The Impact of Infrastructure development on Foreign Direct Investment in Cameroon

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Abstract: Better access to improved infrastructure services is one of the components of a favourable investment climate for foreign investors and an important engine for sustainable economic growth. This study investigates the impact of communication, energy and transport infrastructure development on Foreign Direct Investment (FDI) in Cameroon over the period 1984-2014. Auto Regressive Distributed Lags (ARDL) bounds test approach to co-integration has been applied to analyse the annual time series data coming from United Nations Conference on Trade and Development (UNCTAD) and World Development Indicators (WDI). The results show that communication infrastructure exerts a positive and significant impact on FDI inflows. In addition, energy infrastructure reduces the volume of FDI inflows, while transport infrastructure is not relevant in attracting FDI inflows. According to these findings, this study recommends that the government of Cameroon pay further attention to improving the quality of infrastructure in order to attract more FDI.

Keywords: Infrastructure**,** ARDL, FDI, Cameroon

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1. Introduction

1.1. Background

Foreign Direct Investment (FDI) is an important source of capital for investment in developing countries. Like many emerging economies, the level of economic development of Sub-Saharan African (SSA) countries requires continued foreign investment to stimulate the economy and improve the welfare. For SSA countries, the role of FDI has proven all the more essential as it can help in filling the gap between domestic savings and investments while mobilizing the necessary resources to achieve the Sustainable Development Goals (SDGs). For the Organization of Economic Cooperation and Development (OECD, 2008), FDI is one of the main drivers of international economic system. When the appropriate host-country policies are in place, it can be a financial stability factor, support to the economic development and the social welfare.

According to Nyaosi (2011), FDI provides new technologies, improves the efficiency of existing technologies and brings financial resources to host countries. Foreign Direct Investment also facilitates access to international markets and plays a major role in the development and strengthening of the export capabilities of the host economies. FDI has the potential to lead to change in management and corporate governance, enhance domestic competences and transfer modern and "cleaner" technologies in the host country. The importance given to FDI in modernisation, employment, income growth and development process pushed several SSA countries to introduce strategies to attract and promote FDI. However, Sub-Saharan African countries are not performing as well than any region in the world in FDI attractiveness process (UNCTAD, 2018). In fact, FDI does not accrue mechanically, national policies such as development of human capital and infrastructure, macroeconomics and political stability, and financial development matter for attracting FDI in the SSA countries and for reaping the full gain of foreign investment for development.

The availability of infrastructures such as telecommunications, railways, airports, ports and roads reduce operational costs, tariffs and facilitate access to new markets in a specific country. The competitive position of a country is determined by its transportation costs, tariffs and access to a new market (Rehman et al., 2011). Poor infrastructure limits access to both local and international markets which ultimately impede FDI growth in SSA countries. Several studies focusing on the determinant of FDI concluded that infrastructures have a positive impact in captivating FDI (Chakrabarti et al., 2012; Khadaroo and Seetanah, 2009; Babatunde, 2011).

1.2 Cameroon FDI inflows

FDI is like the main driver behind the economic globalization process and have been considered as the "the peak" of globalization process (Donciu, 2013). Within a favourable framework, it is gainful for developing countries like Cameroon.

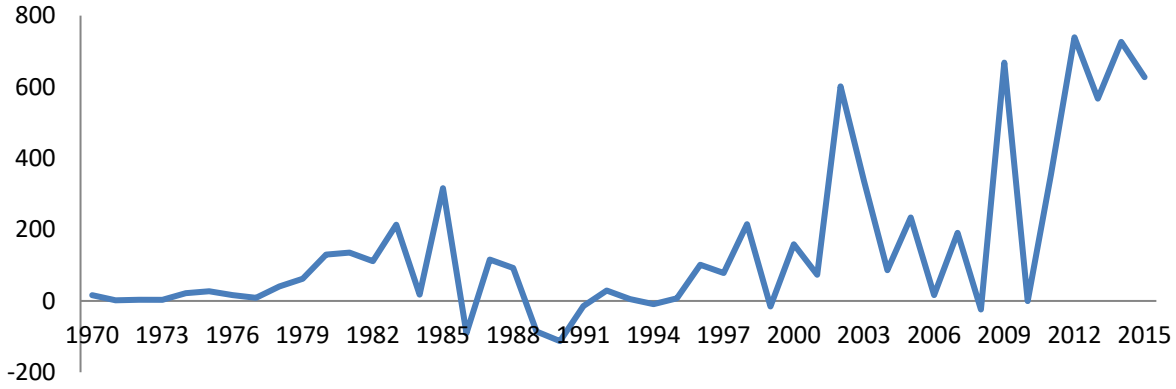

Figure 1: FDI trend in Cameroon from 1970 to 2015 (Current US$ in Millions)
Source: Constructed by author from UNCTAD (2018)

Cameroon FDI net inflows have been low and stable from 1970 to 1977 when it shut up and until half of the years 1980 with a spectacular rise in 1981, 1983 and 1985 where are recorded $135.391 million, $213.821 million and $316.229 million respectively due to the fact that Cameroon's economy experienced a structural change with the discovery of crude oil and the increase in agricultural output. Between 1985 and 1995 FDI inflows went down sharply with a massive disinvestment amounting to about $29.2 million, $5.12 million and $7.292 million respectively in 1992, 1993 and 1995 owing mainly to the severe economic crisis, combined with the application of a number of measures taken within the context of Structural Adjustment Programmes (SAPs) which wrecked the national economy between 1986 and 1994.

After the economic crisis, there was a significant increase in the FDI inflows with the implementation of macroeconomics policies, the construction of the Chad-Cameroon oil pipeline and integration into the world economy. Between 1995 and 2006 FDI inflows reached $601.746 million in 2002 and dropped to $191.017 million in 2007. It later declined drastically between 2007 and 2008 due to global financial crisis. Foreign direct investment net inflows steadily rose from 2008 to 2009 and declined sharply in 2010. Thereafter, it rose sharply from the year 2011 to 2015 with a record level of about $739.177 million in 2012 before slightly decreasing to $627.441 million in 2015 (see Figure 1).

FDI inflows to Cameroon is traditionally low compared to the potential of its economy. Cameroon has the potential to become one of the most prosperous and best countries to receive FDI in Africa. However the Cameroon's business climate such as inadequate infrastructure, unskilled labour, corruption, high political risk and others discourage FDI in Cameroon. In order to attract more FDI, significant programs are being implemented by Cameroonian authorities among which infrastructure development.

Since the year 2001, Cameroonian government has made significant progress in many aspects of infrastructure. Cameroonian authorities have managed to developed roads, rails, power, water and sanitation supply and Information and Communication Technology (ICT) networks. During this decade, the government spent about $930 million per year on infrastructure, equivalent to 5.6 percent of its GDP (Dominguez-Torres and Foster, 2011). After having got to the finishing line of the Heavily-Indebted Poor Country Initiative (HIPCI) in 2006, the government outlines plan to radically improve its energy, transport and telecommunication infrastructure and construction facilities through the Growth and Employment Strategy Paper (GESP) to reach to development by 2035 (Republic of Cameroon 2009). AS evidenced from Energy, Physical and ICT infrastructure, the extension of the railways network from mbalam to Kribi by 450km to ensure the easy transportation of iron from Mbalam iron ore to kribi sea port, the Memve'ele and the Lom Pangar hydroelectric dams with capacity of 211 MegaWatts (MW) and 30MW of electricity respectively, Mekin Hydro-power with capacity of 15MW , the Nigeria Cameroon Submarine Cable system (NCSCS) installed in Kribi under supervision of Cameroon Telecommunication (CAMTEL), the Africa Coast to Europe (ACE) and South Atlantic Interlink (SAIL) submarine Cable which are ready for service. The GESP does not produce the expected result and for this reason the three year Emergency plan (2015-2017) decided by the head of state was the GESP adjustment plan. Despite the up cited infrastructure development projects, Cameroonian economy is still constrained by infrastructure inadequacy and inefficiencies. These include poor roads and railways quality, expensive and unreliable power supply, uncompetitive mobile sector, weak expansion of the mobile and fixed-line markets and shortages of water supply and sanitation. This therefore raises the following research question: What are the impacts of infrastructure development on the scanty increase in FDI recorded in Cameroon?

The studies of Wekesa et al. (2017), Seetanah (2009), Asiedu (2002), Rehman et al. (2011) and Jaiblai and Shenai (2019) have found significant contribution of infrastructure along with other determinants to attract FDI inflows in SSA countries. Despite these considerations, specific research on the impact of infrastructure on FDI in the Cameroonian

context does not exist. Further, empirical studies on the impact of infrastructure on FDI have relied on data from different regions and horizons. Pooling countries in panel data studies is not suitable because policies of infrastructure development and their impacts on the FDI vary across countries. Due to the different operating environments, the results and policy implications are region based and hence the need for country-specific solutions. The results of these studies cannot be generalized to tailor policy recommendations in Cameroon.

The aim of this study is to investigate the impact of infrastructure development on Foreign Direct Investment in Cameroon, taking into consideration the communication, transport and energy infrastructure.

1.3. Objectives of the Study

The main objective of this study is to examine the impact of infrastructure development on FDI in Cameroon over the period 1984-2014. This study specifically seeks to:

1. Determine the impact of transport infrastructure development on FDI
2. Investigate the impact of energy infrastructure development on FDI
3. Find out the impact of communication infrastructure development on FDI

1.4. Structure of this study

This study is organized in five sections: Section 1 covers the introduction and background of the study, statement of the problem, purpose and the objectives of the study. In Section 2, the existing empirical literature on the impact of infrastructure on FDI is reviewed. Section 3 describes econometric methodology and data. The results and their interpretations are presented in Section 4, and Section 5 is reserved for the conclusion and the recommendations.

2. Literature Review

Empirical studies on the relationship between infrastructure and FDI have been increasing over the recent years. In these studies infrastructure is differentiated between hard and soft infrastructure (Bakar et al., 2012; and Seetanah, 2009). Hard comprises all physical infrastructure that are fundamental to functioning a modern industrial economy (such as transport systems, telecommunication services, electricity and broadband systems) and Soft infrastructure refers to all institutions which help to maintain economy and the standard of living of a population such as governance, health, financial and educational systems.

Wheeler and Mody (1992) find evidence that quality of energy, communication, and transport infrastructure have a positive significant impact on the volume of investment in 42 developing countries between the year 1982 and 1988. Fung et al. (2005) empirically examine which type of infrastructure (hard or soft) is key driver of FDI inflows to China. The empirical results show that both soft and hard infrastructures increase FDI inflows. The results also show that soft infrastructures have more significant impact than hard infrastructures. Chakrabarti et al. (2012) investigate the effects of infrastructure development on FDI in India between the year 2002 and 2007 and find that physical infrastructure is associated with increased FDI inflows, though this link rests on the level of infrastructure. Behname (2012) uses cross-sectional data of Southern Asian countries between 1980 and 2009 to investigate the link between infrastructure and FDI flows and find a positive and significant impact of urban infrastructure on FDI inflows. Rehman et al. (2011) investigate the impact of infrastructure on FDI in Pakistan from the period 1975–2008. The results show that infrastructure and market size are positively related to FDI inflows in the both long-run and short run. Bakar et al. (2012) find that both hard and soft infrastructures are positively associated with FDI inflows in Malaysia. The study of Hakro and Omezzine (2011) reveals that governance infrastructure is positively associated with FDI inflows in Mena region countries.

In the African context, Seetanah (2009) examine the relationship between FDI and transport infrastructure in Mauritius from the period 1981–2005. The findings show that both non-transport and transportation infrastructures are important determinants of FDI inflow to manufacturing and services sectors. Besides, manufacturing sector investors pay more attention to physical infrastructure as compared to those investing in services sector. Khadaroo and Seetanah (2009), use static and dynamic panel data methods to investigate the effect of transport infrastructure on FDI in 33 African countries during the 1984 to 2002 period. Their findings reveal that transport infrastructure is a significant determinant of FDI inflows. Using OLS estimation approach on a sample of 70 developing countries, among which, 35 SSA countries, Asiedu (2002) finds that infrastructural development, high return on investment and economic openness are positively related to FDI. Essia and Onyema (2012) also find that improved infrastructure (energy supply, improvements in infrastructure for transportation and communication, and maintaining flexible institutional frameworks) is a key driver for FDI inflows in Nigeria. Babatunde (2011) uses panel data methods on sample of Sub-Saharan African countries over the period 1980 and 2003 and finds that an increase in trade openness, infrastructure and GDP per capita increases FDI inflows. Wekesa et al. (2017)

employ ARDL method to investigate the effects of transport, energy, communication and water and waste infrastructure development on FDI inflows in Kenya. The findings reveal that improved transport infrastructure, communication infrastructure, water and waste infrastructure are important determinants of FDI inflows into Kenya. Jaiblai and Shenai (2019) explore the determinants of FDI in 10 Sub-Saharan economies. Using a set of cross-sectional data over the period 1990–2017, the results show that higher FDI inflows are attracted by countries with better infrastructure.

To summarize, review of the literature on relationship between infrastructure and FDI inflows found a positive and significant role of infrastructure in inviting FDI inflows. Nevertheless, studies neglected developing countries individual cases particularly middle income developing country like Cameroon. Therefore, this study seeks to fill in this gap and hence adds in literature on the determinants of FDI inflows.

3. Empirical Analysis

3.1 Data

This study aims to investigate the impact of infrastructure development on FDI in Cameroon. The study uses annual secondary data spanning from 1984 to 2014. The Data are obtained from the World Bank's World Development Indicators (WDI, 2018) and the United Conference on Trade and development (UNCTAD, 2018).

The dependent variable is the ratio of FDI net inflows as a share of Gross Domestic Product (FDI) and the independent variable is infrastructure. In this study three indicators of infrastructure are used namely; Communication Infrastructure (CI) which is proxied by fixed telephone subscription per 100 people; Energy Infrastructure (EI) which is measured by Electric power consumption per kWh and Transport Infrastructure (TI) which is captured by Rail lines. The choice of these infrastructural indicators is based on the fact that they are fundamental infrastructures that help the productive sector in the Cameroonian economy. Communication infrastructure is a measure of availability and cost of telecommunication, which is important for Multinationals Enterprises (MNEs) to coordinate cross-border activity. Energy Infrastructure is important for efficiency in industrial sector. Transport infrastructure is crucial for access to the new market and reduces operational cost.

From literature, it has been proven that the availability and the quality of infrastructure is a relevant determinant in the foreign investment decisions. Thus, better infrastructural facilities reduce the transaction cost and hence improve the investment climate. It is expected that communication, transport and energy infrastructure are positively

related to the FDI. The description of the variable employed in the study and their source is presented in the Table 1 below.

Table 1. Description of the variables and sources.

Variables	Description	Source
FDI	Foreign direct investment, net inflows (% of GDP)	UNCTAD (2017)
CI	Fixed telephone subscriptions (per 100 people	WDI (2017)
EI	Electric power consumption (kWh per capita)	WDI (2017)
TI	Rail lines (total route-km)	WDI (2017)

3.2 Methodology

The aim of this study is to investigate the impact of transport, energy and communication infrastructure on FDI inflows in Cameroon. The hypothesis is that with better infrastructure, a middle-income country like Cameroon is more attractive to foreign investments.

The model for the research is specified as below:

$$FDI_t = \propto_0 + \propto_1 TI_t + \propto_2 EI_t + \propto_3 CI_t + \varepsilon_t \quad (1)$$

Where FDI is the foreign direct investment, net inflows (% of GDP); TI is the Transport Infrastructure; EI is the Energy Infrastructure; CI is Communication infrastructure. $\propto_0$ is the Intercept; $\propto_1,\ldots,\propto_3$ are the coefficients; ε is the error term and t the time.

This study employs the Autoregressive Distributed Lags (ARDL) developed by Pesaran and al. (2001). The choice of this method is justified by the following advantages: Firstly, the ARDL is more flexible and presents the advantage of being applicable when all variables are I (0), I (1), or are mutually integrated (Pesaran et al, 2001). Secondly, the ARDL is robust in the case of small size (Solarin and Shahbaz, 2013). Thirdly by applying the ARDL method we obtain unbiased estimators in the long run model (Harris and Sollis 2003). Considering the above benefits of ARDL approach to cointegration, the following unrestricted error correction model is specified as follows:

$$\Delta FDI_t = \propto_0 + \sum_{i=1}^{n} \alpha_1 \Delta FDI_{t-i} + \sum_{i=1}^{n} \alpha_2 \Delta TI_{t-i} + \sum_{i=1}^{n} \alpha_3 \Delta EI_{t-i} + \sum_{i=1}^{n} \alpha_4 \Delta CI_{t-i} + \vartheta_1 FDI_{t-1} + \vartheta_2 TI_{t-1} + \vartheta_3 EI_{t-1} + \vartheta_4 CI_{t-1} + \mu_t \quad (2)$$

Where Δ is the first difference operator; n is the optimal lag length; α_1, α_2, α_3 and α_4 represents the short run dynamics and ϑ_1, ϑ_2, ϑ_3 and ϑ_4 represents long run elasticities.

Before applying the ARDL approach of Pesaran and al. (2001), it is imperative to carry out the stationarity test in order to be sure that no variable is integrated into a higher order than 1. In this study, the unit root test of Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) test statistic are used. After this, cointegration test will be carried out using

ARDL Bounds Test approach to cointegration. The null hypothesis assumes no cointegration among variables. The rule of ARDL Bounds test of cointegration states that the null hypothesis should be rejected if the value of the F-statistic is greater than the upper bounds value and accepted if the F-statistic is less than the lower bounds. The ARDL cointegration test will be said to be inconclusive if the F-statistic falls between the lower and upper bound. Once the existence of cointegration is established, the final step is the regression of the long- and the short run coefficients of the ARDL model. Since the study utilizes time series data with 31 years of observation, the model lag length was determined using Schwartz–Bayesian Information Criterion (SBIC).

The short run dynamic relationship is given as below:

$$\Delta FDI_t = \propto_0 + \sum_{i=1}^{n} \alpha_1 \Delta FDI_{t-i} + \sum_{i=1}^{n} \alpha_2 \Delta TI_{t-i} + \sum_{i=1}^{n} \alpha_3 \Delta EI_{t-i} + \sum_{i=1}^{n} \alpha_4 \Delta CI_{t-i} + \gamma_1 ECM_{t-1} + \mu_t \quad (3)$$

Where γ is the speed of adjustment parameter and ECM represent error correction term derived from the estimated cointegration model as given in equation (2).

4. Empirical Results and Discussion

4.1 Unit Root Test

Before applying the ARDL approach to cointegration, the Augmented Dickey–Fuller (ADF) test and Phillips-Perron (PP) test statistic were done at levels and differences to determine the order of integration. Results of unit roots under Augmented Dickey–Fuller (ADF) and Phillips-Perron tests are summarized in Table 2. As results reveal, FDI is stationary at level while transport infrastructure (TI), communication infrastructure (CI) and energy infrastructure (EI) are stationary at the first difference. This means that FDI is I(0) while TI, CI and EI are I(1). Thus, the requirements to determine the cointegration test between FDI and independent variables are satisfied.

Table 2. Unit Root Test

Variables	Augmented Dickey Fuller			Phillip Perron		
	Level	First Difference	Order of Integration	Level	First Difference	Order of Integration
FDI	-4.895*	-10.942*	I(0)	-4.958*	-14.689*	I(0)
CI	-2.131	-6.243*	I(1)	4.605	-6.352*	I(1)
EI	-0.801	-5.181*	I(1)	-1.053	-5.288*	I(1)
TI	-1.294	-5.836*	I(1)	-1.241	-5.872*	I(1)

* Indicates statistical significance at 1 % level.

4.2 Bounds Test Approach to Cointegration

To determine the existence of cointegration between the dependent and independent variables, this study applied the Bound testing approach proposed by Pesaran and al. (2001). The results show that computed value of F-statistics (8.5) is greater than the upper bound

critical value (Table 3). Therefore, the H0 assumption of absence of cointegration is rejected which implies that there is a long-run relationship among the variables.

Table 3. Result of ARDL Bounds Test Approach to Cointegration

Critical Value Bounds	Lower bound value	Upper bound value	Computed F-statistics
1%	4.29	5.61	8.5
2.5%	3.69	4.89	
5%	3.23	4.35	
10%	2.72	3.77	

Source: Authors' computation

4.3 Impact Analysis

The results of the impact of the infrastructure development on FDI are reported and discussed in this sub-section. The results of the short run and long run estimations are presented in Table 4 and 5. The optimal lag-length selected for model is ARDL (1, 0, 0, 0). The overall performance of model is valid, as the prob (F-statistic) value integrated in Table 4 is statistically significant. The coefficient of determination (R-squared) is 0.39 for the model, indicating that all the independent variables as a group explain 39 % of the total variations in FDI.

The results from the Tables 4 and 5 indicate that the coefficient of communication infrastructure is positive and significant in both the long run and the short run. All things being equal, a 5% increase in fixed telephone subscriptions increases FDI inflows to Cameroon by 0.69% and 0.77% respectively in the long run and in the short run. This result could be due to the increase of public private partnerships investments in ICT sector. These findings are in line with research by Wekesa et al. (2017) and Jaiblai and Shenai (2019). The coefficient of energy infrastructure enters negatively and significantly in all estimated models in both the long run and the short run, implying that electricity power consumption significantly reduces the attraction of FDI in Cameroon. The negative effects of energy infrastructure could be the results of unreliable power supply, decrepit metering systems, burgeoning illegal connections, and outmoded billing software which deteriorate the energy quality and supply. Additionally, investment climate surveys noted that firms in Cameroon encountered around 128 outages in 2009, almost as twice the average for Africa's middle-income countries, enduring blackouts of four hours each time (Dominguez-Torres and Foster, 2011). The results also show that the coefficient of transport infrastructure is not statistically significant in both the long run and short run, meaning that transport infrastructure has no effect on FDI in Cameroon. This result may partly be due to the lack of competition and inadequate operating quality in railways system, poor quality of the railways infrastructure with a narrow gauge of 1,000 mm.

Table 4. Estimated Long-run coefficients

Variable	Coefficient	Std Error	t-statistic	Prob
CI	0.696**	0.326	2.13	0.043
EI	-3.567*	1.847	-1.93	0.065
TI	-0.212	5.375	-0.04	0.969
Constant	23.093	39.624	0.58	0.565

Notes: (1) *** p < 0.01, ** p < 0.05 and * p <0.1.

(2) R-squared = 0.5403, adjusted R-squared = 0.3931, F (4, 25) = 5.72, p = 0.006.

Table 5. Error Correction Model

Variable	Coefficient	Std Error	t-statistic	Prob
ECM(-1)	-0.5715	0.192	-5.80	0.000
CI	0.778**	0.377	2.06	0.050
EI	-3.989*	2.148	-1.86	0.075
TI	-0.237	6.012	-0.04	0.969

Note: *** p < 0.01, ** p < 0.05 and * p <0.1; EI and TI are in log

For the purpose of goodness of fit of the ARDL models, the diagnostic and the stability tests are conducted. The diagnostic tests include the Durbin Watson statistic, test for omitted variables, model specification, serial correlation, model fit and test for homoscedasticity (see Table 6). The Durbin Watson statistic of 1.76 lies in the indecision quadrant (is closer to 2 and far from the extreme values, 0 and 4); hence, the model is considered as having no serial correlation problem. Applying White's test, the error term was found to be homoscedastic with a calculated chi-square value of 8.01 with probability 0.888, implying that the null hypothesis of constant variance could not be rejected at 5 % level of significance, as the probability was greater than 0.05 (see Table 6). Model specification tests were checked using the Ramsey's test (RESET) and the null hypothesis is that the model had no omitted variables. The test results indicated that there is no evidence of model misspecification, while a test of model specification showed that the model is specified appropriately. The stability of the estimated coefficient of ECM is also tested by using the cumulative sum of recursive residual (CUSUM) and cumulative sum of squares of recursive residual (CUSUMQ) methods. The Figures 1 and 2 show that parameter constancy in the model is maintained for the entire study period (see Figures 2 and 3).

Table 6. Summary of Diagnostic Tests Results

Diagnostic Tests	Description	t-statistic	p-value
Breush-Godfrey LM Test	Test for Serial Correlation	0.538	0.4632
Ramsey Reset Test	Test for omitted variables	0.46	0.7122
Durbin–Watson Test	Test for serial correlation (if lies close to 0 and 4, then presence of collinearity)	1.764	
Link Test	Test for model fit	-0.35	0.727
White Test	Test for homoscedasticity	8.01	0.8888

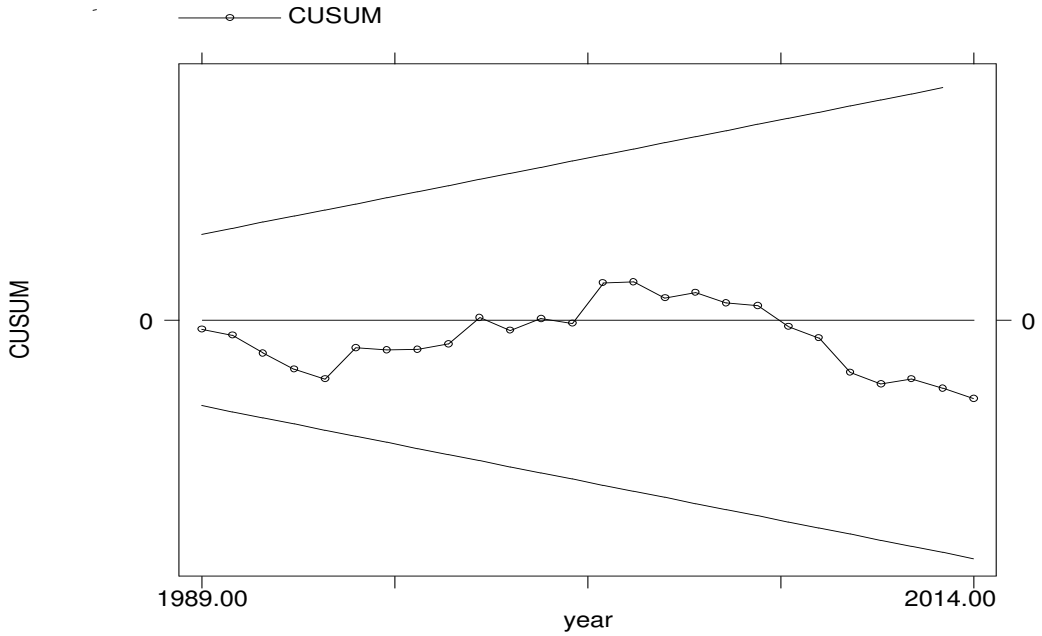

Figure 2. CUSUM Test
Source: Constructed from CUSUM test results by the authors'.

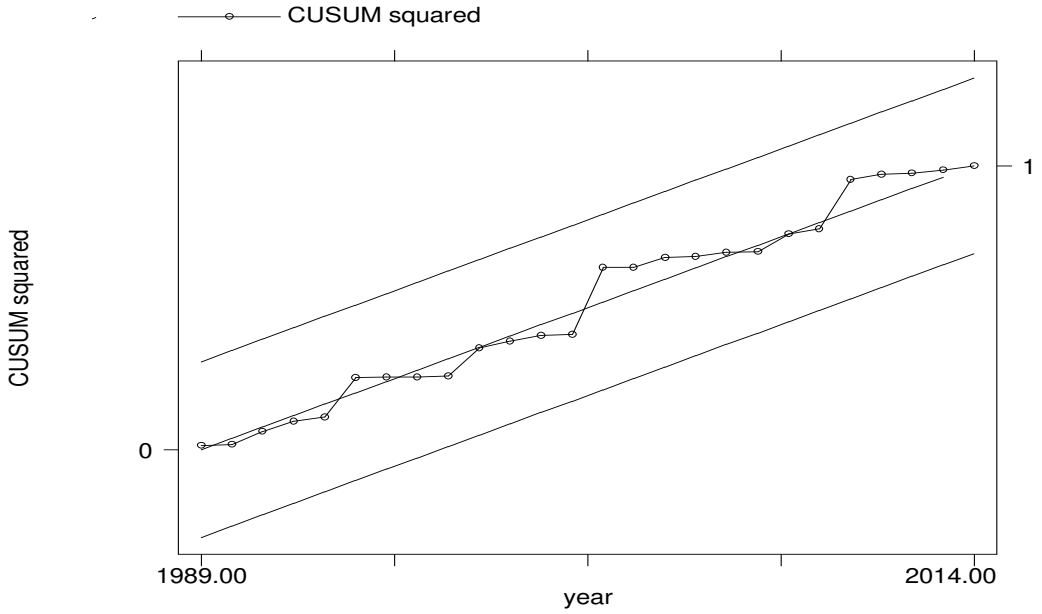

Figure 3. CUSUM Squared Test
Source: Constructed from CUSUM test results by the authors'.

5. Conclusion and policy implications

This study investigates the relationship between infrastructure development and foreign direct investment in Cameroon from 1984 to 2014. For this purpose, Augmented Dickey-Fuller and Phillip Perron tests were used to check the variables stationarity, and an ARDL Bound testing approach to cointegration was applied to check the dynamic relationship among the study variables with short-run and long-run analysis. The results from ARDL approach revealed that communication infrastructure promotes FDI in Cameroon. Afterwards, energy infrastructure has adverse effects on FDI in Cameroon. At last, transport infrastructure is not relevant to FDI. The findings suggest that the impact of infrastructure development on FDI is sensitive to the infrastructure measure used. The results also suggest that infrastructure plays a major role in attracting FDI inflows in Cameroon as evidenced by communication and energy infrastructures which significantly impact the FDI.

From a policy perspective, the following recommendations should be implemented to improve the quality of infrastructure for attracting FDI in Cameroon. First, government together with private sector should continue to invest in railways infrastructure and improve the governance capacity in the railway sector. Second, government policymakers need to speed up the development of its hydropower sites and develop renewable energy sources in order to increase the domestic power efficiency and capacity. Third, Cameroonian government should strengthen and improve the quality of ICT goods and services through the public private partnerships investment in the ICT sector. Fourth, The international organization such as African Development Bank, International Monetary Fund, European Union have to strengthen and pursuit their investments and partnerships in the infrastructure development.

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