[43] highlights the incentive role of a favorable institutional environment in the research activities: The State that produces property rights supports the innovation through the introduction of mechanisms of re-appropriation of private returns. Moreover, the model retained by the World Bank^[77] for the estimation of the determinants of growth in developing countries is an effort to integrate quantitative and qualitative factors in order not to neglect the set of variables likely to influence economic growth.

From the limited theoretical and empirical literature on this subject, we can deduce that the effect of government capital expenditure on growth depends on the institutional specificities of the zone and its level of growth, which are positively determined by the level of government investment spending and private sector investments.

2. Empirical Studies of the Relationship between Government Capital Expenditure, Private Sector Investments and Economic Growth

The relationship between these three aggregates enables us to subdivide the studies in the field in two groups. The first group highlights the role of public investment in promoting private investment and economic growth and the second makes an effort to integrate the quality of institutions into the assessment of the impact of the public investment on growth.

Firstly, Yang^[78] undertook a comparative empirical study on the relationship between public and private investment on economic growth for the USA and Japan. Using the Generalized Method of Moments (GMM) for the Japanese economic data and the Ordinary Least Squares (OLS) for the USA data, both public and private investment were found to be important to the Japanese economic growth process. However, for the USA economy, private investment contributed more to economic growth than does public investment. Samake^[72] in the Benin economic examined the relationship between public and private investment in economic growth process. By using a VAR framework with spanning data from 1965 to 2005, the author reported that both public and private investment were important in the Beninian economic growth process. Evidence of public investment crowding in effect on private investment was also reported. Aubyn and Afon-

so^[8] assessed the macroeconomic returns of public and private investment using the VAR framework for a sample of European countries, adding Japan, Canada and the United States. Their empirical results showed that while both public and private investment positively affect output for the economies reviewed, the complementarity effect of public investment on private investment varied across countries.

Phetsavong and Ichihashi^[66] examined the impact of public and private investment on economic growth for the sample of 15 developing Asian economies. Using the panel data from 1984 to 2009, private domestic investment had the higher contribution to economic growth than public investment. In the Bangladesh economy, Hague^[41] evaluated the effect of public and private investment on economic growth. The empirical results implied that private investment was reported to be more significant than public investment in the economic growth process both in the short and in the long run.

Suhendra and Anwar^[76] studied the effect of private investment and public investment in Indonesia GDP from 1990-2011 using Ordinary Least Square (OLS). They found out that government investment, economic growth, credit available for private investment, and the exchange rate have a positive and significant impact on private investment while interest rates and inflation have a negative and significant impact on private investment. The higher the interest rate and inflation, the lower private investment. Nevertheless, Hussein and Benhin^[44] used Co-integration and Error Correction Models (ECM) to identify the effect of public and private investment in economic development process of Iraq based on a neoclassical growth framework covered the period from 1970 to 2010. They concluded that in the long run, private investment, public investment, growth in the labor force and growth in oil revenues affect real Gross Domestic Product (GDP) positively and statistically significant.

According to Imoisi, Abuo and Sogules^[47], they investigated the impact of domestic investment on economic growth in Nigeria from 1970 to 2013. Using co-integration and error correction mechanism techniques, their result indicate that private investment has positive but, insignificant impact on economic growth. The study shows that private domestic investment and government productive expenditure influenced economic growth positively, but was not significant for the period of study. Meanwhile, Getachew^[37] analyzed the impact of investment on economic growth in Ethiopia adopting the new neo-classical growth model of Cobb Douglas Production Function and Error Correction Model (ECM) estimation technic. He used macroeconomic data for Ethiopia from 1981 to

2011 period and concluded that there exist a short-run and long-run relationship between investment and economic growth in Ethiopia. Osman ^[63] applied the Auto-Regressive Distributed Lag (ARDL) model as an approach to co-integration on annual time series data from 1974-2012 to investigate the relationship between private sector credit and economic growth in Saudi Arabia. The study found that there is a long-run relationship between private sector credit and economic growth.

In the second category of studies, we find the work of Dabla-Norris and al. ^[25], FMI ^[33], Rajaram et al. ^[67]. According to Dabla-Norris et al. ^[25], to improve the impact of public investment on development, it is necessary to reinforce the institutions responsible for the management of public investments¹. In their study, they decompose the total index of management of public investments (PIMI - *Public Investment Management Index*) into sub-indices to evaluate the performance of certain institutional characteristics of 71 countries between 2007 and 2010 in four stages: identification, selection, execution and the evaluation of the projects. The scores obtained vary on a scale of 1 (weak performance) to 4 (high performance)

A more efficient public investment can stimulate growth through various channels ^[33]:(a) reduction of transaction costs for the private sector;(b) increases the marginal productivity of the private physical and human capital;(c) an increase in budgetary space thanks to low cost infrastructural services of better quality;(d) mobilization of resources for recurring expenditures which boosts growth.

Rajaram et al. ^[67] identify several institutional characteristics which countries should have for public investment to have a positive effect on growth. These include:(a) the setting-up of a transparent and responsible system to direct, examine, evaluate and select projects which will favor inclusive growth; and (b) the setting-up of mechanisms and procedures aimed at implementing, adjusting and evaluating projects in order to optimize the performance of public services.

The case studies above show that the empirical evidence on the relationship between public investment, private sector investment and growth in developing countries remains ambiguous. Moreover, few studies specifically analyze the simultaneous effects of government capital spending and private sector investments on economic growth by taking into account the political risk as the explanatory variable.

1 This requires a reinforcement of project evaluation policies taking into account uncertainty, the integration of the system of awarding public contracts in the implementation of projects, and the management of decisions on public private partnerships (PPP).

3. Methodology and Data

Our analysis is inspired by the model of Romer ^[69] which is reproduced by Barro and Sala-i-Martin ^[11]. From this last model, Borenztein, De Gregorio and Lee (1998) as well as Koffi ^[52] develop an endogenous growth model which is adapted to the characteristics of developing countries. This model supposes that the economy produces only one consumer good appears in the form of the following production function:

$$Y_t = AH_t^\alpha K_t^{1-\alpha} = AH_t^\alpha K_t^\beta \tag{1}$$

with $\beta = 1 - \alpha$

Where Y represents production, K physical capital, H human capital, and A the state of the external environment. Human capital is considered as given. Physical capital K is considered as an aggregate of various capital goods whose increase leads to the accumulation of capital. The state of the environment (A) considered here integrates various political and control variables which affect the level of productivity in the economy. These include the rate of inflation, financial development, taxation, quality of institutions, etc.

This model thus has the specificity of being able to integrate public capital as a component of physical capital and take into account institutional indicators as elements of the external environment.

Within the framework of this study, we suppose that physical capital K_t includes both government capital expenditure and private investment

$$\text{Log}(K_t) = \rho \text{Log}(IPUB_t) + q \text{Log}(IPRI_t)$$

The gross secondary school enrolment is used as proxy of human capital. The inciting factors (A_t) are composed of the rate of inflation, the degree of openness of the economy (OUV), the quality of institutions measured by the variable political risk and the foreign exchange rate (TCH). Human capital (KHU) is approximated by the gross rate of secondary enrolment. We can thus write:

$$Y_{it} = KHU_{it}^\alpha IPUB_{it}^{\beta_1} IPRI_{it}^{\beta_2} TCH_{it}^{\beta_3} OUV_{it}^{\beta_4} IDE_{it}^{\beta_5} RP_{it}^{\beta_6} INF_{it}^{\beta_7} \tag{2}$$

By log-linear form and after transformation, we obtain:

$$\begin{aligned} LY_{it} = & \delta_0 + \delta_1 LKHU_{it} + \delta_2 LIPUB_{it} + \delta_3 LIPRI_{it} + \delta_4 LTCH_{it} \\ & + \delta_5 LOUV_{it} + \delta_6 LIDE_{it} + \delta_7 LRP_{it} + \delta_8 LINF_{it} + \mu_{it} \end{aligned} \tag{3}$$

To simplify the expression, we write:

$$LPIBr_{it} = \delta_0 + \delta_1 LKHU_{it} + \delta_2 LIPUB_{it} + \delta_3 LIPRI_{it} + \delta_4 LTCH_{it} + \delta_5 LOUV_{it} + \delta_6 LIDE_{it} + \delta_7 LRP_{it} + \delta_8 LINF_{it} + \mu_{it} \quad (4)$$

In this specification, we have:

(1) The level of openness (**LOUV**) measured by the ratio of the sum of exports and imports relative to the GDP (Berthelemy and Varoudakis, 1998) which has two aspects: trade openness (freedom of movement of goods and services) and financial openness (absence of controls on the movement of capital).

(2) Inflation (**LINF**) measured by the consumer price index and enables the taking into account of the effect of the trend of prices on the purchasing power of residents and its effect on the size of the market.

(3) The real exchange rate (**LTCH**) shows the competitiveness of the domestic economy and is supposed to have a favorable effect on economic growth since it is likely to start-up the dynamics of internal supply, thus increasing the capacity of the economy to meet foreign demand.

(4) Credit to the economy (**LCE**): This is measured by net internal credit that is the sum of loans granted to the public non-financial sector and the private sector as well as other accounts. This definition is drawn from the International Financial Statistics of the IMF (1999).

(5) Human capital (**LKHU**) expresses the quality of labor is measured by the gross secondary enrolment rate. An increase in the active population having at least a secondary level of schooling is supposed to affect economic growth positively in line with the results obtained by the main theorists of endogenous growth [54,69].

(6) The private sector investment (**LIPRI**) is a growth factor for both neo-classical and the Keynesian theorists. It is measured by the formation of fixed assets by the private sector.

(7) Public investment (**LIPUB**) can be used as an instrument of revival of growth in periods of recession according to the Keynesians. It is approximated by the formation of fixed assets by the public sector.

(8) Foreign direct investment (**LFDI**) measures the attractiveness of the country to foreign investors. If **FDI** results in the raising of capital in the market of the host country, then we witness a redistribution of capital from labor intensive industries towards capital-intensive industries, thus creating a job loss and consequently a drop in export prices and a deterioration of the terms of trade of the host country [71].

(9) The index of political risk (**LRP**) is an institutional indicator which varies from 0 to 100 and is composed of 12 factors, namely: government stability, socio-economic

conditions, investment profile, internal and external conflicts, corruption, the implication of soldiers in politics, religious tensions, the respect of laws and regulations, ethnic tensions, the control of democracy and the quality of bureaucracy. This indicator is built going from a weighting of scores evolving from 0 to 12 points according to the risk factors considered. The arithmetic total of the scores on the various factors constitutes the perception of the level or index of political risk of the country.

From the PMG (*Pool Mean Group*) formulation, it is possible to jointly consider the model in the short and long-run. Moreover, there will be no difficulty to take into account stationary variables, I (0), and I (1) or cointegrated variables simultaneously [65]. It should be emphasized that the values of p and q_i which indicate the number of lags to be used in the model are determined by the Schwarz Information Criterion (SIC).

By taking into account the spatial (i) and time dimension (t), we obtain:

$$\Delta LPIBr_{it} = \theta_0 + \theta_1 \Delta LKHU_{i,t-1} + \theta_2 \Delta LIPUB_{i,t-1} + \theta_3 \Delta LIPRI_{i,t-1} + \theta_4 \Delta LTCH_{i,t-1} + \theta_5 \Delta LOUV_{i,t-1} + \theta_6 \Delta LIDE_{i,t-1} + \theta_7 \Delta LRP_{i,t-1} + \theta_8 \Delta LINF_{i,t-1} + \delta ECT_{i,t-1} + \sum_{j=1}^p \theta_{9+j} \Delta LKHU_{i,t-j} + \sum_{j=1}^q \theta_{10+j} \Delta LIPUB_{i,t-j} + \sum_{j=1}^q \theta_{11+j} \Delta LIPRI_{i,t-j} + \sum_{j=1}^q \theta_{12+j} \Delta LTCH_{i,t-j} + \sum_{j=1}^q \theta_{13+j} \Delta LOUV_{i,t-j} + \sum_{j=1}^q \theta_{14+j} \Delta LIDE_{i,t-j} + \sum_{j=1}^q \theta_{15+j} \Delta LRP_{i,t-j} + \sum_{j=1}^q \theta_{16+j} \Delta LINF_{i,t-j} + \mu_{it} \dots \dots \dots (5)$$

In this equation θ_1 to θ_8 represent the short run dynamics while θ_9 to θ_{16} represent the long run dynamics. θ_{16} is the coefficient of error correction between the short and long run. The error term $\mu_{it} = \varepsilon_i + \pi_t + \varphi_{it}$ where ε_i denotes a constant term during the period and depending only on individual *i*, π_t is a term depending only on the period *t*, φ_{it} is a cross random term. The data used in this study is from secondary sources and comes primarily from *World Development Indicator (WDI, 2017)*. However, the data on human capital (KHU) is from the African Development Bank [2] and the variable “political risk” is calculated using data drawn from *International Country Risk Guide* [45]. The “L” placed before the variables represent natural logarithm.

4. Estimation Results and Interpretation

4.1 Descriptive Analysis of the Variables

Before carrying out the PMG estimation, an analysis of the descriptive statistics of the variables is necessary. As shown in table 2 below, there are no significant differences between the mean and median of the various observations. This supposes that the distributions are approximately normal. This result is confirmed by the fact that the Jacque-Bera statistics are significantly high for the majority at the 5% level.

It is also noticed there that only the foreign direct investments have a mean relatively higher than that of the

Table 2. Descriptive statistics of the variables

	Mean	Med.	Max	Min	Std.Dev	Skew.	Kurt.	J.B	Prob.	Sum	Sq.Dev
LPIBr	9,03	7,85	27,4	2,31	3,95	1,51	7,94	23,4	0,00	1734,0	2981,7
LIPUB	5,59	4,29	25,5	1,12	5,21	2,93	10,2	66,5	0,00	1074,3	5185,0
LIDE	17,2	17,3	21,7	9,90	2,21	-0,68	3,56	17,5	0,00	3294,8	934,03
LINF	4,17	4,17	4,86	2,95	0,39	-0,38	2,63	5,69	0,05	801,5	295,45
LOUV	2,75	2,02	17,5	0,2	2,54	3,23	18,6	29,8	0,00	528,26	1236,5
LIPRI	6,75	5,61	27,76	1,028	6,04	2,44	8,05	35,7	0,00	1297,73	6969,86
LRP	4,13	4,23	5,5	1,61	0,86	-0,62	2,79	12,7	0,00	792,72	140,53
LKHU	3,009	3,14	4,28	0,64	0,735	-0,73	3,65	20,53	0,00	577,78	103,38
LTCH	5,30	5,79	6,60	1,47	1,598	-1,66	4,10	97,68	0,00	1018,03	487,85

Note: Med.:Median; Max:maximum; Min:minimum

Source: Authors using “Eviews9”

Table 3. Correlation matrix

	LPIBr	LIPRI	LIPUB	LINFL	LTCH	LIDE	LOUV	LKHU	LRP
LPIBr	1.0000								
LIPRI	0.5914	1.0000							
LIPUB	0.5601	0.8868	1.0000						
LINFL	-0.066	-0.2513	-0.158	1.0000					
LTCH	-0.465	-0.1502	-0.053	0.2124	1.0000				
LIDE	0.1047	-0.0391	-0.141	0.4525	-0.064	1.0000			
LOUV	-0.275	-0.0348	-0.059	-0.103	0.0018	-0.001	1.0000		
LKHU	-0.068	-0.1095	-0.293	0.2324	-0.086	0.5694	0.0055	1.0000	
LRP	-0.276	0.0895	-0.038	0.1724	-0.217	0.4928	-0.081	0.6469	1.0000

Source: Authors using “Eviews9”

other explanatory variables of the model, followed by the private sector investments and the public investment expenditure. This explains why these variables are positively related to the growth rate. The matrix of correlation of the variables shows that the variables public capital expenditure, private sector investments, and political risk are negatively correlated with real growth as shown in table 3 below. Moreover, the degree of correlation between the variables is not very high, which dismisses any hypothesis of multi-collinearity.

4.2 Specification Test

This consists in testing the hypothesis according to which the panel is homogeneous. From the results below, we can reject the hypothesis of homogeneity since the probability of the Fisher statistic is lower than 5% ($0.0000 < 0.05$). Thus the panel is heterogeneous.

Test of homogeneity

H0: homogeneous model

H1: heterogeneous model

If $P\text{-value} < 0,05$, then the null hypothesis is rejected

Table 4. Summary of specification test

Fisher	P-value
79.257	0.000000

Source: Authors using “Eviews9”

4.3 Stationarity Tests

From table 4, we can see that two orders of stationarity are retained. While certain variables like *LIPUB*, *LIPRI*, *LOUV*, *LPIB*, *LTCH* are I (0), others like *LIDE*, *LINF*, *LRP*, *LKHU* are I (1). This brings us to perform the test of cointegration of Pedroni (2004) and Kao^[48] to detect the existence of a possible long run relationship between these variables.

4.4 Cointegration Test Based on the VECM

The test of Pedroni shows that six statistical variables out of eleven are significant at the 5% level. This confirms the

Table 5. Tests of stationarity of variables

Variables	In levels		Decision I (0)	In first difference		Decision I (1)
	IPS	LLC		IPS	LLC	
LIPUB	0.0000	0.0000	Yes ***	0.0000	0.0000	Yes ***
LIDE	0.1211	0.0141	No	0.0000	0.0000	Yes ***
LINF	0.9680	0.2590	No	0.0000	0.0000	Yes ***
LIPRI	0.0000	0.0000	Yes ***	0.0000	0.0000	Yes ***
LOUV	0.0276	0.0490	Yes **	0.0000	0.0000	Yes ***
LPIB	0.0000	0.0000	Yes ***	0.0000	0.0000	Yes ***
LRP	0.3841	0.3751	No	0.0000	0.0000	Yes ***
LKHU	0.2635	0.0222	No	0.0000	0.0000	Yes ***
LTCH	0.0124	0.0114	Yes **	0.0000	0.0049	Yes ***

Note: ***, **, * represent significance at the 1%,5% and 10% levels

Source: Authors using “Eviews9”

Table 5. Test of cointegration of Pedroni (2004) and Kao [48] on the combined effects of the government capital expenditure and private sector investments on growth

LPIB LIPUB LIPRI LTCH LOUV LIDE LRP LCH LINFL				P-value
Test of Pedroni	Within Dimension	Panel v-statistic	Statistic (S)	0.7464
			Weighted (S)	0.8555
		Panel rho-statistic	Statistic (S)	0.0151
			Weighted (S)	0.0782
		Panel PPP-statistic	Statistic (S)	0.9037
			Weighted (S)	0.9072
	Panel ADF-statistic	Statistic (S)	0.0572	
		Weighted (S)	0.0791	
	Between dimension	Group rho-statistic		0.9801
		Group PPP-statistic		0.0309
Group ADF-statistic		0.0357		
Test of Kao		ADF-statistic		0.0000
P-value of the IPS and LLC tests at levels on residuals				0.0000

Source: Authors using “Eviews9”

existence of a cointegration relationship. This result is also confirmed by the test of Kao. Its statistics are lower than the 1%critical value. The results are summarized in table 5 below and show that we can proceed to the estimation.

Before carrying out the PMG (Pool Mean Group) estimation itself, we should first have an idea of the causal relationship which could exist between real GDP, public investment and private investment.

4.5 Causality Test Based on the VECM

Using the approach of Odhiambo and al. [61] and Akpan and Akpan. [4], we adopt the vector error correction model (VECM) of each equation 6 to 8 below to test the causal relationship between public investments, private sector investments and growth. Unlike the conventional approach

to causality of Granger, this method, besides integrating the error correction term which indicates if there is cointegration also makes it possible to simultaneously test short and long run causality. Having undertaken this analysis at the level of each country, we use the following formulation of the VECM:

$$\Delta PIB_t = \delta_0 + \sum_{i=1}^a \delta_{1i} \Delta PIB_{t-i} + \sum_{i=1}^b \delta_{2i} \Delta IPRI_{t-i} + \sum_{i=1}^c \delta_{3i} \Delta MPUB_{t-i} + \rho ECT_{t-1} + \tau_t \dots (6)$$

$$\Delta IPRI_t = \lambda_0 + \sum_{i=1}^a \lambda_{1i} \Delta IPRI_{t-i} + \sum_{i=1}^b \lambda_{2i} \Delta PIB_{t-i} + \sum_{i=1}^c \lambda_{3i} \Delta MPUB_{t-i} + \phi ECT_{t-1} + \kappa_t \dots (7)$$

$$\Delta MPUB_t = \phi_0 + \sum_{i=1}^a \phi_{1i} \Delta MPUB_{t-i} + \sum_{i=1}^b \phi_{2i} \Delta IPRI_{t-i} + \sum_{i=1}^c \phi_{3i} \Delta PIB_{t-i} + \mu ECT_{t-1} + \pi_t \dots (8)$$

Where ECT is error correction term, all the other variables areas defined before.

Long run causality is based on the significance of the coefficient of the error correction term. In this case, the di-

4.5.1 Determination of Causality going from the Short-run VECM

Table 6. Test of short-run Granger causality on the basis of the VECM (Cameroon-Congo)

Dependent variables		independent variables or sources of causality						ECT (- 1)
		Cameroon			Congo			
		$\Delta(LPIBr)$	$\Delta(LIPRI)$	$\Delta(LIPUB)$	$\Delta(LPIBr)$	$\Delta(LIPRI)$	$\Delta(LIPUB)$	
Cameroon	$\Delta(LPIBr)$	-	0,2665 (0,8661)	0,7304 *** (3,4172)	-	-	-	-1,1466 *** (- 5,969)
	$\Delta(LIPRI)$	0,0574 (1,2278)	-	0,1530* (1,8865)	-	-	-	-0,0665 (- 0,8910)
	$\Delta(LIPUB)$	0,4878 *** (3,1313)	0,1445 (0,5596)	-	-	-	-	0,2994 (1,3175)
Congo	$\Delta(LPIBr)$	-	-	-	-	-0,0319 (- 0,350)	0,1275 (0,6684)	-1,1834 *** (- 9,0908)
	$\Delta(LIPRI)$	-	-	-	0,12316 (0,5700)	-	-0,4777* (- 1,9100)	-0,4028 *** (- 3,0278)
	$\Delta(LIPUB)$	-	-	-	0,0115 (0,0665)	-0,0556 (- 0,809)	-	-0,3222 (- 1,3290)

Note: *, **, *** respectively represent significance at the 10%,5% and 1% levels and the values in brackets are the student t-statistics.

Source: Authors using “Eviews 9”

Table 7. Short-run Granger causality test on the basis of the VECM (Equatorial Guinea, Gabon)

Dependent variables		independent variables or sources of causality						ECT (- 1)
		Gabon			Equatorial Guinea			
		$\Delta(LPIBr)$	$\Delta(LIPRI)$	$\Delta(LIPUB)$	$\Delta(LPIBr)$	$\Delta(LIPRI)$	$\Delta(LIPUB)$	
Gabon	$\Delta(LPIBr)$	-	-0,4708 ** (- 2,5250)	0,0095 (0,0238)	-	-	-	-1,004 *** (- 5,9241)
	$\Delta(LIPRI)$	-0,1933 (- 1,548)	-	0,1673 (0,5927)	-	-	-	-0,2895 (- 1,5968)
	$\Delta(LIPUB)$	0,0180 (0,2209)	0,0931 (0,9083)	-	-	-	-	-0,7719 ** (- 2,6989)
Equatorial Guinea	$\Delta(LPIBr)$	-	-	-	-	0,324 ** (2,1145)	-0,0888 (- 0,3357)	-1,261 *** (- 7,0752)
	$\Delta(LIPRI)$	-	-	-	-0,0027 (- 0,0280)	-	-0,0786 (- 0,7492)	-0,2618* (- 1,8308)
	$\Delta(LIPUB)$	-	-	-	-0,0027 (- 0,0280)	-0,0786 (- 0,749)	-	-0,2618* (- 1,8308)

Note: *, **, *** respectively represent significance at the 10%,5% and 1% levels and the values between brackets are the student t-statistics.

Source: Authors using “Eviews 9”

Table 8. Short-run Granger causality test based on the VECM (CAR-TCHAD)

Dependent variables		Independent variables or sources of causality						ECT (- 1)
		CAR			Chad			
		$\Delta(LPIBr)$	$\Delta(LIPRI)$	$\Delta(LIPUB)$	$\Delta(LPIBr)$	$\Delta(LIPRI)$	$\Delta(LIPUB)$	
CAR	$\Delta(LPIBr)$	-	-0,6581 (- 0,9010)	1,2589 ** (2,2804)	-	-	-	-2,116 *** (- 5,0345)
	$\Delta(LIPRI)$	-0,0276 (- 0,739)	-	0,1321 (0,9889)	-	-	-	-0,3127 ** (- 2,3779)
	$\Delta(LIPUB)$	0,1213* (1,8868)	0,1998 (0,7848)	-	-	-	-	-0,2516 (- 1,2523)
Chad	$\Delta(LPIBr)$	-	-	-	-	-0,1166 (- 0,519)	0,1427 (0,2930)	-1,161 *** (- 6,1892)
	$\Delta(LIPRI)$	-	-	-	0,2162 (1,5925)	-	-0,1021 (- 0,2746)	-0,0130 (- 0,0987)
	$\Delta(LIPUB)$	-	-	-	0,0956 (1,4376)	-0,0196 (- 0,270)	-	-1,262 *** (- 4,7828)

Note: *, **, *** respectively represent significance at the 10%,5% and 1% levels and the values in brackets are the student t-statistics.

Source: Authors using “Eviews 9”

4.5.2 Causality test using the long-run VECM

Table 9. Long run Granger causality test based on the *VECM* (Cameroon-Congo)

Dependent variables		independent variables or sources of causality					
		Cameroon			Congo		
		<i>LPIBr</i>	<i>LIPRI</i>	<i>LIPUB</i>	<i>LPIBr</i>	<i>LIPRI</i>	<i>LIPUB</i>
Cameroon	<i>LPIBr</i>	-	0,2199* (1,7899)	-0,5916 ** (- 2,7166)	-		-
Congo	<i>LPIBr</i>	-	-		-	-0,211** (- 2,521)	-0,0389 (- 0,2402)
	<i>LIPRI</i>	-	-		0,3057 (0,5496)		-1,1858* (- 1,9076)

Note: *, **, *** respectively represent the significance at the 10%,5% and 1% levels and the values in brackets are the student t-statistics.

Source: Authors using“Eviews 9”

Table 10. Long run Granger causality test based on the *VECM* (Equatorial Guinea-Gabon)

Dependent variables		independent variables or sources of causality					
		Gabon			Equatorial Guinea		
		<i>LPIBr</i>	<i>LIPRI</i>	<i>LIPUB</i>	<i>LPIBr</i>	<i>LIPRI</i>	<i>LIPUB</i>
Gabon	<i>LPIBr</i>	-	-0,469** (- 2,2653)	0,7224 (1,5271)	-	-	-
	<i>LIPUB</i>	0,1988 (1,2772)	0,1206 (1,0486)	-	-	-	-
Equatorial Guinea	<i>LPIBr</i>				-	0,646 *** (5,7702)	-0,0704 (- 0,3377)
	<i>LIPRI</i>				-0,0104 (- 0,0281)	-	-0,3571 (- 1,0416)
	<i>LIPUB</i>				-0,0105 (- 0,0281)	-0,3571 (- 1,0416)	-

Note: *, **, *** respectively represent significance at the 10%,5% and 1% levels and the values in brackets are the student t-statistics.

Source: Authors using “Eviews 9”

Table 11. Long run Granger causality test based on the *VECM*(CAR-Chad)

Dependent variables		independent variables or sources of causality					
		RCA			Chad		
		<i>LPIBr</i>	<i>LIPRI</i>	<i>LIPUB</i>	<i>LPIBr</i>	<i>LIPRI</i>	<i>LIPUB</i>
RCA	<i>LPIBr</i>	-	-1,102 *** (- 3,3379)	-0,1523 (- 0,5502)			
	<i>LIPRI</i>	-0,2520 (- 1,298)	-	-0,9035* (- 1,8985)			
Chad	<i>LPIBr</i>				-	0,2694 ** (2,2559)	0,1229 (0,2898)
	<i>LIPUB</i>				0,1346 (1,3048)	0,0022 (0,0532)	-

Note: *, **, *** respectively represent significance at the 10%; 5% and 1% levels and the values in brackets are the student t- statistics.

Source: Authors using “Eviews 9”

rection of causality can be given by the F statistics and the coefficient of the error correction term. If this coefficient is negative and significant, the hypothesis of cointegration is accepted. The student t-statistic of the explanatory variable makes it possible to analyze the effect of causality on

the dependent variable in the short run ^[57,61]. There exists a bi-directional causality between the real rate of economic growth, private sector investment and public investment if the coefficients δ_{2i} , λ_{2i} and ϕ_{3i} of equations (6), (7) and (8) are statistically significant, In case only one is (δ_{2i} , λ_{2i} or

ϕ_{3i}) is, this indicates a an one-way causality.

In the short run, there exists a positive, significant and bidirectional causality relationship between public investment and the growth rate of real GDP in Cameroon and the CAR. Moreover, public investment significantly stimulates private sector investment in Cameroon. However, its effect is rather negative on the activity of the Congolese private sector. The direction of causality is one-way going from private sector investment to the real rate of economic growth in Gabon and in Equatorial Guinea. However, its effect is negative and significant in Equatorial Guinea. No causality relationship is detected in Chad.

In the long run, private sector investment has a positive significant effect on the real GDP in Cameroon, Equatorial Guinea and Chad. In addition, its effect deteriorates economic activity in Congo, Gabon and the CAR. In the CAR, this result can be explained by the negative effect of public investment on private sector investment. However, we observe that in Cameroon, public investment deteriorates long-run economic growth. This result is contrary to those obtained by Chimobi (2009), Aregbeyen^[5], Hjerpe and al. (2007).

4.6 PMG Estimation of the Combined Effects of Public Investment Spending and Private Sector Investment on Economic Growth

Here, we seek to simultaneously integrate government capital expenditure and private sector investments in the analysis in order to evaluate the simultaneous effects of the latter on growth. It is thus necessary to use a method which can make it possible to analyze the behavior of exogenous variables on the short run dynamics and long run equilibrium. This justifies our use of a panel ARDL model. The choice of this model rests on the fact that in addition to the critical aspects of endogeneity and heterogeneity which enables us to address, it uses the conditions of orthogonality which enable us to address the problems of autocorrelation and makes the estimates more efficient in the presence of heteroscedasticity. The choice between the *Pool Mean Group* and the *Mean Group* estimation results is done using the Hausman test.

The Hausman test tests the null hypothesis of absence of systematic differences between the coefficients in the long run from one country to another. This hypothesis is accepted at the threshold of 5%, if the p-value of the test is higher than 0,05. We find in line, table 6 that this is the case (p-value= 0,738). Thus, the *PMG* estimate produces better results relative to the *MG*. The results obtained from the approach by the *PMG* are presented in table 12 below.

Table12. PMG estimates of the joint effects of public investment spending and private sector investment on growth

Independent variables	Dependent variable Δ LPIB
	Coefficients
Short run dynamics	
Δ LIPRI	2,8887 ** (1,98)
Δ LIPUB	-3,4100 ** (- 2,21)
Δ LINFL	2,7658 (0,88)
Δ LTCH	7,5267 (0,69)
Δ LIDE	-0,6887 (- 1,48)
Δ LOUV	2,1024 (0,45)
Δ LKHU	-4,3971 (- 1,35)
Δ LRP	-1,1664 (- 0,28)
Constant	-3,0529 *** (- 2,77)
ECT	-0,7567 (- 7,94)
Long-run equilibrium	
LIPRI	-0,7236 *** (- 6,72)
LIPUB	0,8868 *** (7,19)
LINFL	0,2805 (0,48)
LTCH	1,4600 ** (2,06)
LIDE	-0,1243 (- 1,21)
LOUV	-0,0485 (- 0,09)
LRP	-0,2303 ** (- 2,51)
LKHU	1,7094 *** (4,09)
Hausman Test(x2)	4,35

Note: ***, **, * indicate significance at 1%,5%, and 10% respectively; the values in brackets are the z-statistics or the normal distribution.

Source: Authors, using “Eviews 9”

Table 12 above shows that in the short run public capital expenditure has a negative effect on the rate of real economic growth which significant at the 5% level. Also, private sector investments have a positive significant effect at the same level in the short run.

In fact, this result that seems paradoxical to theory is explained by an unstable social and macroeconomic environment represented by a negative coefficient of the variable political risk. This leads to a reallocation of public expenditure to support war efforts. It is thus understandable that public investments are clearly reduced and

this leads to a fall in economic growth. Moreover, faced with the risks of over-indebtedness and a deterioration of budgetary viability, many countries of the CEMAC zone have engaged in a policy of budgetary cleansing through a gradual limitation of the volume of expenditure and an increase in public revenue. But, given the need for investments in infrastructures and other pro-poor expenditures and the fall in income from the raw materials, budgetary cleansing appears difficult for certain countries. This is particularly the case of Cameroon and Congo that saw their position being degraded because of an expansionist budgetary orientation.

These results are in line with those of Kahn and Kumar (1997) who show that the effects of private sector investment and public investment on growth are significantly different in periods of instability since private sector investment is in a consistent manner more productive than public investment. Good economic institutions thus remain one of the most convincing means likely to stimulate investment by improving returns thanks to the reduction of transaction costs. These results are in line with those of Avom and Song^[9], Baye^[13], Obad and Jamal^[60] who, besides rekindling the debate on the appropriateness of government expenditure recognize the positive and essential role of public investment expenditure on the GDP.

Contrary to the economic theory which supports the long run complementarity between public and private investments, we obtain an eviction of private sector investments by long run public investments. Public investments positively and significantly affect growth at the 1% level. However, private sector investments have an opposite effect. This finding is justified by an increase in budget deficits which undermine the economies of the sub-region and pushes the State to resort to banks in order to continue to finance public investments. This is likely to discourage the private sector. Also, the launching of structuring projects by various States reveals the need for tax adjustments and discourages entrepreneurial initiative. These results are in line with those of Ramirez^[68] and Aschauer^[6].

On a purely illustrative basis, we can talk of the implementation of structuring projects in Cameroon and Gabon and of a national plan of economic and social development (PNDES) aimed at making of Equatorial Guinea an emerging economy by 2020. Knight, Loayza and Villanueva^[51], and Nelson and Singh^[58] highlight that the level of public investment in infrastructures has a significant long run effect on growth.

A cross-sectional study on a sample of 119 countries carried out by Easterly and Rebelo^[31] shows that public investment in transport and communications is positively related to long run economic growth.

Still in long run, the exchange rate positively and significantly affects growth at the 5% level. The elasticity of the exchange rate is higher than one. Thus, a unit point increase in the foreign exchange rate leads to an increase in the growth rate of 1,46 units. The countries of the CEMAC zone after a mitigated success in programs of economic revival undertaken after the devaluation of 1994, attempted to diversify their economies in view of stimulating exports at the detriment of imports. The majority of them are dependent on incomes from oil and suffer from exogenous shocks that affect this sector. In the debate on the orientation and growth in foreign trade, several researchers try to determine if the misalignment of the real exchange rate exerts a shock on private sector investment and thus, economic growth. Various cross-sectional studies that use different exchange rate and distribution models find a negative impact of the distortion of the foreign exchange rate on economic growth^[28,38,73].

Moreover, the instability of the euro area exerts a double effect on the economies of the countries of the zone. On the one hand, the crisis of the euro area leads to a reduction in the exports of CEMAC countries towards Europe; and on the other, a decline in the value of the Euro promotes the exports of CEMAC countries towards other markets. Beyond these possibilities, the question of the monetary sovereignty of the CEMAC countries remains a major stake given the important implications for the diversification of exports and the development of companies. In the event of an intensification of the global crisis, there exists a risk related to confidence in the system of external payments. This risk is partially reduced by the guarantee of convertibility given by France to the CFA Franc. In the event of a sudden loss of confidence towards the CFA franc or its banking system, a strong reaction of the BEAC with emergency measures will be necessary to avoid bank runs.

The elasticity of the coefficient of foreign direct investments (IDE) is negative in the short and long run. Specifically, the greater the volume of inflow of the foreign assets, the more growth evolves in an opposite direction due to the repatriation of the income from these investments. Thus, a unit increase in IDE leads to a fall of 0,68 units and 0,12 units in economic growth in the short and long run respectively, although these results are not significant. These findings are contrary to those obtained by Acemoglu and Zilibotti^[1]. Other authors rather find a close relationship between the uncertainty of credit and the negative reaction of foreign direct investment on economic growth in developing countries^[40,49].

The rate of inflation is positively related to the growth

rate but this relationship is not significant¹ in the short and long run. Thus, price stability is not favourable to the development of economic activity but it simply enables the economy to survive.

Following this reasoning, Bikai and Kamgna^[16] study the “effects of thresholds of inflation on economic activity in the CEMAC zone: an analysis using a panel data model with non-dynamic thresholds”, and using the iterative procedure of determination of endogenous thresholds developed by Hansen^[42] identify an optimal threshold of inflation of 6% in the CEMAC zone, thus revealing a non-linear relationship between inflation and growth. In other words, below this threshold, inflation has a positive impact on the economic activity and any monetary policy that increases inflation is likely to improve economic activity. Beyond this threshold, it is the reverse that occurs.

Moreover, in the long run, the positive coefficient which is statistically significant at the 1% level of human capital shows that a unit increase in gross secondary school enrolment leads to a 1,71 units increase in the growth rate. This result is similar to those of Barro and Sala-i-Martin^[11], Romer^[69], and Barro^[10].

5. Conclusion and Recommendations

This study seeks to examine the simultaneous effects of public capital expenditure and private sector investment on economic growth. Using a panel covering the 1982-2017 period, we apply the Pedroni^[64] and Kao^[48] cointegration test which enables us to confirm the existence of a long run relationship between the variables. From our *Pool Mean Group* estimates, we find that the taking into account of the variable political risk in the estimation reveals us the real effects of public and private investments on economic growth in the CEMAC region. We find that public investment has a negative and significant impact on growth while private sector investment improves the real output in the short run. In long-run however, the effects are reversed: the contribution of public investment is positive and significant and that of the private sector investment is negative and significant. It is thus urgent for the countries of the CEMAC zone to reinforce the management systems of public investment in view of lifting the obstacles to the development of the private sector and ensure a sustainable economic growth. Governments can therefore call upon the private sector for the supply of necessary goods and services, for example, the construction of schools or hospitals, dams, and the extension of the highway network^[27]. We however agree that when they

are weak, political institutions are likely to damage the efficiency of public investments, thus blocking its effects on growth^[23].

References

- [1] Acemoglu D. and Zilibotti F. Was Prometheus Unbound by chance? Risk, diversification and growth, *Journal of Political Economy*, 1997, 4(105): 709-751. <https://dx.doi.org/10.1086/262091>
- [2] African Development Bank. AfDB Rapport annuel, 2017. <http://www.afdb.org/statistics>.
- [3] African Development Bank. Perspectives économiques en Afrique centrale, 2019. <https://www.afdb.org>.
- [4] Akpan G. E. & Akpan U. F. Electricity Consumption, Carbon Emissions and Economic Growth in Nigeria. *International Journal of Energy Economics and Policy*, 2012, 4(2): 292-306.
- [5] Aregbeyen O. Cointegration, and Wagner's Law: A test for Nigeria. *Economic and Financial Review*, 2008, 44(2): 1-17.
- [6] Aschauer D. Does public capital crowd out private capital? *Journal of Monetary Economics*, 1988, 24: 171-188.
- [7] Ashwani B. and Sheera V. P. Public spending and economic growth for Indian states. *International Journal of Public Sector Performance Management*, 2017, 3: 250-265.
- [8] Aubyn M.S. and Afonso A. Macroeconomic Rates of Return of Public and Private Investment: Crowding-in and Crowding-out Effects. Department of Economics, Technical University of Lisbon, Working Paper Number WP/06/2008/DE/UECE. HYPERLINK", 2008. <https://www.ecb.europa.eu/pub/pdf/scpwps/ecbw-p864?288e44ac756b0d892c32a6d3bd05f83>
- [9] Avom D. and Song S. Institutions économiques, capital humain et croissance économique en Afrique au Sud du Sahara. *Journal of Economic Literature*, 2010, 6(3): 21-26.
- [10] Banque Mondiale. Qualité de la croissance. Bruxelles, De Boeck Université, 2002: 282 p.
- [11] Barro R. J. and Sala-i-Martin X. Technological diffusion, convergence and growth, NBER Working Paper, 1995, 5151: 1-45. Doi: 10.3386/w5151
- [12] Barro, R., J.. Economic Growth in a Cross Section of Countries. *Quarterly Journal of Economics*, 1991, 2(106): 407-443. [http://links.jstor.org/sici?sici=0033-5533%](http://links.jstor.org/sici?sici=0033-5533%201006%3C407%3E%3C%3E%3E)

¹ According to Mba et al.^[55], this result can be different at the level of the individual countries.

- 28199105%29106%3A2%3C407%3AEGI-ACS%3E2.0.CO%3B2-C
- [13] Baye M. F. Growth and Redistribution Effects of Poverty Changes in Cameroon: A Shapley Decomposition Analysis. Forum Paper, Development Policy Research Unit, 2004.
- [14] Bayraktar N. and Moreno-Dodson B. How can public spending help you? An empirical analysis for developing countries. Bulletin of Economic Research, 2015, 67: 30-64.
- [15] Berthélemy J-C and Varoudakis A.. Développement financier, réformes financières et croissance: une approche en données de panel, Revue Economique, 1998, 49(1): 195-206.
- [16] Bikai J. L. and Kamgna Y. S.. Effets de seuils de l'inflation sur l'activité économique en CEMAC. Journées Internationales du Risque, Niort 25 et 26 Mai, 2011.
- [17] Bom, P., and Ligthart E. J.. How Productive Is Public Capital? A Meta-Regression Analysis, Working Paper, 2008, 2206: 1-37.
- [18] Borensztein E. J., DeGregorio J. and Lee J. W.. How does foreign direct investment affect economic growth. Journal of International Economics, 1998, 45L 115-135.
[https://dx.doi.org/10.1016/S0022-1996\(97\)00033-0](https://dx.doi.org/10.1016/S0022-1996(97)00033-0)
- [19] Brewer T.. Foreign direct investment in developing countries: patterns, policies and prospects", PRE working paper, 1991, 34.
- [20] Calderon C., Moral-Benito E. and Servén L.. Is Infrastructure Capital Productive? A Dynamic Heterogeneous Approach. Journal of Applied Econometrics, 2015, 2(30): 98-177.
<https://doi.org/10.1002/jae.2373>
- [21] Canh T. N. and Phong A. N.. Effect of public investment on private investment and economic growth: Evidence from Vietnam by economic industries, Applied Economics and Finance, 2018: 2(5). ISSN 2332-7308.
<https://doi.org/10.11114/aef.v5i2.2998>.
- [22] Cantu C.. Defining infrastructure and its effects on economic growth, Equilibrio Economico, Revista de Economía, Política y Sociedad, 2017, 13(1): 77-104.
- [23] Cavallo A. E. and Daude C.. Public investment in developing countries: A blessing or a curse? Inter-American Development Bank Working Paper, 2011, 547: 42.
- [24] Chamois P. O.. Government Expenditure and National income: A Causality Test for Nigeria, European Journal of Economic and Political Studies, 2009, 2(2): 1-11.
- [25] Dabla-Norris, E., Brumby J., Kyobe A., Mills, C. and Papageorgiou. Investing in public Investment: An Index of Public Investment Efficiency, IMF Working Paper, 2011: 1-43.
- [26] Dikeogu C. C., Ohale L., Otto G.. Public expenditure and economic growth in Nigeria. International Journal of Advanced Academic Research, 2016.
- [27] Djankov S., Saliola F. and Islam A.. Is Public Procurement a Rich Country's Policy? Banque Mondiale, Governance for Development Blog, 2016.
<https://blogs.worldbank.org/governance/public-procurement-rich-country-s-policy>
- [28] Dollar D. and Kraay A.. Growth is good for the poor. Journal of Economic Growth, 2002, 3(7): 195-225.
- [29] Dreger C. and Reimers H. E.. On the relationship between public and private investment in the euro area. Discussion Papers, DIW Berlin, 2014.
<https://doi.org/10.2139/ssm.2403885>.
- [30] Dreger C. and Reimers H. E.. Does public investment stimulate private investment? Evidence for the euro area. Economic Modelling, 2016, 58: 154-158.
<https://doi.org/10.1016/j.econmod.2016.05.028>.
- [31] Easterly W. and Rebelo S.. Fiscal policy and economic growth: an empirical investigation. Journal of Monetary Economics, 1993, 32: 417-458.
- [32] FMI. Enhanced structural adjustment facility economic and financial, Policy Framework Paper, 1999.
- [33] FMI. Making Public Investment More Efficient. Washington, DC: FMI, 2015.
- [34] Fouopi D., Ella P., Ndoumba J. M., Ella N. P. and Ngah B. E.. Dépenses publiques et croissance économique dans les pays de la CEMAC, Premier Colloque de l'association d'économie théorique et appliquée, 2016.
[https://www.ecoasso.org/articles/Fouopi et al..pdf](https://www.ecoasso.org/articles/Fouopi%20et%20al..pdf)
- [35] Fouopi, D., Ella, P., Ndoumba J. M., Ella N. P. et Ngah B. E.. Effets de seuil des dépenses publiques sur la croissance économique dans les pays de la CEMAC, Working Paper, 2014: 1-30.
<https://doi.org/10.13140/RG.2.2.20264.67847>.
- [36] Foye O. V.. The impact of public capital spending on private investment in Nigeria. Journal of International Academic Research for Multidisciplinary, 2014, 2(2): 86-100. www.jiarm.com
- [37] Getachew Z.. The Impacts of Investment on Economic growth in Ethiopia. Doctoral dissertation, Addis Ababa University, Department of Economics, 2014.
- [38] Ghura D. and Hadjimichael M.. Growth in Sub-Saharan Africa, IMF Staff Papers, 1996, 43: 605-631.
<https://doi.org/10.2307/3867556>
- [39] Gjini A. and Kukeli A.. Crowding-out effect of public investment on private investment: An empirical investigation, Journal of Business and Economics

- Research, 2012.
<https://doi.org/10.1080/00036849400000022>.
- [40] Greene J. and Villanueva D.. Private investment in developing countries: an empirical analysis, IMF Staff Papers, Palgrave Macmillan, 1991, 38(1): 33-58.
- [41] Hague S. T.. Effect of Public and Private Investment on Economic Growth in Bangladesh: An Econometric Analysis, Research Study Series No FDRS05/2013, Finance Division, Ministry of Finance, 2013.
www.mof.gov.bd/en/budget/pathprosperity/chapter5.pdf
- [42] Hansen M. N.. Unbalanced growth and regional development, *Economic Inquiry*, 1965: 1(4).<https://doi.org/10.1111/j.1465-7295.1965.tb00931.x>
- [43] Helpman E. and Grossman M. G.. Endogenous innovation in the theory of growth. *Journal of Economic Perspectives*, 1994, 8(1): 23-44. Doi:10.1257/jep.8.1.23
- [44] Hussein J. and Benhin J.. Public and Private Investment and Economic Development in Iraq (1970-2010). *International Journal of Social Science and Humanity*, 2015,5(9): 743.
- [45] ICRG. International country risk guide. Researcher dataset, 2017.
- [46] Iheanacho E.. The contribution of government expenditure on economic growth of Nigeria Disaggregated Approach. *Int J Eco Manag Sci*, 2016.
- [47] Imoisi A. I., Abuo M. and Sogules I. W.. Domestic investment and economic growth in Nigeria from 1970-2013: An econometric analysis. *Canadian Social Science*, 2015, 6(11), 70-79.
 Doi:<http://dx.doi.org/10.3968/7009>
- [48] Kao C.. Spurious regression and residual-based tests for cointegration in panel data. *Journal of Econometrics*, 1999, 90: 1-44.
[https://doi.org/10.1016/S0304-4076\(98\)00023-2](https://doi.org/10.1016/S0304-4076(98)00023-2)
- [49] Khan M. and Blejer M.. Government Policy and Private Investment in Developing Countries, IMF Staff Papers, 1984, 31: 379-403.
<https://dx.doi.org/10.2307/3866797>
- [50] Khan M. S. and Kumar M.S.. Public and Private Investment and the Growth Process in Developing Countries. *Oxford Bulletin of Economics and Statistics*, 1997, 59(1): 69-88.
- [51] Knight M., Loaza N. and Villanueva D.. Testing the neoclassical theory of economic growth: A panel data approach, IMF Staff Papers, 1993, 3(40): 512-541.
<https://www.jstor.org/stable/3867446?origin=pubexport>
- [52] Koffi Y.. Public expenditures, private investment and economic growth in Togo. *Theoretical Economics Letters*, 2017, 2(7): 193-209.
 DOI: 10.4236/tel.2017.72017
- [53] Kouassi B. K.. Public spending and economic growth countries: a synthesis. *Financial Markets, Institutions and Risks*, 2018, 2(2): 22-30.
- [54] Lucas R. E.. On the Mechanics of Economic Development. *Journal of Monetary Economics*, 1988, 22: 3-42.
- [55] Mba F. and Ngouhouo I.. Impact du crédit à l'économie sur l'inflation et la croissance au Cameroun. *Global Journal of Economic and Management*, 2013, 3(13): 23-45.
- [56] Moussavou F.. Dépenses publiques et dynamique de croissance au Congo-Brazzaville. *Annales de l'Université Marien NGOUABI*, 2017, 17(1): 21-37.
www.annalesumng.org
- [57] Narayan K. P. and Smyth R.. Dead man walking: An empirical reassessment of the deterrent effect of capital punishment using the bounds testing approach to cointegration. *Applied Economics*, 2006, 38: 1975-1989.
<http://dx.doi.org/10.1080/00036840500427288>
- [58] Nelson M. and Singh D. R.. The deficit-growth connection: some recent evidence from developing countries. *Economic Development and Cultural Change*, 1994, 1(43): 167-191.
- [59] Nose M.. Enforcing public-private partnership contact: how fiscal institutions matter. IMF Working Paper 17/243, Washington, DC, 2017.
- [60] Obad J. and Jamal Y.. Impact des dépenses publiques sur la croissance économique au Maroc. *International Journal of Innovation and Applied Studies*, 2016, 16: 444-445.
- [61] Odhiambo G.. Academic brain drain: impact and implications for public higher education quality in Kenya. *Research in Comparative and International Education*, 2013, 8(4): 510-523.
 doi: 10.2304/rcie.2013.8.4.510
- [62] Olulu R. M., Erhieryovwe E. K. and Andrew U.. Government expenditure and economic growth: The Nigerian experience. *Mediterranean Journal of Social Sciences*, 5, 146.
- [63] Osman E. G. A. 2014. The impact of private sector credit on Saudi Arabia Economic Growth (GDP): An Econometrics model using (ARDL) Approach to Cointegration. *Am Int J Soc Sci* 2014, 3(6): 109-117.
- [64] Pédróni. Panel cointegration: Asymptotic and finite sample proprieties pooled tie series tests with an application to the PPP hypothesis. *Econometric Theory*, 2004, 20: 597-625.
<https://web.williams.edu/Economics/wp/pedronipanelcointegration.pdf>
- [65] Pesaran M., Shin Y., Smith R.. Bounds Testing Ap-

- proaches to the Analysis of Level Relationships. *Journal of Applied Econometrics*, 1999, 16(3): 289-326.
- [66] Phetsavong K. and Ichihashi M.. The Impact of Public and Private Investment on Economic Growth: Evidence from Developing Asian Countries, *International Development and Cooperation, IDEC Discussion Paper 2012*, Hiroshima University, 2012. <https://home.hiroshima-u.ac.jp/ichi/kongphet2012.pdf>
- [67] Rajaram A., Kaiser, Kai-Alexander, Tuan M., Jay-Hyung, Jonas M.. *The Power of Public Investment Management: Transforming Resources into Assets for Growth*. Directions in development; public sector governance. Washington, DC, World Bank Group, 2014. <http://documents.worldbank.org/curated/en/461121468164052711/The-power-of-public-investment-management-transforming-resources-into-assets-for-growth>
- [68] Ramirez. Public capital formation and labor productivity growth in Chile. *Contemporary Economic Policy*, 2000, 2(18): 159-169. <https://doi.org/10.1111/j.1465-7287.2000.tb00014.x>
- [69] Romer P.. "Endogenous Technological Change", *Journal of Political Economy*, 1990, 5(98): S71-S102. <http://links.jstor.org/sici?sici=0012-9682%28198505%2929%3A3%3C155%3ATEI-OLB%3E2.0.CO%3B2-%23>
- [70] Romps W. and De Haan J.. *Public Capital and Economic Growth: A Critical Survey*, *European Investment Bank Papers*, 2005, 10(1): 40-70.
- [71] Saltz I. S.. Foreign direct investment and the distribution of income. *Atlantic Economic Journal*, 1992, 20(1). <https://doi.org/10.1007/BF02303394>
- [72] Samake I.. *Investment and Growth Dynamics: An Empirical Assessment Applied to Benin*, *International Monetary Fund, IMF Working Paper Series, WP/08/120*, 2008. <https://www.imf.org/external/pubs/ft/wp/2008/wp08120.pdf>
- [73] Serven L. and Solimano A.. *Private investment and macroeconomic adjustment: Theory, country experience and policy implication*. Unpublished, *Macroeconomic Adjustment and growth Division*, World Bank, 1990.
- [74] Siefu D. D., Njoke M. and Yah C. N.. *Government spending and economic growth in Cameroon*. *European Scientific Journal*, 28(14), 68-100, 2018. URL: <https://dx.doi.org/10.19044/esj.2018.v14n28p68>
- [75] Sturm J., Kuperet G. and De Haan J.. *Modelling government investment and economic growth on a macro level: A review and some new evidence*. In Shibata H. and Ihori T., *WELFARE STATE, PUBLIC INVESTMENT AND GROWTH*. TOKYO Springer, 1998: 61-83.
- [76] Suhendra I. and Anwar C. J. *Determinants of private investment and the effects on economic growth in Indonesia*. *GSTF Journal on Business Review (GBR)*. 2014, 3(3): 127-130.
- [77] World Bank. *World development indicators*. Washington DC: World Bank, 2017.
- [78] Yang Z.. *Empirical Studies on the Relationship Between Public and Private Investment and GDP Growth*, *Applied Economics*, 2006, 38(1): 1259-1270.