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# IMPACT OF FOREIGN DIRECT INVESTMENT ON SUSTAINABLE DEVELOPMENT IN SUB-SAHARAN COUNTRIES

**Yamben Michel Freddy Harry [1]**
**Wang-Laouna Benguellah [2]**

## Abstract

The article investigates the direct and indirect effects of foreign direct and indirect investment on sustainable development is an empirical analysis of the relationship between Foreign Direct Investment (FDI) and sustainable development in the WAEMU and ECCAS zones. It examines the impact of FDI on sustainable development in a sample of ten countries[1] during the period 2000-2017. The estimation technique is based on the Generalized Method of Moments based on Dynamic Panel data. After a battery of tests (interdependence, stationarity, co-integration, endogeneity and model identification tests), the results reveal through the prism of co-integration that our main variables have three long-term relationships in the ECCAS sub-region and no long-term relationship in the WAEMU sub-region. In addition, in the WAEMU subregion, an increase of one unit of human development index (HDI) leads to a decrease of 2.41E-10% in FDI; 1.36E-05% in non-renewable energy consumption (CENREN). On the other hand, there is an increase of 0.499551% in carbon dioxide emissions (ECO2); 0.003856% in renewable energy consumption (CEREN); 2.75E-05% in Gross Domestic Product per capita (GDP per capita). In the ECCAS subregion, an increase of one HDI unit reveals a decrease of 1.15E-05% in HDPI, and there is an increase of 3.06E-12% in FDI, 0.005318% in non-renewable energy consumption (CENREN), an increase of 0.089169% in carbon dioxide emissions (ECO2); and 8.85E-05% in renewable energy consumption (CEREN). These results show, on the one hand, that the HDI does not contribute to the increase of the HDP in the ECCAS sub-region (which can be explained by the presence of corruption, lack of employment, low labour costs, political instability in the different countries of the sub-region...) and deteriorates FDI and CENREN in the WAEMU sub-region. In terms of recommendations, in order to have an HDI that can have a positive impact on the HDP, the actions to be taken must focus on improving governance at the level of both the States and the ECCAS sub-region. Diversifying energy sources. Finally, avoid the repatriation of profits to the countries of origin.

***Keywords***: Sustainable development; foreign direct investment; gross domestic product, renewable energy and non-renewable energy

***JEL Codes:*** F64, Q01, Q56.

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1. Teacher/Doctoral Student, Faculty of Economics and Management, University of Maroua, Cameroon, Email: yambenharry@yahoo.fr
2. Teacher/Doctoral Student, Faculty of Economics and Management, University of Maroua, Cameroon, Email: wanglaobeng98@gmail.com

[1] Angola, Cameroon, Congo, Gabon, DRC, Benin, Ivory Coast, Niger, Senegal, Togo

## 1. Introduction

Low sustainable development in the world in general, in the Sub-Saharan African countries is generally at the root of challenges world face in finding or accessing sustainable growth (Danish and al. 2019). Indeed, sustainable development is both an enabler and an outcome of a nation's prosperity (Asongu, 2018; Danish and al. 2018). In this context, this article is an empirical analysis of the impact of foreign direct investment on sustainable development in Sub-Saharan African countries. Indeed, FDI and development are two concepts that are very often associated but rarely sustainable development. ECCAS and WAEMU countries represent a relevant empirical field of application to analyse this impact. And this for at least two reasons. Firstly, because, for more than a decade, these countries have been engaged in vast programs in favor of sustainable development. Indeed, the establishment of the Central African Forest Commission (COMIFAC) in 2002, whose main objectives are the orientation, harmonization and monitoring of forestry and environmental policies in Central Africa, is a perfect illustration of this. Moreover, in parallel with these programs, these countries are continuing their efforts to attract foreign direct investment (Avom and Gandjon, 2012). Moreover, to our knowledge, very few studies dealing with the link between sustainable development and foreign direct investment have focused on African countries. Worse still, in all likelihood there would be no study specific to Sub-Saharan Africa. Indeed, most of the almost recent work on the issue focuses on developed countries and emerging countries Olszak, (2010). This article also aims to fill this gap. We base our research on a statistical analysis using indicators of sustainable development and foreign direct investment. This choice stems from the fact that, to our knowledge, we do not yet have a theoretically sound empirical model that explicitly links sustainable development to foreign direct investment. Even if, following Krugman (1991), a large number of studies on the so-called "new geographical economy"[2] have focused on the location of activities (and/or territorial attractiveness). Therefore, like Olszak, (2010) we bring these indicators closer together in order to highlight possible correlations or, on the contrary, the independence between sustainable development and foreign direct investment.

FDI has a direct impact on host economies, both in developed and developing countries (Louis Kouamé Caningan, 2012). Indeed, FDI can have technological spin-offs, contribute to the formation of human capital, facilitate integration into international trade, foster the creation of a more competitive business climate and this in complementarity with local enterprises and thus serve their development. (Demery, 2003) In addition, FDI can help improve environmental and social conditions in host countries. (Demery, 2003).

Nevertheless, in addition to these positive effects, FDI can also generate certain negative effects which mainly concern the costs borne by the host countries and which are generally manifested by the deterioration of the balance of payments due to the repatriation of profits. (Ikiara, 2003)

[2] NGE : New Geographical Economy

Indeed, Alaya, (2009), demonstrates that if in the 1980s, FDI was considered a threat to national sovereignty because multinational firms were suspected of reducing social welfare, and today we are witnessing a paradigm shift in the attitude of developing countries that have adopted favorable regulations in their policies towards them. Thus, the low level of local savings, the search for new sources of financing and a permanent quest for non-debt generating investments, the poor development of local financial markets, the limited access to international financial markets, the lack of technology and skills, etc... [3]are key reasons why developing countries are moving more towards FDI.(Ajayi, 2006).

However, our empirical results imply that FDI is more productive than domestic investment than when the host country has a minimum threshold stock of human capital. The results are robust to other authors (Borensztein et al., 1998) who control for variables usually identified as the main determinants of sustainable development in cross-country regressions.

We test the impact of FDI on sustainable development in a regression framework using data on FDI flows of ECCAS and WAEMU countries over the period 2000 to 2015. The purpose of this paper is to examine empirically the impact of FDI on sustainable development. Thus, it appears that the main channels through which FDI contributes to sustainable development are the human development index and carbon dioxide emissions. Sustainable development is about improving the well-being of present generations without reducing the possibility for future generations to improve theirs. Thus, considering sustainable development as development that respects the principle of intergenerational equity, what is the nature of the relationship between sustainable development and foreign direct investment in ECCAS and WAEMU countries? In other words, is it a unidirectional or a bidirectional relationship in both sub-regions? Answering this question means conducting a comparative study in the two zones. [4]

The rest of the article is organized as follows. Section two presents a review of the literature on the relationship between sustainable development and foreign direct investment. Section three details the econometric approach implemented and the data. Section four presents and discusses the empirical results and section five presents the conclusion and policy recommendations.

## 2. Literature review

In the neo-classical model anchorage adoubled by Solow (1956), FDI may in the long run affect the level of per capita growth and not the growth rate because of the presence of a steady state. In a model, characterized by the immobility of international production factors, the growth rates of countries at comparable technological levels converge. In the case of factor mobility, this convergence is reinforced. In contrast to this pattern, Romer (1986) develops a new theoretical framework in which technical progress is endogenous,

[3] Alaya and al., «Under what conditions do FDI stimulate growth? FDI, growth and catalysts in Mediterranean countries», *developing world*, n°148, 2009 P. 119-138
[4] ECCAS and UEMOA countries

i.e., yields are increasing and the marginal productivities of the factors of production are greater than unity. Following this work, many authors have tried to study the impact of FDI flows on per capita income.

Annie Valée (2014), in her book of synthesis on a field that has become a speciality in its own right in economics; free of jargon and mathematics, she takes stock of all the theoretical analyses as well as of the concrete practice of environmental policies and the public debates generated by them. She integrates into her research a decade (year 2000) rich in controversies on sustainable development.

Olivier Godard (2015), in his very impressive book, the result of a lifetime of research and teaching, provides an overview of all the analyses published on environmental issues. It is not a tedious catalogue, but a real perspective on economic, sociological and political analyses. Moreover, the author goes beyond this by proposing an innovative and convincing organization of society so that the environment is no longer a "controversial universe", but a collective issue that is taken on board.

Nicolas Buclet (2017), in his research, notes that the dominant economic system generates and aggravates a multitude of ecological and social problems. He discusses the various operational and conceptual avenues (participatory democracy, industrial and territorial ecology, functional economy, etc.) available to us to meet the challenges of sustainable development.

Yvette Veyret, Paul Arnould (2019), show that sustainable development is a complex concept, which considers the environment in its broadest sense: resources, biodiversity, food, health, natural and technological risks, waste management ... What are the new objectives to be achieved and what are the answers? An update on the state of the world and its inequalities: population, resources, health, biodiversity, risks, migration... The multiplication of global responses: major international conferences, legislation, adaptation to change...

De Gregorio (1992), working on a panel of 12 Latin American countries between 1950 and 1985 finds a significant and positive relationship between direct investment and growth. He further notes that the impact of FDI is three times greater than that of domestic investment. Blomstrom et al. (1992) confirm the first result using a sample of 78 developing countries, but working with cross-sectional data. Balasubramanyam et al. (1996) also use a cross-sectional analysis of 46 countries. They conclude that FDI flows affect growth in countries that have also implemented liberalization policies. De Mello (1999) finds complementarity between FDI and domestic investment. However, recent studies have shown that there may be a crowding out effect in some countries. Thus Agosin and Mayer (2000) have shown that in the case of some countries (Central African Republic, Nigeria, Zimbabwe) there is a crowding in effect, while a crowding in effect is observed in Ghana, Côte d'Ivoire and Senegal, while this effect is neutral in Gabon, Niger and Morocco.

In more targeted studies on certain countries, the direction of the FDI-domestic investment relationship is not always systematic. Kokko (1994) has highlighted the presence of a crowding out effect in the case of Mexico. Let us note that Agosin and Mayer (2000) rather

conclude to a neutral relationship. The crowding out effect will also be confirmed in the case of Uruguay by Blomstrom et al. (1994) and in Indonesia by Sjoholm (1999). The lack of consensus is confirmed by authors who reach strictly opposite conclusions for other countries, such as Aitken et al. (1991) for Venezuela. Furthermore, Bosworth and Collins (1999), using the panel approach on 58 countries between 1978-1995, show that there is neither a crowding out effect nor a complementarity effect caused by FDI on domestic investment that can explain sustainable development.

It was in 1980 that the International Union for Conservation of Nature and Natural Resources (IUCN) first referred to the concept of "sustainable development" on the occasion of the publication of its World Conservation Strategy. In doing so, the organization broke with its hitherto narrower view of nature protection and recognized the legitimacy of people's aspirations for economic and social development. The continuation of many phenomena of ecological degradation, the inadequacy of the practical results obtained ten years after the first United Nations Conference on the Human Environment (Stockholm, 1972), despite the creation of the United Nations Environment Programme (UNEP), but also the worsening economic situation of the populations of large parts of the world led the United Nations General Assembly to mandate in 1983 a World Commission on Environment and Development chaired by Mrs. Brundtland, who submitted her famous report four years later in 1987. The latter report did much to impose the reference to "sustainable development" as a new semantic element in the international language and as a focus for the work of experts from international organizations (Hatem, 1990). As a result, much of the pre-existing work on the relationship between environment and growth, or environment and economy, then fell under this new banner, without the differences between them being abolished. The themes that now feed the debates on sustainable development did not therefore emerge with the Brundtland report, which was above all remarkable for the publicity and dissemination it received. Without wishing to go too far back in the analysis of filiations, we can distinguish three main theoretical currents among the thousands of scientists and experts concerned by the analysis of economic development and its consequences on the environment.

As early as the early 1970s, particularly under the aegis of UNEP, a first current of thought (Farvar, 1977; Glaeser, 1984; Sachs; Simonis, 1990) had focused on promoting what were called "eco-development strategies" (Sachs, 1974, 1980, 1993). Conceived as a new approach to development, these strategies focused on satisfying the basic needs (housing, food, cooking energy, water, sanitary conditions, education and health and participation in decision-making) of the most deprived populations, primarily in developing countries, adapting technologies and lifestyles to the specific potential and constraints of each ecozone, recycling waste and organizing the exploitation of renewable resources by designing loop production systems that systematize ecological cycles. They were primarily aimed at populations whose survival and activities were largely organized outside the formal market economy (domestic and peasant economy, informal urban economy), and were based on the direct participation of the populations concerned and the creation of new institutional forms of impetus and planning at the level of human settlements (towns, urban districts, villages) and rural districts.

This approach, which was both pragmatic and critical of the development strategies that had been the dominant driving force since the post-war period, took shape at the level of experimental or exemplary projects based on the initiatives of local population groups or militant or independent organizations, with the assistance of international organizations or public agencies. However, its influence has remained limited due to economic and political obstacles (extension of market logics conveying mimicry of modes of consumption accessible only to the middle classes, and mimicry of technological modernism). National political changes and the restructuring of North-South economic relations then appeared to the promoters of ecodevelopment as necessary conditions for a wider dissemination of this approach. More broadly, a major change in the lifestyles and development patterns of the industrial countries was seen as a sine qua non for a long-term harmonization between the rights to development of all countries and the preservation of the global environment. These radical demands were not to everyone's liking, so that after an initial flash in the pan, ecodevelopment remained confined to the margins.

A second current of thought (Costanza, 1989; Daly, 1977; Georgescu-Roegen, 1978; Passet, 1979) set out to develop a new theoretical representation of economic activity based on a confrontation with the new concepts and models developed by the natural sciences (thermodynamics, evolution and organisation of life, ecology, theory of self-organising systems). They first led to critical formulations: questioning of the idea that the economic system is a self-sustaining process, impossibility of extrapolating local solutions to global solutions due to entropy phenomena, impossibility of a complete recycling of raw materials, non-substitutability between natural capital and reproducible productive capital. They have also tried to find new ways such as eco-energy analysis to complement monetary evaluations. In recent years, all this has led to what is known as the "bio-economy" or "ecological economics", whose interdisciplinary inspiration remains very diverse.

A third stream is an extension of the neoclassical theory of economic equilibrium and growth. Some authors, such as Beckerman, 1974, took pains to deny the existence of a relationship between growth and environmental degradation, believing that there was an error in the target: the theory of growth is organised around the question of savings and investment, i.e. the trade-off on consumption flows over time, whereas environmental problems should be interpreted as inefficiency in the allocation of economic goods at a given time, inefficiency caused by the presence of external effects or public goods. Others have analysed regimes for the exploitation of non-renewable (Dasgupta and Heal, 1979; Solow, 1974) or renewable (Clark, 1973, 1990) natural resources in order to identify the conditions for economically optimal exploitation, to identify the implications for the evolution of these resources, and to draw analytical conclusions for the study of long-term growth and the optimal inter-temporal allocation of well-being. A set of models has also been constructed to analyse the logical implications of an intergenerational equity requirement on optimal growth paths, the consumption levels available to each generation and the conditions for transferring costs from one generation to the next. (Dasgupta, 1978; Henry, 1990; Kneese and Schulze, 1985). The tensions between these three currents are today very largely reflected in the proposals put forward to give content to the objective of sustainable development. Certainly the most commonly accepted definition is one of

those given in the Brundtland Report, (1988): "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs".

## 3. Estimation strategy and data

In order to assess the main objective of this paper, that of analysing the nature of the link between FDI and sustainable development in the ECCAS and UEMOA sub-regions, our methodology is based on two main points. First, we draw on the work of Bruno Emmanuel (2016), from a theoretical point of view, and on dynamic panel models, more precisely a GMM/DPD (Generalized Method of Moments/Dynamic Panel Data) from an econometric point of view, to study the regression of direct and indirect effects on sustainable development. And finally, we will use a test battery to solve problems of endogeneity and heteroscedasticity of variables.

**Table 1:** Global rank of ECCAS and UEMOA countries according to HDI

| | *N°* | *CEMAC countries* | *Rank HDI (2016)* | *Rank HDI (2017)* |
|---|---|---|---|---|
| *ECCAC* | *1* | *Angola* | *145* | *147* |
| | *2* | *Cameroun* | *150* | *151* |
| | *3* | *Congo* | *133* | *137* |
| | *4* | *Gabon* | *109* | *110* |
| | *5* | *RDC* | *176* | *176* |
| *WAEMU* | *6* | *Bénin* | *161* | *163* |
| | *7* | *Cote d'Ivoire* | *169* | *170* |
| | *8* | *Niger* | *188* | *189* |
| | *9* | *Sénégal* | *165* | *164* |
| | *10* | *Togo* | *164* | *165* |

**Source:** Elaborated by the author based on UNDP data.

**Data presentation and descriptive analysis**

To compare our assumptions with reality, our main variables come from the World Development Indicator (2018) database. The main variables are the HDI, ECO2, CENREN, CEREN, GDPH and FDI. The difficulty of having sustainable growth shows how much this study is of capital interest. These cover a period from 2000 to 2017, using the panel data 2000 to 2017 for a sample of 5 ECCAS countries (Angola, Cameroon, Congo, Gabon, and DRC) and 5 WAEMU countries (Benin, Côte d'Ivoire, Niger, Senegal, Togo).

**Presentation of variables**

- The World Bank site (from the World Development Indicator database http://data.worldbank.org. Accessed 6 July 2018) provides data on CO2 emissions, GDP per capita, inward FDI, renewable and non-renewable energy consumption;

- The World Bank site (from the World Governance Indicator database) provides data on instruments such as corruption, political stability, regularity, compliance and annual GDP growth.

The information collected covers the period from 2000 to 2017. The sample of ECCAS and WAEMU countries selected amounts to 10 countries. Data for the other countries are insufficient for some variables and non-existent for others. This is why we excluded 9 countries from the sample in order to work on a dynamic panel.

**Table 2:** Distribution of variables

| *Variables* | *Meaning* | *Database* |
|---|---|---|
| *Ide* | *Inward foreign direct investment flows* | *UNDP, WGI, and WDI* *(World Developpement Indicator)* |
| *Idh* | *Human development index* | |
| *Eco2* | *Carbone dioxide emission* | |
| *Cenren* | *Non-renewable energy consumption* | |
| *Ceren* | *Consumption of renewable energy* | |
| *Pibh* | *Gross domestic product per capital* | |

**Source:** Elaborated by the author based on UNDP, WGI and WDI data.

## 4. Empirical results

This section comment sine step wise manner: the descriptive statistics; the reduced form and sample selection estimates

### Stationarity tests

There are several unit root tests on panel data. The most famous of them are the test of Levine, Lin and Chu, (2002) called LLC; and the test of Im, Pesaran and Shin (2003) IPS called LM-bar test. Both tests are based on the same structure, but the first test (LLC) requires that N /T → 0, while the second test (LM-bar test), more generally applicable, just requires that N /T → k for any finite positive k constant. The IPS test is shown to be identical to the ADF test of Dickey Fuller, (1979). For the purposes of this paper, we have chosen the IPS test in the sense that it is stable, efficient, and better adapted to small panel data.

### Assumptions of the test:

H0: The series is non-stationary;

H1: the series is stationary.

### Decision ruler:

We accept the hypothesis of non-stationarity of the series when the probability of the test is greater than 5%. However, when this probability is less than or equal to 5%, we conclude that the series is stationary.

**Table 3:** Results of the unit root test (Im, Pesaran and Shin, 2003)

| *Variables* | *W-stat (IPS)*[a] | | *P-value* | | *Degree of integration* | |
|---|---|---|---|---|---|---|
| | *WAEMU* | *ECCAC* | *WAEMU* | *ECCAC* | *WAEMU* | *ECCAC* |
| *Ide* | *-1,96424* | *-1,96424* | *0,0248* | *0,0000* | $I^{1b}$ | $I^{1}$ |
| *Idh* | *-2,05696* | *-3,61017* | *0,0198* | *0,0002* | $I^{1}$ | $I^{2c}$ |
| *Eco2* | *-1,70700* | *-2,02640* | *0,0439* | *0,0214* | $I^{1}$ | $I^{1}$ |
| *Pibh* | *-3,89844* | *-2,68032* | *0,0001* | *0,0037* | $I^{1}$ | $I^{1}$ |
| *Ceren* | *-2,22425* | *-3,31650* | *0,0131* | *0,0005* | $I^{1}$ | $I^{1}$ |
| *Cenren* | *-3,40007* | *-3,33698* | *0,0003* | *0,0004* | $I^{1}$ | $I^{1}$ |

(a) means that this is the unit root test statistic of Im, Pesaran and Shin (2003); (b) means that the variable is first-order stationary; (c) means that the variable is second-order stationary.

**Source:** Elaborated by the author based on panel data with the use of Eviews 8 software.

The results of the stationarity test of Im, Pesaran and Shin show that the variables are stationary of order 1; except for the HDI variable of the ECCAS sub-region which is stationary of order 2. We conclude that all the variables are stationary and we accept the alternative hypothesis (H1) at a threshold of 5% and we reject the non-stationarity of the variables.

### Co-integration test

The results of Pedroni's co-integration test show that there are three long-term co-integration equations between our variables in the ECCAS sub-region and no long-term co-integration equation between our variables in the *WAEMU* sub-region. Indeed, in ECCAS, out of the seven statistics of the test, three statistics including two of the within dimension and one of the between dimension reject the null hypothesis of absence of co-integration. This shows that a structural policy and not a conjunctural policy should be put in place.

**Table 4:** Alternative hypothesis: within-dimension

| ***Tests*** | ***Statistiques*** | | ***Probability*** | |
|---|---|---|---|---|
| | ***WAEMU*** | ***ECCAC*** | ***WAEMU*** | ***ECCAC*** |
| *Panel v-statistic$^{w}$* | *-0,284651* | *-0,623024* | *0,9413* | *0,9196* |
| *Panel rho-statistic$^{w}$* | *1,395468* | *1,075103* | *0,9578* | *0,9422* |
| *Panel PP-statistic$^{w}$* | *-0,274904* | *-2,353535* | *0,5740* | *0,0000* |
| *Panel ADF-statistic$^{w}$* | *-0,768591* | *1,497465* | *0,7541* | *0,0452* |

***Alternative hypothesis: between-dimension***

| ***Tests*** | ***Statistiques*** | | ***Probability*** | |
|---|---|---|---|---|
| | ***WAEMU*** | ***ECCAC*** | ***WAEMU*** | ***ECCAC*** |
| *Group rho-statistic* | *2,004461* | *2,136808* | *0,9898* | *0,9837* |
| *Group PP-statistic* | *-5,9963333* | *-7,241386* | *0,5954* | *0,0000* |
| *Group ADF-statistic* | *-0,264016* | *0,046790* | *0,9739* | *0,5187* |

**Source:** Elaborated by the author based on panel data with the use of Eviews 8 software.

### Endogeneity test

The endogeneity test should allow us to know what the statistically significant influences of our model are. Its study is therefore a prerequisite for assessing the dynamics of the model.

**Table 5:** ECCAS endogeneity test

| *VARIABLE* | *COEFFICIENT* | *STANDARD DEVIATION* | *T* | *PROBABILITY* |
|---|---|---|---|---|
| *Endogenous variable* | | | | |
| *Ide* | *$1,70^{E}$-11* | *$3,17^{E}$-11* | *0,54* | *0,614* |
| *eco2* | *0,0288783* | *0,0243873* | *1,18* | *0,290* |
| *Exogenous variable* | | | | |
| *ceren* | *0,0048641* | *0,0003798* | *12,81* | *0,000* |
| *cenren* | *0,0001851* | *0,0000402* | *4,61* | *0,006* |
| *pibh* | *$7,72^{E}$-08* | *$3,89^{E}$-06* | *0,02* | *0,985* |
| *Autocorrelation test* | | | | |
| *AR (1)* | *Z= -0,59* | | *Prob=0,553* | |
| *AR (2)* | *Z= -0,86* | | *Prob=0,391* | |
| *Instrument over-identification test* | | | | |
| *Sargan* | *Chi2(4) = 165,75* | | *Prob=0,000* | |
| *Hansen* | *Chi2(4) = 0,000* | | *Prob=1,000* | |
| *Linear Hypothesis Testing* | | | | |
| *Wald test* | *F(5,5)= 6882,65* | | *Prob= 0,000* | |

**Source:** Elaborated by the author based on panel data with the use of Eviews 8 software.

Table 5 shows that the generalized method of moments yields acceptable prima facie results. The Sargan's test provides evidence that the selected instruments are valid.

**Table 6:** WAEMU endogeneity test

| *VARIABLE* | *COEFFICIENT* | *STANDARD DEVIATION* | *T* | *PROBABILITE* |
|---|---|---|---|---|
| *Endegenous variable* | | | | |
| *ide* | *-8,00$^{E}$-11* | *1,39$^{E}$-10* | *0,57* | *0,591* |
| *eco2* | *0,4782599* | *0,0993913* | *4,81* | *0,005* |
| *Exogenous variables* | | | | |
| *ceren* | *0,0001594* | *0,0001589* | *1,00* | *0,362* |
| *cenren* | *0,003129* | *0,000636* | *4,92* | *0,004* |
| *pibh* | *4,29$^{E}$-06* | *1,59$^{E}$-06* | *2,70* | *0,043* |
| *Autocorrelation test* | | | | |
| *AR (1)* | *Z= -0,44* | | *Prob=0,662* | |
| *AR (2)* | *Z= -0,55* | | *Prob=0,582* | |
| *Instrument over-identification test* | | | | |
| *Sargan* | *Chi2(4) = 78,31* | | *Prob=0,000* | |
| *Hansen* | *Chi2(4) = 0,000* | | *Prob=1,000* | |
| *Linear Hypothesis Testing* | | | | |
| *Wald test* | *F(5,5)= 2496,03* | | *Prob= 0,000* | |

**Source:** Elaborated by the author based on panel data with the use of Eviews 8 software.

Table 6 shows that the generalized method of moments yields acceptable prima facie results. The Sargan's test provides evidence that the selected instruments are valid.

### The estimating equation

Only the variables presented in Table 2 were selected. This table presents the results of the regression performed. We performed a single estimate using the dynamic panel generalized method of moments (GMM/DPD). The regression covers ten countries in Sub-Saharan Africa. The estimation equation of our model is given in Table 7.

**Table 7:** Model estimation

| *Variable* | *Coefficient* | | *Standard deviation* | | *t-statistique* | | *Probability* | |
|---|---|---|---|---|---|---|---|---|
| | ***WAEMU*** | ***ECCAC*** | ***WAEMU*** | ***ECCAC*** | ***WAEMU*** | ***ECCAC*** | ***WAEMU*** | ***ECCAC*** |
| ***Ide*** | *-2,43$^{E}$-10* | *3,06$^{E}$-12* | *8,30$^{E}$-11* | *1,29$^{E}$-11* | *-2,933704* | *0,237988* | *0,0044* | *0,8125* |
| ***eco2*** | *0,499551* | *0,089169* | *0,088148* | *0,031286* | *5,667209* | *2,850091* | *0,0000* | *0,0056* |
| ***Cenren*** | *-1,36$^{E}$-05* | *0,005318* | *0,000108* | *0,000355* | *-0,126227* | *14,99477* | *0,8999* | *0,0000* |
| ***Ceren*** | *0,003856* | *8,85$^{E}$-05* | *0,000329* | *5,46$^{E}$-05* | *9,911043* | *1,638014* | *0,0000* | *0,1056* |
| ***Pibh*** | *2,75$^{E}$-05* | *-1,15$^{E}$-05* | *1,33$^{E}$-05* | *1,11$^{E}$-05* | *2,070887* | *-1,033422* | *0,0418* | *0,3047* |

| | ***WAEMU*** | ***ECCAC*** | | ***WAEMU*** | ***ECCAC*** |
|---|---|---|---|---|---|
| ***R-squared*** | *-2,283667* | *0,275435* | ***mean dependent var*** | *0,414975* | *0,511413* |
| ***Adjusted R-squared*** | *-2,458796* | *0,236792* | ***S.D. dependent var*** | *0,065671* | *0,097647* |
| ***S.E of regression*** | *0,122134* | *0,085306* | ***sum squared resid*** | *1,118758* | *0,545788* |
| ***Durbin-watson stat*** | *1,402894* | *0,419374* | ***j-statistic*** | *0,575061* | *2,649828* |
| ***instrument rank*** | *7* | *7* | ***Prob (j-statistic)*** | *0,750114* | *0,265826* |

**Source:** Elaborated by the author based on panel data with the use of Eviews 8 software

For all estimates, the carbon dioxide emission (ECO2) is highly significant and has the positive sign as opposed to the expected negative sign. Indeed, in the UEMOA sub-region,

the regression results indicate that the consumption of renewable energy (CEREN) has a positive impact on the HDI. The consumption of non-renewable energy (CENREN), on the other hand, is not significant but has the expected negative sign on sustainable development (HDI). The GDP is significantly positive, reflecting the fact that the benefits from FDI are redistributed to workers. While this variable negatively impacts FDI and CENREN, their coefficients are -2.43E-10 and -1.36E-05 respectively. This result in the WAEMU zone indicates that any increase in the HDI/FDI ratio translates, all other things being equal, into a decrease of about 2.43E-11 percentage points in FDI the following year.

The results of the various tests (referring to the 2000-2017 period) show that inward FDI and consumption of non-renewable resources in the WAEMU zone have a negative impact on sustainable development (the HDI). In addition to this result, the revealed importance of the variable indicating the consumption of renewable energy must be added. Firstly, they indicate the importance of the HDPI for the sustainable development of the WAEMU zone, particularly for the improvement of social conditions and the standard of living of the population. Indeed, the fact that FDI inflows are a determinant of ECO2 confirms certain theories defended by the theories of endogenous growth (Solow, 1956) and those favorable to sustainable development; for these, the integration of foreign investment into the local economy has direct effects and significant spillovers for national enterprises and the active labor force. Thus, the arrival of FDI has positive repercussions on the quality of life and the qualification of workers in the WAEMU zone (GDP is significant and positive).

The arrival of foreign investors and workers also has a knock-on and imitative effect on the population. Indeed, the major efforts made by these companies and the State to create a workforce capable of meeting the needs of these investments lead to a change in the structure of society, which seeks to adapt to new lifestyles. The involvement of multinational companies in the construction of rural works for access to education, drinking water and rural electrification plays an undeniable role in this regard.

Secondly, the GDPH evolves in the opposite direction to FDI. This reflects the presence of an indirect channel between these two variables. A channel that we interpret in this research by the presence of corruption, mismanagement, bad governance, misappropriation of public funds and poor control over its companies. Thus, on the one hand, it is not mainly performance in economic growth that has attracted FDI in the WAEMU zone, and, on the other hand, the influx of FDI is not large enough to improve and create sustained growth; shortcomings in the orientation of FDI by sector of activity and in the regional space partly explain this lack of correlation between GDP and FDI. This result may also reflect shortcomings in the choices of development strategy based on an economy of opportunities for internal competitiveness. It is also explained by the great vulnerability of this economy to the international economic and financial situation; attention to the benefit of foreign investors can have limits and does not produce the expected economic effect. This means that foreign direct investment makes a significant contribution to improving the living conditions of the population of the WAEMU zone.

Finally, these results show that all the variables are significant. This means that FDI is at the root of pollution in the WAEMU and ECCAS zones (the ECO2 coefficients are 0.499551 and 0.089169 respectively). Similarly, it is not environmental policies that attract FDI in the WAEMU zone; this could explain why the consideration of environmental conditions is weak (-1.36E-05 for CENREN and 0.003856 for CEREN) in the investment code and the PRSP. However, the long-term relationship indicates a positive coefficient between the CO2 emission rate and the HDI (0.089169) in the ECCAS subregion. Indeed, these countries are still well below their economic objectives, which are mainly satisfied by the exploitation of their natural resources.

However, from the perspective of sustainable development, this result calls on the fact that in the pursuit of economic objectives, environmental imperatives must be taken into account so as not to deviate from social priorities, particularly the improvement of human capital (HDI). It is therefore imperative that production methods be revised, particularly in the industrial sectors that are the biggest polluters in the WAEMU zone. From this perspective, FDIs are also eagerly awaited, as they should be the vectors for the transmission of clean technologies to the economy and national enterprises.

## 5. Conclusion

This article empirically investigated the direct and indirect effects of foreign direct investment on sustainable development and this study cover a period from 2000 to 2017. FDI constitute a channel of transmission to national enterprises of technological processes and production organization. Indeed, foreign firms, by stimulating competition on the local market, encourage the improvement of productivity gains. This is done through new production methods, new expertise introduced and disseminated in the fields of management and distribution. This spill-over effect may extend beyond the sector concerned by direct investment insofar as goods with a more sophisticated technological content require in particular the provision of quality local services based on more elaborate standards. (Ekodo R. and S. Nkot, 2017).

This study has made it possible to carry out some prospective reflections on the impact of foreign direct investment on sustainable development in sub-Saharan countries and to see the nature of the relationship between these two notions. The primary ambition was not to take stock of its functioning, as several studies have done so. In this research, we examined the link between sustainable development and foreign direct investment. The avowed ambition was to verify the nature of the relationship between the two concepts in the context of the WAEMU and ECCAS economies. To do so, our empirical study consisted in comparing composite indicators of FDI and sustainability.

The analysis of the correlation highlights two main results. First, there is a discrepancy between the HDI (a variable capturing sustainability according to UNDP) from an environmental perspective and the inflow of foreign direct investment (FDI). Second, environmentally sustainable development (ECO2) seems to be compatible with foreign direct investment in the *WAEMU* and ECCAS countries. These results would therefore call for the protection of the environment and the well-being of populations to be taken

into account in the formulation and implementation of land-use planning policies in these two zones. However, the emergence of a causal relationship between the two concepts requires the use of econometric methods that make it possible to control for other determinants of foreign direct investment. This necessarily requires the development of a theoretically sound empirical model explicitly linking foreign direct investment to sustainable development.

We further questioned four non-exhaustive conditions for ensuring sustainable development in these areas, including the issues that revolve around these areas. First, improved governance at both state and community levels is helpful in stabilizing institutions to facilitate the location of FDI. Secondly, productive diversification, coupled with structural transformation, would help to reduce the rate of carbon dioxide emissions and improve the future of future generations in the ECCAS zone. Thirdly, better coordination of economic policies would avoid the repatriation of profits to the countries of origin of MNCs but rather their reinvestment in host countries. Implicit in this requirement is a rationalization of the Regional Economic Communities (RECs), and proliferation therefore hinders the entry into force of the decisions taken at the various summits of Heads of State and Government. Fourthly, it is argued that the mobility of factors of production accelerates private investment in the countries of a monetary union. Intra-regional migration contributes to the pooling of the labor force to meet the need for structural transformation. Beyond these four non-exhaustive conditions, sub-Saharan countries raise many challenges, some of which have been mentioned. Imposing environmental standards on firms, especially those that work through subcontractors with production sites in southern countries.

Finally, to get a fuller picture of the relationship under study, it would be interesting to further investigate if the effect of foreign direct investment on sustainable development is actually modulated or mediated by home produced sustainable growth.

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