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THE SHORT AND LONG RUN EFFECT OF DOMESTIC INVESTMENT, FOREIGN DIRECT INVESTMENT AND RENEWABLE ENERGY ON ECONOMIC DEVELOPMENT: EVIDENCE FROM CAMEROON

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ABSTRACT

The purpose of this paper is to examine the short and long-run effect of domestic investment, foreign direct investment and renewable energy on economic development in Cameroon. To achieve this, the study makes use of the Autoregressive Distributed Lag Model and Bound test for co-integration to establish the short and long-run relationships. The results show that in the short-run domestic investment and renewable energy both have a positive and significant effect on economic development while foreign direct investment has a negative but significant effect on economic growth. The long-run equilibrium shows a significant and positive relationship between domestic investment and foreign direct investment on economic development while population growth rate and renewable energy show a negative relationship with economic growth. Official development aid inflow is found to positively affect economic development. However, this finding is seen to be statistically insignificant. The study therefore recommends that the state should continually encourage domestic savings, grant investment incentives as well as improved infrastructural facilities to spur the investment level and consequently economic development. Furthermore, the government should improve the business environment, set up a facilitating structure for both foreign and domestic investors and free movement of capital flows to attract FDI, which raises economic growth hence development.

Contribution/ Originality: The study contribute to the existing literature by providing short and a long dynamics of FDI, domestic investment and renewable energy on development, specifically in the case of Cameroon.

1. INTRODUCTION

Developed and developing countries have increasingly come to see Domestic investment (DI), foreign direct investment (FDI) and renewable energy (RE) as drivers of economic development. Africa is currently experiencing sustained economic growth with its population growing rapidly, its economies developing and diversifying. According to International Renewable Energy Agency (IRENA) (2014) the continent will be home to at least 2 billion people by 2050. In order for such growth to be sustained, it needs to be driven by a gigantic domestic investment, foreign direct investment and investment in energy especially renewable energy.

According to the IMF Report (2014) Sub-Saharan Africa has experienced relatively dynamic growth over the last decade and has remained the second most dynamic region in the world with an average growth of 5.1% of real GDP from 2009 to 2013. Nevertheless, this growth rate is considered insufficient to ensure sustainable development and even growth, since according to the United Nations 2014 report on Africa's development, Africa is expected to have an average growth rate of 7% to climb the path of sustainable development. This raises important policy questions especially on the exhaustion of investment opportunities as well as renewed interest in the problem of long-run investment opportunities. Investment is a tool that improves and drives growth through constant advances in technological knowledge in form of new goods, markets or processes which may come in form of domestic and foreign investment (Solow, 1956).

Foreign direct investment is an essential part of an effective international economic system and a key catalyst to development. It is useful for developing countries like Cameroon as it offers capital needed to generate positive externalities such as trade-related benefit through its long-term contribution in integrating the host economy more closely into the world economy in a process likely to include higher imports as well as exports thus mutually reinforcing channels for cross-border activities like technological transfers which is one of the most important channel through which foreign corporate presence may produce positive externalities in the host economy and human capital enhancement which is intimately related with other broader development issues such as productivity. Furthermore, energy represents an essential input to economic productivity. FDI is also regarded as one of the largest components of external finance and capital flow in developing countries which overshadows official development assistance (Adams, 2009).

Besides FDI, renewable energy represents an essential input to economic productivity, growth and development as it makes up one of the 17 sustainable development goals, initiated by the United Nations in 2015 (Arndt, Pauwk, & Thurlow, 2016). It has also been seen as a pivot of economic development and industrialization since time immemorial and has being increasingly touted as the fuel of the future, which will help to reconcile the prerogatives of high economic growth and an economically friendly development path (Singh, Nyuur, & Richmond, 2019). Renewable resource energy have the potential to reduce dependency on imported fuel and solve the issues of energy access for over 1.4 billion people across the globe who remain "energy poor", thereby creating jobs and fostering the development of small-scale industries in developing countries (Sovacool, 2012).

Ever since Cameroon's economic crisis in 1986 which led to a fall of 50 per cent in GDP per head, economic depression arising from the crisis led to public financial imbalances, accumulation of arrears to internal and external creditors, cutting back on government expenditures which affected public and private sector investment projects well as to a decline in technological advancement. Overall economic growth declined to about 3.0 percent per annum from 2001 to 2007 which could be attributed to outdated production facilities and substantial energy shortages which have affected the industry. The country recovered at the rate of about 4.5 percent yearly but was however lower than the targeted 6 percent established in the poverty reduction strategy paper (PRSP) in 2003 Fambon (2013). The growth rates were 3.5%, 3.6%, 2.0%, 3.4%, 5.7% and 4.41% for the years 1995, 2000, 2005, 2010, 2015 and 2018 respectively thus a call for concern (World Bank, 2018).

Like many developing economies, the level of economic development in Cameroon requires deployment in renewable energy resource mobilization as well as continual foreign and domestic investment to stimulate the economy and improve welfare (OECD, 2008). Most studies such as Bakari (2017), Kukaj and Ahmeti (2016) have examined the role of investment and found that it is one of the most important contributors to growth in developing economies. However, these studies have primarily concentrated on the relationship between foreign direct investments and economic growth with little consideration to domestic investment and renewable energy especially in Cameroon. The study therefore contributes to limited empirical literature by examining the combined effect of domestic investments, foreign direct investment and renewable energy on economic development. The aim

of this study is to examine the short run and long run effect of domestic investment, foreign direct investment and renewable energy on economic development in Cameroon.

2. LITERATURE REVIEW

The role of investment as one of the engines of growth is enfolded in several economic growth theories. The Keynesian theory posits that investment affects economic growth positively and depends on the expected rate of return of capital. Similarly, the neoclassical theory of Solow (1956) argues that investment stimulates higher economic growth. A bulk of studies has explored the relationship between domestic investment and economic growth, foreign direct investment and economic growth and foreign direct investment and domestic investment on economic growth. Ijirshar, Anjande, Fefa, and Mile (2019) studied the growth-differential effects of domestic investment and foreign direct investment in Africa. They employed the dynamic panel models to assess the growth differential effects of foreign direct investment and domestic investment among 41 selected African countries from 1970 to 2017. They found that FDI and DI were important grease for growth of African countries in the long-run. In the short-run, estimates showed that foreign direct investment had negative influence on the growth of 24 countries while the estimated influence of domestic investment on growth of most African countries was positive. This indicated that foreign direct investment in Africa has negative effects on growth of host economies in the short-run. Bakari, Mabroukib, and Othmani (2018) used cointegration analysis and vector error correction model over the period 1981-2015 to examine the nexus between domestic investment, exports and economic growth in Nigeria. However, the results revealed that there was no relationship between domestic investment, exports and economic growth both in the long run and short run.

Adams (2009) analyzed the impact of foreign direct investment and domestic investment on economic growth in Sub-Saharan Africa for the period 1990 to 2003 and found that DI was positive and significantly correlated with economic growth in both the OLS and fixed effects estimation, but FDI was positive and significant only in the OLS estimation. The study also found that FDI has an initial negative effect on DI and subsequent positive effect in later periods for the panel of countries studied. Most studies that have explored the effect of foreign direct investment on economic growth generally reveal that foreign direct investment influences growth positively. However, a few contradict this finding. Yeboua (2020) examined the nexus between FDI and economic growth in Africa, employing a panel smoothing transitional regression on 27 African economies over the period 1990-2017. His findings indicated that FDI promotes growth in countries with good institutions above a certain threshold and retard or has no effect on growth in those below the threshold. Ndikumana and Verick (2008) also examined the linkages between foreign direct investment and domestic investment and their effects on growth in Sub-Saharan Africa using correlation and fixed effects regressions on panel data of 38 countries from 1970 to 2005. They found that foreign direct investment crowds-in private investment. A study by Adegboye, Osabohien, Olokoyo, Matthew, and Adediran (2020) equally revealed that foreign capital inflow is crucial for economic development in the SSA sub-region of Africa. Quality of institutions as determining factors also affects the level of inflow of FDI to the host SSA sub-region which results in the underutilization of domestic resources and hence abnormal development of domestic sector investment. The findings of Osabohien, Oluwalayomi, Itua, and Elomien (2020) also validate this.

Sukar, Ahmed, and Hassan (2007); Gui-Diby (2014) and Agbloyor, Gyeke-Dako, Kuipo, and Abor (2016) also examined the effect of foreign direct investment on economic growth. They all found that FDI inflows had a significant impact on economic growth in Africa. Sarker and Khan (2020) examined the nexus between foreign direct investment and economic growth in Bangladesh and found that a long-run relationship exist between FDI and GDP. Using a Generalized Methods of Moments (GMM) estimation technique, Adams and Opoku (2015) examined the effect of foreign direct investment on economic growth and also determined the effects of the regulatory regime of the 22 sub-Saharan African countries on growth from 1980 to 2011. The results proved that

foreign direct investment does not encourage economic growth. Their finding indicated that the growth effect of FDI is stimulated when there are effective and quality regulations.

The literature of renewable energy and economic development is extensive with many conflicting results. These studies contrast in sample, design and methodology. Singh et al. (2019) examined the relationship between renewable energy production and economic growth and the differential impact on both developed and developing economies. They employed the Fully Modified Ordinary Least Square (FMOLS) regression model to a sample of 20 developed and developing countries for the period 1995 to 2016. Their findings revealed that renewable energy production is associated with a positive and statistically significant impact on economic growth in both developed and developing countries for the period 1995 to 2016.Their results also showed that the impact of renewable energy production on economic growth is higher in developing economies, as compared to developed economies. Chen, Pinar, and Stengos (2020) examined the causal relationship between renewable energy use and economic growth by employing a threshold model using a 103-country sample from 1995 to 2015 period and found that the effect of renewable energy consumption on economic growth is positive and significant if and only if developing countries surpass a certain threshold of renewable energy consumption. Their results further revealed that if developing countries use renewable energy below a given threshold level, the effect of renewable energy consumption on economic growth is negative.

Furthermore, Ntanos et al. (2018) employed the autoregressive distributed lag (ARDL) to examine the relationship between energy consumption deriving from renewable energy sources, and countries' economic growth expressed as GDP per capita concerning 25 European countries. Their findings suggested a correlation between GDP and renewable energy sources, nonrenewable energy consumption, gross fixed capital formation and labour force in the long-run. The results further revealed that there was a higher correlation between renewable energy sources consumption and the economic growth of countries of higher GDP than with those of lower GDP. On his part, Venkatraja (2020) concluded on a negative effect of renewable energy on economic growth within BRIC nations. Meanwhile, Dinga, Fonchamnyo, Nginyu, and Njuh (2020) using a dynamic common correlation technique, they concluded that FDI exert positive effect while official development aid exerts negative effect on economic growth within sub Saharan Africa countries. Abdouli and Hammam (2017) examined the relationship between economic growth, FDI inflows and energy consumption on a panel of 17 countries using a growth model framework and simultaneous-equation models estimated by the generalized method of moments (GMM) over the 1990-2012 period and found that there is a bidirectional causal relationship between FDI inflows and economic growth, as well as energy consumption and economic growth . They also found that there is a unidirectional causal relationship between energy consumption to FDI inflows for the global panel.

3. METHODOLOGY

3.1. Data and Sources

The study explores the effect of domestic investments, foreign direct investment and renewable energy on economic development over a period of 28years (1990 – 2018). Time series data for all explanatory variables were collected from United Nations Development Program (UNDP) for HDI, World Development Indicators (WDI) for DINV, FDI, ODA and POP, meanwhile renewable energy consumption was obtained from the world Statistics database. The dependent variable was captured using the Human Development index (HDI) which is used as a proxy for economic development. DI is measured as gross fixed capital formation as a percentage of GDP, FDI as foreign direct investment net inflows as a percentage of gross national product, POP as population growth rate and renewable energy as renewable energy consumption as a percentage of total final energy consumption.

3.2. Empirical Specifications

To test for the relationship between economic development, domestic investment, foreign direct investment and renewable energy, a linear ARDL regression model is estimated. The human development index is used as a proxy for economic development. The model ARDL specification following the bound testing approach developed by Pesaran, Shin, and Smith (2001) and in line with the model employed by Ntanos et al. (2018), Sarker and Khan (2020) is given as follows;

$$\Delta HDIDX = \alpha_0 + \alpha_{1i}\sum_{i=1}^{n} \Delta HDIDX_{t-1} + \alpha_{2i}\sum_{i=1}^{n} \Delta DINV_{t-1} + \alpha_{3i}\sum_{i=1}^{n} \Delta FDI_{t-1} + \alpha_{4i}\sum_{i=1}^{n} \Delta RENG_{t-1} +$$

$$\alpha_{5i}\sum_{i=1}^{n} \Delta ODA_{t-1} + \alpha_{6i}\sum_{i=1}^{n} \Delta POP_{t-1} + \lambda_1 DINV_{t-1} + \lambda_2 FDI_{t-1} + \lambda_3 RENG_{t-1} + \lambda_4 ODA_{t-1} + \lambda_5 POP_{t-1} + \xi_t \quad (1)$$

Where Δ is the first difference, α_1 to α_6 are the short run parameters while λ_1 to λ_5 are the long run parameters. HDIDX is human development index, DINV is domestic investment, FDI is foreign direct invest, RENG is renewable energy, ODA is official development aid inflow and POP is population growth rate.

3.3. Estimation Technique

The study was conducted using quantitative analysis approach. The auto regressive distributive lag model (ARDL) by Pesaran, Shin, and Smith (1999) and Pesaran et al. (2001) was used to capture the relationship between our regressan and regressors which checks for endogeneity problems as well as correcting for serial correlation when the appropriate lag is being used. This model is more advantageous over others as it is more flexible to small sample sizes (Pesaran et al., 2001; Pesaran et al., 1999). The long run relation is investigated by employing the F-test for cointegration. The F-statistics relies on the number of regressors and on whether the model contains lags or trends. When the computed F-statistics range out of the critical bound, then there is the existence of cointegration. Furthermore, the ARDL model is preferred as it is applicable even when the variables are stationary at different levels (Pesaran et al., 2001; Pesaran et al., 1999). Although ARDL does not require pretesting for checking stationarity of the variables, we employ the Phillps- Perron (PP) unit root test to check the stationarity of variables in order to avoid spurious results since a pre-requisite for employing the ARDL technique is that all the variables should either be integrated at order zero or one. This is preceded by testing the existence of a short-run and long-run relationship among the variables using an ARDL bounds testing approach developed by Pesaran et al. (2001). The diagnostic and stability tests were also applied to verify the goodness of fit of the model.

4. FINDINGS AND DISCUSSIONS

4.1. Unit Root Test Results

To ensure that the regression results do not produce spurious outcome, the dependent variable and independent variables were tested for stationarity using the Philips-Perron (PP) unit root test by considering the stationarity at level of the variables and later extended to include the first difference of variables that were not stationary at level. The results of PP unit root test presented in Table 1 indicate that the Human Development Index (HDIDX) which is a proxy for economic development, domestic investment (DINV), and renewable energy (RENG) were not stationary at level since the null hypothesis of stationarity could not be rejected but these variables become stationary at first difference hence, they follow an I(1) process. Meanwhile, foreign direct investment (FDI), official development aid inflow (ODA) and population growth rate (POP) are seen to be stationary at level and as such they follow an I(0) process. Since all the variables are stationary at first difference or at level, this justifies the use of the ARDL technique since the technique requires that variables should only be integrated at level and first difference.

Table-1. Philips-Perron unit root test.

Variables	Levels		First difference		Conclusion
	Coefficient	P-value	Coefficient	P-value	
HDIDX	1.2467	0.998	-6.2837***	0.000	I(1)
DINV	-1.760363	0.391	-6.2911***	0.000	I(1)
FDI	-4.1890***	0.003***			I(0)
RENG	-0.2744	0.916	-4.8691***	0.001	I(1)
ODA	-3.1688**	0.033			I(0)
POP	-3.111**	0.037			I(0)

Note: ***, **, * denote the rejection of the null hypothesis of unit root at the 1%, 5%, and 10% significant level, respectively.

4.2. Cointegration and Diagnostic Test Results

The F-statistics of the bound test was used to determine the existence of a long-run relationship between the variables used in the study following Pesaran et al. (2001). The null hypothesis of the Bound test assumes that no long-run relationship exist between the variables.

Table-2. Cointegration and diagnostic test results.

Description	Test statistics	
Cointegration test		
Selected ARDL model: SIC	(4,3,3,4)	
K	3	
F statistic	13.92702	
Critical values	I(0) Bound	I(1) Bound
1%	4.29	5.61
5%	3.23	4.35
10%	2.72	3.77
Diagnostic test		
Test	Statistic	p-value
R^2	0.981	
Adjusted R^2	0.946	
F-statistic	168.80	0.001[x]
LM Test	2.9076	0.3831
B-P-G Test	0.4657	0.8721
RESET Test	0.0511	0.9525
Normality Test	2.1560	0.3381

Note: [x] 1% significance level.

Based on the bound test result presented in Table 2, the F-statistics value of 13.92702 is greater than the upper bound values of 3.77, 4.35 and 5.61 at 10%, 5% and 1% levels of significance implying the existence of a long-run relationship between economic development and all independent variables. Before proceeding to interpret the short and long run coefficient of our estimated model, diagnostic test were perform on the model to ensure goodness of fit. From the different diagnostic test results presented in Table 2, the null hypothesis of autocorrelation from the Breusch-Godfrey LM test is rejected, showing that the model does not suffer from autocorrelation of residuals. The Breusch-Pagan-Godfrey test results equally confirm the absence of Heteroskedasticity of residuals since the null hypothesis cannot be rejected. For normality, the Jarque-Bera normality test result fails to reject the null hypothesis on normally distributed errors. This implies that the estimated model has normally distributed errors, hence is good for inference. The Ramsey RESET test equally confirms that the model is well specified since the null hypothesis of correct specification cannot be rejected.

4.3. Results of the Short-Run Relations

After confirming goodness of fit and cointegration in our estimated results, we proceed to interpretation. The results of the short-run relation are presented in Table 3. It is expected that, all the independent variables will positively affect economic development.

From the findings, domestic investment is seen to have a positive effect on economic development in the short run. It shows that, a 1% increase in domestic investment, will lead to a 0.3334% increase in Economic development. This finding is seen to be significant at 10%. This is in line with the findings of Ijirshar et al. (2019) who argued that the estimated influence of domestic investment on growth of most African countries was positive. They based this on the complementarity of foreign direct investment as relates to domestic investment in developing economies. This also corresponds to the findings of Adams (2009).

Also, the outcome shows a negative short run effect of FDI on economic development. The result indicates that a 1% increase in foreign direct investment will lead to a 0.8930% decrease in economic development. This was found to be significant at a 5% level of significance. This is however not in line with our apriori theoretical expectations and the findings of Agbloyor et al. (2016) and Dinga et al. (2020) who concluded on a short run positive effect of FDI on economic development within a panel framework. This finding is however in line with the findings of Ijirshar et al. (2019) who found that in the short-run, foreign direct investment has a negative influence on growth of 24 countries. This could be as a result of the fact that in the short-run, FDI may negatively affect the host countries because of the possibility that most of the profit made by multinational companies is expatriated to foreign countries.

In addition, the results indicate that a 1% increase in renewable energy consumption in the short run will lead to a 0.6482% increase in economic development at a 5% level of significance. This corroborates with Singh et al. (2019) who examined the relationship between renewable energy production and economic growth and concluded that renewable energy production is associated with a positive and statistically significant impact on economic growth in both developed and developing countries. This could be as a result of the fact that it has the potential to reduce dependency on imported fuel and solve the issues of energy access thereby reducing the cost of production in many firms. This will thus lead to higher production and therefore an increase in GDP. Population and official development aid are seen to exert a short run negative and positive effect on economic development respectively. But these outcomes are not statistically significant.

Table-3. Results of short and long run relationship.

Variables	Coefficients	Std. error	t-statistic	p-value
Short run				
D(DINV)	0.0033*	0.0013	2.587	0.081
D(FDI)	-0.0089**	0.0019	-4.653	0.019
D(RENG)	0.0065**	0.0014	4.502	0.021
D(ODA)	0.0006	0.0004	1.383	0.261
D(POP)	-0.1092	0.0483	-2.258	0.109
ECT(-1)	-0.3461*	0.1334	-2.595	0.081
Long Run				
DINV	0.0180*	0.0070	2.560	0.083
FDI	0.0461**	0.0123	3.757	0.033
RENG	-0.0138***	0.0014	-9.907	0.002
ODA	0.0016	0.0008	2.187	0.117
POP	-0.3154**	0.0760	-4.150	0.025
C	1.9966***	0.2118	9.428	0.003

Note: ***,**,* are the respective significance levels at 1%, 5% and 10%.

Because of the existence of cointegration relationship among the variables, an ECM is required to capture the short-run dynamics of the system. The ECM value of -0.3461 measures the speed of adjustment from short run disequilibrium to long run equilibrium in the event of a shock. It is significant at 10% and falls between 0 and -1 in our model. Thus, disequilibrium will be adjusted at the rate of 34.611% per year.

4.4. Results of Long-Run Relations

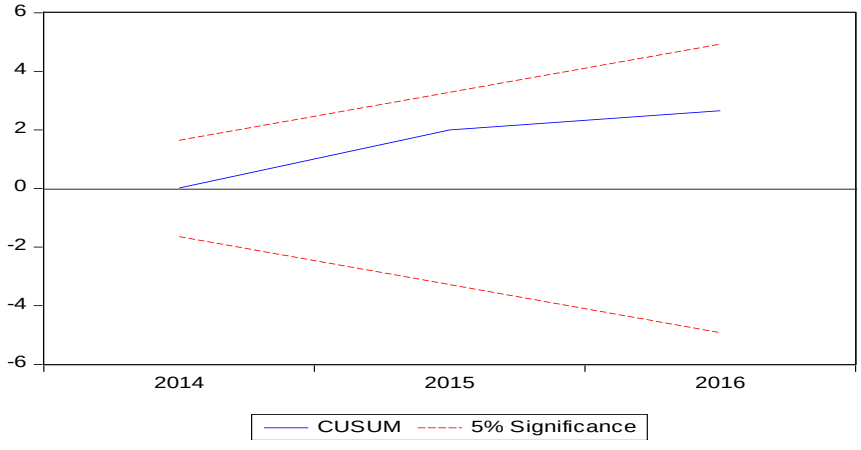
The results of long-run relations are equally presented in Table 3. From the findings, all the variables significantly affects economic development but for official development aid inflow which is seen to have a positive but insignificant effect on economic development.

From the results, a 1% increase in domestic investment in the long run, will lead to a 1.8024% increase in economic development. This coefficient is significant at the 10% level. This is in line with the Harrod Domar theory. Harrod and Domar postulated that for an economy with low savings, growth will be so low therefore to increase the rate of income growth, it is necessary and sufficient to increase the investment rate and therefore the savings rate.

Renewable energy has a negative and significant effect on economic development while foreign direct investment (FDI1) has a positive and significant effect on economic development at 1% and 5% level of significance respectively. The result of renewable energy is not in line with those of Singh et al. (2019) but conform with the findings of Venkatraja (2020) who concluded on a negative effect of renewable energy on economic growth. This may be as a resort of the underutilization of renewable energy resources due to inadequate technology to fully exploit renewable energy resources. The results of FDI are in line with Rosenstein-Rodan (1943) big push theory. According to him, by heavily financing investment in countries which are poor through international assistance, countries falling into the poverty trap can begin a process of economic growth and escape the trap. Economic growth can then be self-sustaining, hence the Big Push. This positive long run outcome corroborates with the findings of Dinga et al. (2020).

With respect to Population growth rate, a 1% increase will lead to a 0.3154% decrease in economic development. This is significant at a 5% level. This is in line with the findings of Peterson (2009) who observed that low population growth in high-income countries is likely to create social and economic problems while high population growth in low-income countries may slow their development. This may be as a result of the fact that as population grows, resources which are to be used for development are strained which can result in wars.

The stability test was conducted in order to increase the stability of the long and short-run parameters through CUSUM and CUSUMSq. The graphs of CUSUM and CUSUMSq test presented in Figure 1 show that all the values fall within the critical boundaries at 5% level of significance. This confirms goodness of fit in our estimation and goes a long way to confirm the different diagnostic test in Table 2. Thus, all the test statistics reveal that our model is well specified, good for inference and stable over the period under study.



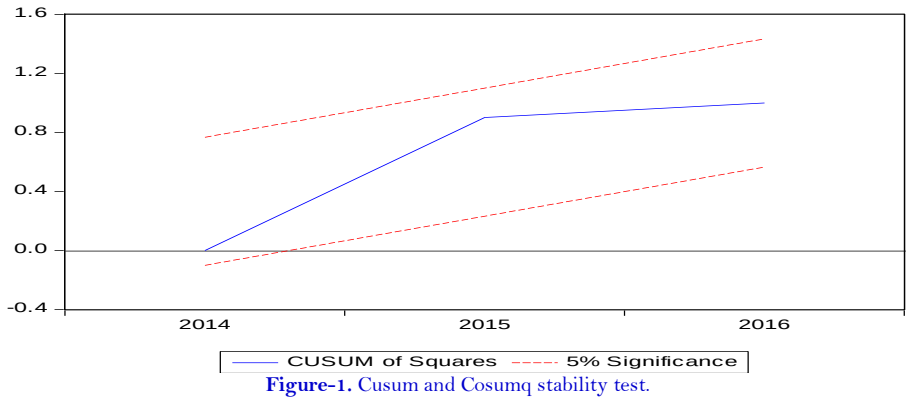


Figure-1. Cusum and Cosumq stability test.

5. CONCLUSION AND RECOMMENDATION

The purpose of this study was to examine the short run and long run effect of Domestic Investment, Foreign Direct Investment Renewable Energy Resource on economic development in Cameroon. Using time series data from 1990 to 2018, autoregressive distributive lag (ARDL) approach to co-integration was used to identify short run and long run relationships between the variables. Stationarity and co-integration test for the variables were also verified using Phillips-Perron (PP) test statistic and the bounds testing approach developed by Pesaran and Shin (1998) respectively. The results of the short-run relationship reveal that Domestic investment and Renewable Energy Resource have positive and significant effect on economic development while Foreign Direct Investment has a negative significant effect. Conversely, official development aid inflow and Population growth rate are found to have insignificant positive and negative effect on economic development in Cameroon respectively. From the long run analysis, the findings show that Domestic and Foreign Direct Investment have positive and significant relationship with economic development while Renewable Energy and Population growth rate have negative significant effect. Contrary, official development aid inflow is seen to have a positive but insignificant effect on economic development.

The study therefore recommends that the state should continually encourage domestic savings, grant investment incentives as well as improved infrastructural facilities to spur the investment level and consequently economic development. Furthermore, the government should improve the business environment, set up a facilitating structure for both foreign and domestic investors and free movement of capital flows to attract FDI, which raises economic growth and hence development.

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