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DOES FOREIGN DIRECT INVESTMENT IMPROVE ECONOMIC GROWTH IN CEMAC COUNTRIES?

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ABSTRACT

The aim of this research work is to assess the influence of FDI on economic growth in the CEMAC region. The ratio of FDIs in the actual GDP of countries of the CEMAC region has recorded a steady annual increase for the past three decades. Moreover, the high variability of FDI, given the various crises and fluctuations in the prices of raw materials invites us to reflect and question the impact of FDI on growth by studying the case of CEMAC countries. The theoretical analysis is based on the neoclassical growth theory and its extensions. After the selection of a model crafted from Imoudu (2012) and Boreinsztein et al. (1998). The results show that FDI have a positive impact on the growth of the sub-region and these are conveyed by human capital.

JEL CLASSIFICATION & KEYWORDS

■ E23 ■ F2 ■ F23 ■ F43 ■ FOREIGN DIRECT INVESTMENT ■ ECONOMIC GROWTH ■ HUMAN CAPITAL ■ CEMAC ■ PANEL DATA

INTRODUCTION

Developing countries, especially in Africa, recently considered the role of foreign direct investment (FDI) as essential to their development. FDI is a development tool given that it provides the capital direly needed by these countries and which is necessary to increase investment and competition in the industries in host countries while improving the productivity of local firms through the adoption of more effective technologies or investing in human and / or physical capital. FDI also improves the management capacity of local firms (Bertrand and Gouia, 1998). For purposes of an illustration, FDI inflows accounted for over 20% of GDP in some countries of the CEMAC region (WDI, 2012)[1]. FDI has many advantages: it is particularly a source of both physical and human capital, creates jobs, provides access to foreign markets and its impact on local businesses is positive in terms of technology and efficiency. Given that FDI grants access to foreign markets, technological exchanges and usually creates competences in companies found in host countries, it can however only improve the integration of these countries into the global economy while promoting economic growth. The main orientation of the leaders of developing countries towards FDI is the search for extra funding since they are usually fall short of financial resources (Maingy, 2004).

This positive view of FDI today has undergone a real transformation. In fact, in the early 1970s, FDI is considered as a new form of colonization. . Thus, the rights of countries succumb to the obligations of foreign companies, reinforced by the ambient protectionism and commitment to a considerable development of local industries. But due to the multiple crises recorded by developing countries and the need for trade liberalization advocated by the WTO in 1994, the call for multinationals is increasingly urgent for these countries. The rights of firms increasingly supersede on the obligations of host countries (Brewer and Young, 2000).

[1] An example is Congo, since 1999. Though FDI inflows now experience significant fluctuation, they however remain high. One can also cite Equatorial Guinea whose FDI level of attractiveness is 77% of the GDP in 1995 and 54% in 2001.

Presently, economists tend to recognize an overall positive effect of FDI on economic growth in developing countries but with some considerable differences. These differences sprout from rather contrasting stands. How do we compare India which has a growth rate of about 5%, having a low FDI level, with Angola, where the importance of FDI goes hand in hand with negative growth, or with Malaysia and China where FDI are correlated with growth (Brewer and Young, 2000)[2]? The same problem is faced in the CEMAC zone. The weak economic growth of Chad between 2008 and 2010, is contrasting to its attractiveness for FDI influx[3]. Nevertheless, the remarkable dynamism of the Congo in terms of FDI inflows goes hand in hand with some considerable growth[4]. Similarly, the observation of the facts in Gabon shows a low growth rate with a low level of FDI attractiveness[5]. But what actually justifies the positive correlation of FDI with economic growth in some countries and not in others? This question shows that the impact of FDI on growth depends on interactions that develop (or not) with the variables that generally and positively influence (or not) growth in developing countries[6].

The main objective of this presentation is to underline the contribution of FDI to economic growth in countries of the CEMAC region. We use a neoclassical development model that we adopt for the empirical method. The first section of the rest of the article comprises of the literature review. The second section embodies the various analysis made while the third section and last presents the conclusion of the paper and proposes some recommendations for economic policies.

Literature review

Before proceeding with the review of empirical literature, it is important that we first of all throw some light on the conceptual basis.

Theoretical framework

The development models to be mentioned are derived from the Solow model. The main problem that the Solow model seeks to answer is based on the following question: "Why are some countries very rich while others remain poor?" (Solow, 1957). It uses a Cobb-Douglas production function which essentially depends on capital and labour and has the following formula:

[2] Between 1991 and 1994, Angola has recorded an average growth rate of -10.93% with FDI inflows of about 418 million USD while India had an average growth rate of 4.48% with 225 million USD of FDI over the same period.

[3] Chad recorded an average growth rate (2008-2010) of 0.77% and a FDI attractiveness level equivalent to 10.24% of the GDP.

[4] From 2008 to 2010, the average growth rate of the Republic of Congo stood at 7.26% for FDI inflows equivalent to 22.15% of the GDP.

[5] Over the same period (2008-2010) the growth rate of Gabon was 2.19% with a FDI attractiveness level equivalent to 1.01% of the GDP.

[6] Here, aspects such as human development, domestic investment, trade policy, infrastructure and natural resources are considered (Nourbakhshian et al., 2012).

$$Y = F(K,L) \quad (1)$$

Where Y is national output, K capital and L labour. At least six hypotheses lay the basis of the analytical framework[7].

Solow (1957) postulates that the marginal productivity of capital and labour are decreasing. It ignores the influence of endogenous technological progress. Furthermore, according to the Solow model, for the same level of given factors, per capita income is the same for all countries (convergence). So it can not explain the differences in levels of per capita income between the poorest and richest countries. Thus, in the absence of any external technological impacts, all economies should converge to zero economic growth. It can therefore explain the growth of South East Asian countries over the past 25 years. In summary, the convergence rate of economic growth is not verified for all regions of the world and the growth rates are vastly different.

New theories on economic growth shell bring more light to these doubtful areas by providing possible answers to the exact origin of technical progress. The model generally used by these theories is the AK model:

$$Y_{it} = A_{it}^{1-\alpha} * K_{it}^{\alpha}, \quad (2)$$

$0 \prec \alpha \prec 1$ Where A_{it} is a productivity parameter attached to the most recent technology used in the industry *i* at a given time *t*. In this equation, K_{it} represents all forms of capital. The main models include: (1) Romer's model (1986) with the accumulation of knowledge, (2) Lucas' model (1988) which is based on the importance of human capital, (3) Romer's model (1990) which is based on research and development (R & D), (4) the role of the state and infrastructures in the Barro model (1990) and (5) the Aghion and Howitt model (1992) based on a destructive creation inspired from Schumpeter's model.

Within this article, the theoretical/conceptual models of Mankiw, Romer and Weil (1992):

$$Y = K^{\alpha} H^{\beta} (AL)^{1-\alpha-\beta} \quad (3)$$

Where 'K' is physical capital, 'H' human capital, 'A' technical progress and 'L' Labour: α, β, and (1-α-β) represent, respectively, the elasticity of physical and human capital, labour and technical progress.

Empirical Review

So far, much has been written on the impact of FDI on economic growth. Although a general consensus is based on a positive impact of FDI on economic growth, some other works instead show that FDI has a negative impact on economic growth. Without being exhaustive, a presentation of the conclusions drawn in some other works will be presented here. Works which concluded that FDI has a positive impact on economic growth shall first be exploited before those that instead concluded that it had a negative impact.

Regarding the impact of FDI on economic growth in general and on the productivity of firms in particular, the first theoretical and econometric studies were done by Caves (1974), who studied the manufacturing sector in Australia, by Blomström and Persson (1983), who analyzed the processing industries in Mexico, and by Globerman (1991), who was interested in the Canadian manufacturing sector using cross-sectional data. In addition to increasing the productivity of local firms, Blomström and Wolff (1994) found that the technological gap between local and foreign companies in Mexico had redressed to one side and a positive impact of FDI economic growth on the other. Balasubramanyam et al. (1996) test the efficiency of FDI in promotion economic growth in a sample of 46 developing countries and find that trade openness is important in the attraction of FDI. It therefore remains an inlet for FDI. Borensztein et al. (1998) found in a sample of 69 developing countries, between 1970 to 1989, that FDI has a positive effect on economic growth if and only if the educational level attains a certain height. In addition, they show that the interactive relationship linking human capital and FDI is positive. The adequately justifies that FDI has an impact on economic growth through human capital which remains the absorptive capacity of technological fillovers (technological externalities).

Moreover, Djankov and Hoekman (1998) examine the effect of FDI on the global productivity of production factors in a group of firms in the Check Republic from 1992-1996. They found that FDI positively and significantly influences the productivity of the various factors. This positive effect is justified by the combination of FDI and technology exchange. Similarly, Lipsey (1999) calculated the coefficient of variation of FDI inflows between 1969 and 1993. He showed that despite its volatility, FDI continues to positively influence economic growth. Basu et al. (2003) found a direct relationship in the short and long term. Alfaro et al. (2004) examined the link between FDI, the financial market and economic growth in a sample of 71 developing countries. They found that FDI positively influences FDI but this requires a development of the financial market.

Li and Lui (2005) also found that FDI positively affects economic growth through human capital. Giovanni and Dieter (2004) take into account the "heterogeneity that exists in the productivity of local and foreign companies. The works of these authors contribute to the debate by focusing on an important determinant cause of the "spillovers" related to FDI, including the advantage of foreign companies over domestic companies with respect to productivity. Blonigen and Wang (2005) show that the factors that influence FDI are different when making a distinction between rich and poor countries on the one hand but, on the other hand, the effect of FDI on economic growth is more significant in developing countries[8]. For Herzer (2009), FDI is positively correlated with economic growth regardless of the estimation techniques used. By establishing interaction with labour force, Bang Vua and Noy (2009) concluded that FDI has a positive impact on economic growth. The results of the study by Adams (2009) on the influence of cumulative foreign direct investment and domestic investment on economic growth in African countries south of the Sahara, show that FDI and domestic investment have is a positive impact on economic growth.

For Alaya et al. (2009), the influence of FDI on economic growth requires the fulfilment of a certain number of conditions. Their study focuses on the analysis of the impact

[7] H1. The countries produce and consume one homogeneous product (product Y), H2. Production is in perfect competition, H3. Technology is exogenous, H4. Technology can be represented by a neoclassical production function based on substitutable factors: capital (K) and labour (L), H5. The aggregate consumption is represented by a Keynesian function. C = c.Y S = (1 − c) Y = s .Y, H6. The employment participation rate of the population is constant. If the population increases at a given rate 'n', the supply of labour (L) also increases at that 'n' rate:

$$\frac{d\log(L)}{dt} = \frac{dL/dt}{L} = \frac{\dot{L}}{L} = n$$

[8] For an empirical review of the impact of FDI on economic growth before the financial crisis (2007) see Ozturk, I. (2007), "Foreign Direct Investment - Growth Nexus: A Review of the Recent Literature", *International Journal of Applied Econometrics and Quantitative Studies*, Vol. 4, N°2, pp. 79-98.

of FDI on economic growth in a sample of eight Mediterranean countries over the period 1975-2004[9]. Using a model with interactive variables strengthens the identification of the channels through which FDI influences economic growth. Using the technique of generalized least squares, the authors show that FDI contributes 21.34% to the economic growth of the sampled countries. This effect is enhanced by the quality of human capital, openness, the rate of domestic investment, government spending and the level of financial development. In conclusion, for these authors, there are certain prerequisites to be met in order to maximize the impact of FDI on economic growth.

Over a very short period, a considerable number of studies are still interested in the influence of FDI on economic growth after the effects of the global financial crisis. Kevin Reiter (2010) found that FDI inflows, accompanied by a high level of human capital contribute to an increase in economic growth for developing countries. They are also interested in the effect of corruption as an institutional variable. Therefore, when the level of corruption is low, FDI seems to directly impact economic growth. Jyh Lin (2010) and Alfaro et al. (2010) arrived at the same conclusion. The first shows that the size of the market interacts with FDI inflows, which contributes 24.5% to the increase in economic growth in China. For the latter, the need for financial development is needed for a rapid influence of FDI on economic growth. Husnain et al. (2011) came up with a positive conclusion in a study that had to do with the influence of FDI on economic growth in Pakistan. He used the technique of ordinary least squares over the period 1975 to 2008. Imoudu (2012) used microeconomic and sectoral data of foreign direct investments to point out their influence on economic growth in Nigeria from 1980 to 2009. Five categories of FDI are therefore analysed[10]. Using all the techniques on time series econometrics such as unit root and co-integration tests, he estimates there is a co-integration vector error. His conclusions show that there is a positive influence on the long-term for FDI in the agricultural, manufacturing and telecommunications sectors. In fact, these sectoral FDIs each contribute to an economic growth of 8%, 2% and 2% respectively. Within the same time frame, FDIs of the oil sector do not contribute to economic growth in Nigeria. In the short term, the impact reduces. Only FDIs in the manufacturing (2%) and telecommunications (1%) sectors positively influence economic growth in Nigeria[11]. In a study of eight developing Islamic countries[12] over the period 1980-2009, Masoudi and Rabie (2012) found that there is a positive impact of FDIs on economic growth: an increase of one percent of FDI contributes to an increase 4.7% of the economic growth of countries in the sample. By focusing on macro-economic stability measured by the rate of inflation, Abdemalki et al. (2012) shows that FDI positively impacts growth. Their study focused on a sample of 87 developing countries divided into three regions (Africa, Latin America / Caribbean and Asia) for the period 1990-2005. The estimation technique is based on the three stage least squares. The positive influence of FDI on growth is explained by the fact that the stability of prices stimulates production, stabilizes or even increases purchasing power and hence the expenditure of private actors which then contributes to economic growth. Other recent studies that have arrived at the conclusion that FDI contributes positively to economic growth could be mentioned (Fatah et al., 2012, Himachalapathy et al., 2012, Aurangzeb and Ul Haq, 2012).

However, Haddad and Harrison (1993) think FDI has no significant impact on economic on economic growth. They examined the data of manufacturing firms in Morocco during the period 1985-1989. The main reason for this conclusion is the fact that the technological gap between local and foreign companies is quite large. Technological spillovers tend to decrease as the gap widens. Kokko (1994 and 1996) came up with the same result for the case of the Mexican economy.

Similarly, Aitken and Harrison (1999) used data from 4000 manufacturing firms belonging to Venezuelan industries, from the period 1976 –1989. The authors found no evidence that supports the existence of technological "spillovers" from foreign direct investment. In summary, FDI does not influence the productivity of various factors of production.

Using a more sophisticated econometric technique (Generalised Method of Moments), Carkovic and Levine (2002) conclude that: “FDI has no specific neither positive nor considerable impact economic growth" (p. 197).

Fort et al. (2008) concludes that FDI does not contribute to economic growth in 48 states of the US between 1978 and 1997. However, the interaction between human capital and FDI seems to have a positive effect on economic growth. For these authors, the non-significance of FDI on economic growth comes from the minimum level of human capital and not from the technological gap as shown in previous studies.

In addition to the failure of the non causality between economic growth and FDI inflows, Mah (2010) and Azman-Saini et al. (2010) instead found that FDI had a negative impact on economic growth. Javed et al. Javed et al. (2012) also concluded that FDI has a negative effect on economic growth. Their study focused on four economies in South Asia (India, Bangladesh, Pakistan and Sri Lanka) between 1973 and 2010. They use the technique of generalized moments and show that an increase of one percent of FDI is accompanied by a 2% reduction in economic growth in Bangladesh and 3, 4 and 3% respectively in India, Pakistan and Sri Lanka. According to these authors, a plausible explanation remains the high concentration of FDI in the extractive and social sector which contribute minimally to economic growth given that they only employ a hand full of persons.

The use of interactive variables may also lead to the conclusion of FDIs having a negative impact on economic growth. For example, Blomström et al. (1994) conclude that the level of education of the population does not contribute significantly to the establishment of a positive relationship between inward FDI and economic growth in developing countries. This finding contrasts with the results obtained by Borensztein et al. (1998) for which FDI stimulates economic growth provided there is a well-educated labour-force and allows qualified personnel to take advantage of technological spillovers generated by foreign investment.

Modelling

The literature review suggests that we use a model of endogenous growth that allows us to integrate several variables. Taking into consideration the formulation specifications of Mankiw, Romer and Weil (1992):

[9] The sampled countries include Algeria, Egypt, Jordan, Lebanon, Morocco, Syria, Tunisia and Turkey

[10] Imoudu (2012) uses FDIs in the agricultural, mining, petroleum, manufacturing and telecommunications sectors.

[11] The advantage of such a study lies in the explanation of the slightest impact of FDI on economic growth on the one hand and contributes to better economic policy recommendations.

[12] The sample of their study comprises of Bangladesh, Egypt, Indonesia, Iran, Malaysia, Nigeria, Pakistan and Turkey.

$$Y = K^{\alpha} H^{\beta} (AL)^{1-\alpha-\beta} \quad (4)$$

The application of the logarithm gives us the following specification:

$$Ln(Y) = \alpha Ln(K) + \beta Ln(H) + \lambda Ln(A) + \mu Ln(L) \quad (5)$$

Where $\lambda = 1 - \alpha - \beta$ and $\mu = 1 - \alpha - \beta$

By integrating individual and temporal horizons in model (5) above, on the one hand, and introducing the variable of foreign direct investment and other variables on the other hand, we came up with the following specification:

$$\begin{aligned} Ln(Y)_{it} &= \alpha_0 + \alpha_1 Ln(IDE)_{it} + \alpha_2 Ln(K)_{it} + \alpha_3 Ln(H)_{it} \\ &+ \alpha_4 Ln(A)_{it} + \alpha_5 Ln(L)_{it} + \alpha_6 Infrast_{it} + \alpha_7 Ouver_{it} \\ &+ \alpha_8 \left[Ln(K) * Ln(IDE) \right]_{it} + \alpha_9 \left[Ln(L) * Ln(IDE) \right]_{it} + \\ &\alpha_{10} \left[Ln(H) * Ln(IDE) \right]_{it} + \alpha_{11} \left[Ouvert * Ln(IDE) \right]_{it} + \mu_{it} \end{aligned} \quad (6)$$

Where $\mu_{it} = \alpha_i + \varepsilon_{it}$, i = 1,…,6 and t = 1980,……..2010.

All the six CEMAC countries are included in the sample. They include, Cameroon=1, Congo=2, Gabon=3, Equatorial Guinea=4, CAR=5 and Chad =6. The time horizon includes any period during which the CEMAC economies have undergone remarkable changes.

Taking into account the interactive variables of the model allows us to identify the channels through which FDI influences economic growth or not. This technique is widely used today. The works of Borensztein et al. (1998), Kumar et al. (2009), Alaya et al. (2009), Yousaf et al. (2011) and Inoudu (2012) can be cited.

The descriptive statistics show low standard deviations for growth, employment, infrastructure, FDI and trade openness. The study variables are presented in the appendix.

In detail, the variables are more stable in Cameroon, CAR and Chad. They remain more volatile in Equatorial Guinea, Congo and Gabon. This observation requires estimation techniques that go beyond the ordinary least squares.

When we analyze the correlation matrix (Table 2), it is observed that the correlation between growth and the explanatory variables are significant and positive except human capital. With a correlation coefficient of 48%, physical capital is the variable that appears to contribute the most to growth. Followed by labour (29.2%), trade openness (15.85%), infrastructure (18.01%) and foreign direct investment (6.13%). These correlations guide on the relative influences of variables. Regarding correlations between explicative variables, it was observed that they have a very low overall correlation between them except for that between human capital and trade openness. One could question the presence of multicollinearity between these variables.

Table 1: Descriptive statistics & results

Variables	Cameroon	Congo	Gabon	Equatorial Guinea	CAR	Chad	Global Model
Ln(Y)	12.80.	11.65.	12.19	9.68.	11.78.	11.91.	11.67.
	(0.085)	(0.097)	(0.076)	(4.39)	(0.04)	(0.20)	(2.02)
Ln(K)	10.76.	11.53	11.68.	7.377.	10.33	8.28	9.99.
	(3.58)	(0.298)	(0.112)	(5.60)	(1.93)	(4.97)	(3.80)
Ln(L)	6.48	5.84.	5.48	5.4	5.96.	6.22	5.84.
	(1.208)	(1.091)	(1.02)	(0.945)	(1.11)	(1.16)	(1.17)
Ln(H)	26.58.	54.77.	41.60.	26.59.	12.91.	0.777.	24.20.
	(8.72)	(12.09)	(6.65)	(12.68)	(1.84)	(0.46)	(20.13)
Ln(FDI)	0.009.	0.74.	0.505.	0.82.	0.007.	0.491.	0.431.
	(0.01)	(1.398)	(1.193)	(1.82)	(0.015)	(1.47)	(1.24)
Infrast	0.61.	0.38	2.37	0.87.	0.209.	0.129.	0.79.
	(0.53)	(0.152)	(0.652)	(0.59)	(0.066)	(0.13)	(0.85)
Opening	0.39	0.877.	0.709.	0.385.	0.309.	0.215.	0.48
	(0.079)	(0.154)	(0.124)	(0.46)	(0.087)	(0.09)	(0.31)
No. of Obs.	31.	31.	31.	26.	31.	31.	31.

Source: Authors

Table 2: Correlation Matrix

	Ln(Y)	Ln(K)	Ln(L)	Ln(H)	Ln(FDI)	Openess	Infrast
Ln(Y)	1.						
Ln(K)	0.4821***	1.					
	(0.0000)						
Ln(L)	0.2924***	0.3338***	1.				
	(0.0000)	(0.0000)					
Ln(H)	0.0928.	0.2386***	-0.1206.	1.			
	(0.3155)	(0.0090)	(0.1913)				
Ln(FDI)	0.0613**	0.0292.	-0.0838.	0.1953**	1.		
	(0.0451)	(0.6925)	(0.2556)	(0.0333)			
Openess	0.1585**	0.2958***	-0.0063.	0.8213***	-0.0185.	1.	
	(0.0307)	(0.0000)	(0.9316)	(0.0000)	(0.8026)		
Infrast	0.1801**	0.1491**	-0.2268***	0.5693***	0.1208.	0.3001***	1.
	(0.0147)	(0.0439)	(0.0002)	(0.0000)	(0.1032)	(0.0000)	

Notes: *, ** and *** represent the significances at 10%, 5% and 1%. Figures in parentheses are increases in value.

Source: Authors

Then, we perform the unit root test on panel data. The panel data has two dimensions: an individual dimension and a time dimension. Thus, individual heterogeneity can affect the relationship between the variables in the long-run.

Generally, there are several root tests on panel data. The main tests are the Levin, Lin and Chu (1992 and 1993) and Im, Pesaran and Shin (2003). For the null hypothesis (H0), the panel is stationary if the p_value is less than 5% and it is not if otherwise.

In Table 3, we observe that all variables are stationary at 1% and 5%, and they therefore maintain a long-term relationship and are integrated as zero. Based on these results, we estimated the model and pooled the results in Table (4).

The results show a positive significance of FDI on economic growth in the CEMAC zone. An increase of one percent of FDI inflows contributes to a 35% increase in economic growth. This result confirms on the one hand, the value of the increasingly growing FDI in the GDP of CEMAC countries, and, on the other hand, the CEMAC countries strive to create a climate conducive for investment. Investment promoting agencies are laying down policies that would ease foreign investment and among these policies;

Table 3: Unit root test on the panel

Variables	Levin_Lin_Chu (p_value)	Im_Pesaran_Shin (p_value)
Ln(Y)	0.5818*** (0.0077)	1.0360 (0.1899)
Ln(K)	1.4932** (0.01923)	-0.2786** (0.0393)
Ln(L)	22.2276*** (0.0000)	-2.6055*** (0.0046)
Ln(H)	NA	NA
Ln(FDI)	-2.4687*** (0.0068)	5.3288*** (0.0091)
Openess	0.8184** (0.0474)	- 0.5409** (0.0293)
Infrast	2.3434*** (0.0001)	4.6849** (0.0102)

Note: *, ** and *** represent the significances at 5% and 1% respectively.

Source: Authors

Table 4: Results of estimates

Variables	Cameroon	Congo	Gabon	Equatorial Guinea	CAR	Chad	Global Model
Ln(Y)1-t							0.96***
							(0.000)
Ln(K)	0.88*	0.095.	0.026.	0.021.	0.081.	0.06	0.002**
	(0.085)	(0.365)	(0.875)	(0.231)	(0.223)	(0.584)	(0.048)
Ln(L)	-1.16*	0.259.	0.950.	0.124*	-0.147.	0.494.	0.001.
	(0.085)	(0.558)	(0.254)	(0.064)	(0.219)	(0.231)	(0.747)
Ln(H)	0.001.	-0.002.	-0.0008.	0.125.	0.004.	-0.57.	0.001***
	(0.753)	(0.431)	(0.892)	(0.523)	(0.390)	(0.641)	(0.004)
Ln(FDI)	43.11**	2.53	103.49*	0.426*	0.012**	27.64**	0.35***
	(0.115)	(0.140)	(0.076)	(0.052)	(0.015)	(0.046)	(0.000)
Ln(K)*Ln(FDI)	-5.26.	0.063*	6.46	1.235.	-9.02.	-0.08.	0.0009.
	(0.174)	(0.095)	(0.101)	(0.142)	(0.312)	(0.762)	(0.258)
Ln(K)*Ln(FDI)	58.26*	0.28	4.51	0.521**	-6.23.	-2.78.	-0.05***
	(0.064)	(0.262)	(0.230)	(0.025)	(0.945)	(0.293)	(0.000)
Ln(H)*Ln(FDI)	0.404*	0.001.	0.078**	0.632.	0.02**	-5.01.	0.0008***
	(0.362)	(0.575)	(0.169)	(0.425)	(0.702)	(0.463)	(0.000)
Infrast	0.60*	-0.08.	-0.056.	0.561.	0.86**	1.22*	0.003.
	(0.096)	(0.392)	(0.290)	(0.215)	(0.028)	(0.056)	(0.760)
Infrast*Ln(FDI)	-42.73.	0.091.	-0.637.	0.568**	0.012.	-21.98.	-0.004.
	(0.025)	(0.671)	(0.128)	(0.023)	(0.218)	(0.154)	(0.565)
Openess	-0.10.	-0.158.	-0.07.	-0.562.	0.140.	-0.62***	-0.11***
	(0.586)	(0.277)	(0.526)	(0.452)	(0.532)	(0.007)	(0.001)
Ouvert*Ln(FDI)	0.00009***	0.00027.	0.000612**	0.0004.	0.00095.	-0.00028**	0.0004.
	(0.001)	(0.167)	(0.026)	(0.351)	(0.701)	(0.033)	(0.131)
_Cons	19.24***	9.32***	6.61.	2.562**	11.55***	8.64***	
	(0.000)	(0.007)	(0.22)	(0.023)	(0.000)	(0.006)	
Num. of Obs.	31.	31.	31.	31.	31.	31.	
Prob>F	0.000.	0.0169.	0.0012.	0.000.	0.002.	0.000.	
R-squard	0.88.	0.92.	0.99.	0.85.	0.90.	0.96.	
Ass. R-squard	0.79.	0.77.	0.96.	0.76.	0.80.	0.93.	
AR1							0.658.
AR2							0.456.
Sargan/Hansen Test							1.658.

Note: The values in parentheses are p-values of the coefficients. . ***, ** And * represent the significances of the error threshold of 1%, 5% and 10% respectively. For the threshold of 5%, if the p-value of the statistical AR1 or AR2 is less than 1.96 then we accept the assumption of independence of errors or the lack of the autocorrelation of errors. At 1%, if the statistical AR1 or AR2 is less than 2.536, the same conclusion is maintained. The P-values of the Sargan / Hansen test widely used to accept the null hypothesis of the validity of instruments. Remember that the overall model is estimated by the generalised moment's method (GMM).
AR1 and AR2 statistics respectively represent autocorrelation tests 1 and tests 2.

Source: Authors

there is tax reduction, infrastructural development, promotion of efficient and effective financial systems (Avom and Ongo, 2012). According to the global model, the positive influence of FDI on economic growth passes through labour and human capital despite their low impact rate. The percentages are 5% for labour and 0.08% for human capital. The results support the conclusion of Boreinsztein et al. (1998), the CEMAC countries should intensify free primary education, diversify training in technical and vocational education, and encourage the learning of new technologies in educational cycles. An increase in human capital and labour contributes to economic growth. As such, the problem of youth employment is especially is a serious problem particularly for the governments of the different countries. The influx of FDI favoured by trade openness policies also contributes to economic growth, an increase of one percent of trade openness accompanied by an influx of FDI increases economic growth by 0.04%.

At the level of each state, FDI contributes a great deal to Gabon's economic growth: 53.49% of the country's economic growth is accounted for by the influx of FDI. The contribution of foreign investors increases economic growth by 43.11%, 42.6% and 27.64% in Cameroon, Equatorial Guinea and Chad respectively.

Despite the positive impact of FDI on economic growth in the Republic of Congo, it is not significant enough. As suggested by the studies of Haddad and Harrison (1993), FDI in the mining sector have a very low impact on economic growth. Labour in the mining industry is provided by foreign institutions. These activities require highly advanced technology. In four of the six CEMAC countries, FDI contributes to economic growth mainly through labour (Cameroon, Congo, Gabon and Equatorial Guinea). As concerns human capital, only Chad has a negative result. It should be noted that the low education levels, together with endemic diseases such as malaria, typhoid fever, among others, inhibit production.

In the case of infrastructure, the coefficient is not significant in the overall model. In Cameroon, 0.60% of economic growth is explained by the contribution of infrastructure. Similarly, 0.86% and 1.22% of the infrastructure level explains the economic growth of the CAR and Chad respectively. Nevertheless, in the CEMAC zone, infrastructure is of a lower quality. Physical infrastructure seems to be limited to the construction of roads and the development of airlines. Different ports are still to be improved and the paved roads do not connect all the capitals of these countries. As concerns ports, in Cameroon, a huge project for the construction of a deep sea water port at Kribi has been launched. Once finished, this port shall be able to harbour large vessels. Moreover, in the Dem. Rep. of Congo, the Pointe-Noire port is about to be reconstructed. At the end of its construction, this port shall help boost trade between Congo and other CEMAC countries.

The results for trade openness are same as that of infrastructure. The rate of trading within the zone is very low; negatively marked by barriers and high custom tariffs. Among CEMAC countries, only Cameroon signed the Economic Partnership Agreements with the European Union which is now its largest export market. Highly land-locked countries such Chad and the Central African Republic increasingly witness a drop in international trade. This reduces the potential for FDI influx. The adoption of a common external tariff, the use of one currency and the economic diversity of partners can change this situation.

Conclusion

This study had as objective to assess the contribution of FDI to the economic growth of the CEMAC zone. After recalling some theories of economic growth, an endogenous growth model coined from the works of Mankiw, Romer and Weil (1992) in which foreign direct investment was introduced as a factor of production. The study shows that FDI contributes positively and significantly both to economic growth across the sub-region as well as in individual member states. In addition, the study suggests that the catalysts of this influence are labour and human capital. These variables are considered as having absorptive capacities of technological spillovers. However, the degree of trade openness does not favour economic growth in the CEMAC zone, and their interaction with FDI though positive, is not significant. As a policy recommendation, the study suggests: (1) the improvement of the business climate in order to attract more FDI, (2) the attraction of foreign direct investors that do not operates in the extraction stage in order to create more jobs, (3) the modernization of infrastructure to facilitate production and reduce costs, and (4) the reduction of custom tariffs as well as the application of the common external tariff adopted by Member States in order to intensify economic integration.

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Appendix: Description of variables and data sources

Variables (label)	Definition	Sources
Foreign Direct Investment (Ln FDI)	Log of annual foreign direct investment in flow, 1980-2010	UNCTAD, 2011
Economic growth (Ln Y)	Log of actual GDP in U.S. dollars obtained by deflating the nominal GDP for all countries	World Bank data, 2011
Human capital (Ln (H)	Gross enrolment ratio in secondary schools. This is the ratio of the total enrolment, regardless of age, and the population of the age group that officially corresponds to the level of secondary education.	World Bank data, 2011
Private Investment (Ln K)	Log of the volume of gross fixed capital creation	World Bank data, 2011
Labour (Ln L)	Log of number of workers	World Bank data, 2011
Trade openness (Open)	Sum of imports and exports in relation to the GDP	World Bank data, 2011
Infrastructure (Infrast)	mobile phone subscribers (per 100 people)	World Bank data, 2011

Source: Author's construction