

Empirical study of Foreign Direct Investment in the participation of Sustainable Development achievement in Africa: Does FDI help to achieve Human Development?

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ABSTRACT: Through times, African leaders have started considering Foreign Direct Investment as an important path to Sustainable Development achievement. Despite the tremendous empirical studies supporting this assumption, there is a lack of studies on FDI implication in human development on the continent. In contrast with studies on the topic in the African region, the present study chose human development index and FDI percentage of GDP respectively as dependent and independent variables, economic variables relative to FDI with possible social influence as control variables. Through analysis using empirical methodologies, three findings of, 1) Foreign Direct investment plays a role in Human development on the African continent, 2) The role played by Foreign Direct Investment in Human development is on a long-term, and 3) Unfortunately, Foreign Direct Investment plays a negative role in Human development on the African continent; each one percent increase of FDI towards the continent decreased the HDI at a scale of 0.24-0.97 percent with difficulty of readjustment to equilibrium between HDI and FDI. Therefore, FDI has a negative impact on Africa' social Sustainable Development and may possibly be caused by lack of FDI' social responsibility (schools and hospitals facilities construction) or the presence of few FDI which doesn't really contribute to the national and individual real income.

KEYWORDS: Africa, Foreign Direct Investment, Human Development, Human Development Index, Sustainable Development.

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I. INTRODUCTION

1.1 Research background and literature review

Ten years after the United Nations conference on the Human Environment, several environmental challenges are still inadequately addressed. Inaction by many Nations to stop environmental burdens caused by economic activities; led to the United Nations General Assembly to vote the resolution 38/161 "Process of preparation of the Environmental Perspective to the Year 2000 and Beyond" in 1983. The resolution resulted into the establishment of the World Commission on Environment and Development (WCED), also known as the Brundtland commission.

Established in 1983 and lead by Gro Harlem Brundtland, Brundtland Commission consisted of four strategic missions on propositions to overcome the environmental burdens with the implication of the international community. In 1987, Brundtland commission published its report "Our Common Future" which made a call for a new way of development, "Sustainable Development" (SD).

SD defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" [1] and was strongly recommended to all countries as an inclusive social, environment and economic integration in their development framework, to save our world and provide a brilliant future. In response to it, the international community took major decisions such as; environment protection through use of alternative energy sources (UNCED, 1992), promotion of the right to education and health (ICPD, 1994), promotion of gender equality (1995) among others [2]. To materialize its participation to SD achievement, in 2001 at Lusaka the New Partnership for Africa's Development (NEPAD) was launched by African heads of state with primary objectives to lead the continent to SD, through NEPAD' Coordinating Agency (NPCA) in charge of the earlier adopted Millennium Development Goals (MDGs) implementation on the continent. MDGs also aimed at targets such as; to eradicate extreme poverty and hunger, to achieve universal primary education, to promote gender equality and empower women, to reduce child mortality, to improve

maternal health, to combat HIV/AIDS, malaria, and other diseases, to ensure environmental sustainability, to develop a global partnership for development before the year 2015. Referring to the 2016's MDGs to Agenda 2063/SDGs- Transition Report, achievement of the MDGs goals in the African region registered positive outcomes. For instance, decrease of hunger percentages, decline in gender parity, poverty reduction and high access to education were reported. Despite the positive outcomes of the MDGs, many targets such as reduction of the rate of child mortality in the Sub-Sahara Africa, sanitation improvement (70% of Africans still suffer from lack of access to improved sanitation facility), poverty reduction (41% of Africans still live with less than \$1.25 a day), increase access to education (33 million of out-of-school in primary age are in Sub-Saharan Africa) and provide a better living environment still in need to be improved in the African region; thus the Sustainable Development Goals (SDGs) framework aimed at achieving what MDGs shortcomings, particularly in reaching the most vulnerable.

Foreign Direct Investment (FDI), commonly defined as an investment operated at least with 10% of shareholder by a direct investor in a direct investment enterprise of a host country in purpose to have a lasting interest [3], is considered as a path for developed and developing countries economic growth [4] [5]. For instance, in developed countries, FDI has a long-run positive effects on their economic growth [6], contribute to the spread of best environmental practices and clean environment promotion [7] [8], increase employment due to work force demand, enhance life expectancy due to better medical assistance and eradicate poverty [2] [9]. Concerning developing countries and especially the African continent, Ndambendia and Njoupouognigni (2010) analysed 36 Sub-Saharan African countries over the period 1980-2007 and found strong evidence supporting the positive impact of FDI on economic growth in the region [4]. The idea of the positive impact of FDI has also been supported by Seetanah and Khadaroo (2007), after their study on the relationship between FDI and the economic performance on 39 Sub-Saharan African countries during the period from 1980 to 2000. To understand the increase of FDI in the past twenty years and its importance in developing countries, Tomasz Michalowski used a linear regression model on 34 Sub-Saharan African countries 'average share of FDI in GDP and changes in average GDP growth rates in 1981-1990 and 2001-2010. The findings supported the role of FDI in economic growth in the sub-Saharan region [4]. Henri Bezuidenhout (2009) expressing concerns of the increased official aid to Africa in 2005, extended the debate to analyse the economic growth impact of official aid and FDI, especially in southern Africa. He used 17 southern African countries panel data from 1990-2005 with GDP per capita as the dependent variable; a negative link between FDI and economic growth in southern Africa was concluded [10]. Adeolu B. Ayanwale used data from 1970 to 2002 to examine the effects of manufacturing FDI on Nigeria's economic growth using ordinary least squares and the 2SLS method. The authors were more in favour of the positive contribution of FDI on Nigeria economic growth and recommended the need to encourage it. O. Augustina Nkechi using human capital as a vehicle for FDI inflows enhancement and the latter a positive economic growth impact in Ghana, found that sustaining FDI was a positive instrument of economic growth in the long run [11]. This was also supported by other studies which used time series economic data with FDI as dependent variable from 1980-2010, confirming that the robustness of FDI in economic growth based on Ghana' study [5]. In contrast to the group of authors supporting FDI importance in African countries' economic growth, authors such as Frimpong and Abayie (2006) were more in favour of the inexistence of such a link. For instance, in a causal link study between FDI and GDP growth for Ghana for the pre and post-structural adjustment program (SAP) periods and study on the direction of the causality between the two variables using an annual time series data, covering the period from 1970 to 2005; inexistence of a causality between FDI and growth for the entire period was found. Results from different empirical studies also denote the contribution or lack of it by FDI to regional or African countries economic growth, one important pillar of SD achievement. Therefore, considering research backing economic growth as a country sustainable development indicator, FDI, economically may be taken as a vehicle in the achievement or not of SD [12].

Others researchers were more concerned with the social impact of FDI on the African continent. Studies on the impact of FDI on Human capital or welfare improvement on the continent have been encountered. Some authors[13], impressed by the increase of FDI inflows to the continent, estimated the need for analysing the linkage between FDI and human capital or welfare improvement and its possible contribution to SD [14]. Onyeagu Augustina Nkechi (2011), in his empirical study on FDI impact on Ghana economic growth as seen previously, confirmed that FDI contributed to human capital through capital formation boosting or country quality of capital stock enhancement [11]. Luc N. Ndeffo (2010), in studying the link between FDI and human capital development in sub-Saharan Africa, captured human capital by using the percentage of children in full-time education in primary and secondary schools in sub-Saharan Africa. According to the author, FDI contributes to human capital development through its participation in children education on the continent despite the less proportion of FDI oriented to the sector [13]. G. Gohou et al. addressed SD achievement's question and FDI's critical role in its realization through poverty alleviation on the African continent. The contribution of FDI to human development improvement in Africa has been the standpoint of analysis. Concerning the role played by FDI, authors have suggested its positive contribution in poverty reduction, especially in the central and east

African region. In the same line of thought, further studies concerning FDI and poverty alleviation throughout human development improvement, access to the 52 African countries human development index, FDI, aid per capita and others social variables are needed. Empirical studies reveal the effectiveness of FDI in poverty reduction or welfare improvement on the continent, especially in the Lower-middle, Upper-middle, or High-income African countries [14]. To be consistent with the results on the linkages previously discussed, few authors have considered a group of African countries sharing same geographical and socio-economic realities. Therefore, [15] the contribution of FDI to welfare improvement in the North African region, an empirical study was conducted using several variables among which human development (considered as welfare measurement) and FDI were the main variables. The main findings revealed the existence of a strong and significant contribution of FDI flows to welfare improvement in the North African region.

.Transfer of technologies for massive production is widely considered as one of the advantages of FDI. Unlike the developed countries with stringent environmental regulations in their economic growth process, developing countries have flexible environmental measures which create an atmosphere of pollution haven of technology transferred. Facing the huge amount of FDI received by the African continent, several authors have focused their study on FDI's environmental impact. A .SHEHU USMAN et al. explored the relationship between FDI and the operations of Multinational Corporations (MNCs) on sustainable development in Nigeria (one major destination for FDI inflow in West Africa). CO₂ emission was the measure of environmental degradation. Annual data spanning from 1970 to 2005 was the base to investigate whether the "pollution haven" or "pollution halo" scenario holds in Nigeria. By applying the Autoregressive Distributed Lag (ARDL) approach to co-integration to examine the nature of the relationship, the authors supported the inexistence of a possible relation between FDI and CO₂ emission thus, confirming a scenario of "pollution halo". Moreover, they implied; if CO₂ is considered as a measure of environmental degradation, more FDI inflow will be beneficial and compatible with sustainable development [16].

The past decade, the African region' FDI inflows have gradually increased (up to USD 70 billion) [17]. Besides, some African leaders like Mr. Adesina (AFDB's president) consider FDI as a positive and best way for SD achievement in Africa. In contrast to the nucleus that FDI could be part of the process of SD in the African region and although FDI increases one quarter of African countries economic growth by 7 per cent or more; this makes a number of African countries among the fastest growing economies in the world. This is despite the African region presenting an ambiguous paradox of glowing gross domestic product (GDP) figures with the lowest levels of human and social development with a large part of the population trapped in poverty, facing rampant unemployment and inequality [18].

1.2 Research study aim and objective

Based on the above literature review, this paper intends to re-examine the relationship between FDI flows and SD achievement in Africa. Other studies have analysed difference in the causal link between FDI and welfare improvement, sustain economic growth or environmental issues; this present study' standpoint is more focus on the contribution of FDI to human development in Africa. Therefore, based on an empirical analysis of the impact of Foreign Direct Investment on the Human development in Africa, this study attempts to contribute to the debate on Sustainable Development in the African region.

1.3 Research content

The study will provide an empirical analysis on FDI role and impact on the HD improvement in Africa; its social implications on sustainable development achievement in the African region. Several recommendations and conclusions will be drawn for better efficiency of FDI in the process of SD achievement through Human development improvement. Additionally, limitations of the study will be discussed.

II. RESEARCH METHODOLOGY, SAMPLE AND DATA

2.1 Methodology

The research conducted in this paper is based on the link between FDI and human development in the African region. Annual data from 20 African countries from 2000-2015 was collected and used. Variables as Foreign Direct Investment percentage of the GDP, GDP per capita, GDP growth and Gross Capital Formation were considered in the analysis.

Obtained from World bank' World Development Indicators (WDI) and Human Development Index annual Report on the UNDP database, the variables were subjected to tree basic empirical analyses. Firstly, panel data analysis was used to examine the regression relationship between FDI and human development on the African continent. Secondly, the existence of long-run relationship between FDI and human developing through panel co-integration analysis was examined. In the analysis, the stationarity of the variable using panel unit root tests, the existence of co-integration through Pedroni and Kao test (1999) and the long run relationship estimation with panel Fully Modified Ordinary Least Square (FMOLS) and Dynamic Ordinary Least Square (DOLS) methods were tested and considered. Thirdly, analysis used was to estimate a panel vector error correction model (VECM) in order to check on the percentage for the return to equilibrium of the series.

2.2 Sample

To complete the literature concerning FDI contribution to welfare and wellbeing and especially to HD promotion for SD achievement in Africa, the present study used a balanced panel dataset sample. This included data for 20 African countries for years ranging from 2000-2015. The countries were selected from the first 25 African countries having a good Human Development Index (HDI) indicator and based on the African countries' HDI ranking for 2015; the selected countries are presented in TABLE 1 divided into five regions.

Table 1: Selected Countries

Countries Regional Location	Countries
North Africa	Algeria Tunisia Egypt Morocco
South Africa	Mauritius Botswana South Africa Namibia Zambia
West Africa	Ghana Nigeria Benin Cote d'Ivoire
East Africa	Kenya Ethiopia Uganda
Central Africa	Republic of Congo Equatorial Guinea Cameroon Gabon

Source: African countries' HDI ranking for 2015

2.3 Data

Table 2: Different Variables

Variables	Variables description	Data sources
Dependent Variables		
HDI	Human Development Index	HDI is from the Human Development Report (HDR) of the UNDP
Independent Variables		
FDIGDP	FDI/GDP	World Bank World Development Indicators (WDI)
Control Variables		
GDPGR	Gross Domestic Product Growth	World Bank World Development Indicators (WDI)
GDPPC	Gross Domestic Product per Capita	World Bank World Development Indicators (WDI)
GCF	Gross Capital Formation	World Bank World Development Indicators (WDI)
CIVILLIB	Civil Liberty Rating	www.FreedomHouse.org

Dependent variables

In analyzing the health, education and living standards' impact of FDI on the African continent using HDI and FDI, several variables can be used to fulfill it. For instance, GDP per capita or poverty incidence indicator are mostly used in studies concerning FDI and welfare relationship analysis. GDP per capita is limited in that it only captures the economic side, while the poverty incidence indicator, although being better indicator for human well-being improvement analysis, lacks year-year long time data. Therefore, for better analysis, UNDP's Human Development Index (HDI) was selected as the main dependent variable. This is a statistical composite which captures income, life expectancy, and educational attainment of individual nations thus, is a good indicator for human development analysis. Secondly, its data is complete and is available for the desired timeframe. Finally, with interpretation as a country with high HDI reflecting a higher lifespan, higher education level and higher GDP per capita, the composite is mostly considered as the best indicator for the countries welfare or human development appreciation.

Independent variable

Few empirical studies related to the subject concerning the African continent have used a set of FDI variables as independent variable. R. Tamer (2013), used FDI flows per capita, FDI as a percentage of GDP,

ODA flows per capita and ODA as a percentage of GDP[14] while other studies, used Real per capita net FDI inflows, net FDI inflows-to-GDP ratio and the net FDI inflows-to-gross capital formation (GCF) ratio (FDIGCF). For an accurate analysis, FDI net inflows as percentage of GDP was chosen as independent variables in this study. FDI net inflows as percentage of GDP give a real estimation of FDI inflows participation in a country economic growth. FDI inflows per capita is a better choice, however, to avoid bias due to unequal wealth repatriation and inequality in the population, an overall indicator index of FDI participation on the overall economy can be better capture its impact on African country population improvement.

Control variable

As suggested in the literature review, FDI is the core of most economic development on the African continent. Attracted by several drivers such as human capital improvement, better political environments among others, its impacts are beneficial to the social, environmental and political development. Therefore, FDI can be considered as a direct and indirect factor of human being development, which has a positive impact on human well-being improvement and HDI improvement. The control variables used in this study were economic variables able to translate to economic and social performance.

Gross Domestic Product Growth (GDPGR). GDPGR, expresses the health status of an economy i.e. the better is it, the better the economy. Theoretically, an increase in GDPGR can create an increase of the national workforce productivity which could influence the national real income. This gives more opportunity to the government to have necessary funds for satisfying government national investment needs in education, health and other social sectors without high indebtedness. Hence, GDPGR is expected to have a positive impact on human development if higher and negative if low.

Gross Domestic Product per Capita (GDPPC). Better living standards give help satisfy human needs from health-care to education. GDPPC expresses the productivity of a country's workforce in a given nation. Theoretically, better the GDPPC, the better the real income per individual. Hence, the higher the individual' real income, higher is the possibility for the individual to purchase more goods and services to contribute to their well-being. Hence, GDPPC is expected to have a positive impact on human development if higher and negative if low.

Gross Capital Formation (GCF). Based on the World Bank analysis, theoretically, an increase in GCF is able to increase a country' GDP. To create more capital formation, the government should receive more taxes. This deprives households of satisfying their social needs for paying their taxes but at the same time give them better social living environment because of the reinvestment of the savings mostly towards social fields by the government. Thus, GCF is used to capture the size of the government investment in the nation. Indeed, it can be justified by the fact that capital formation is high in governments who constantly invest in their populations' well-being enhancement through investment in educational and health-care facilities. Therefore, the expectation is a positive impact of GCF on HDI.

Based on the realities faced by countries on the African continent in terms of civil liberties such as presence of dictatorial regimes, a special control variable was added; civil liberties rating. Theoretically, Civil Liberties are measured on a one-to-seven scale, with one representing the highest degree of freedom and seven the lowest. It is used to capture the degree of freedom for political activism which is an aspect of human well-being since a freedom status is aimed to affect human being mental and physical conditions.

III. EMPIRICAL ANALYSIS AND RESULTS

3.1 Analysis based on Panel data model

3.1.1 Model Analysis

Panel data is a statistical method widely used in social sciences. Panel data is generally operated using a simple regression model using the equation as follows:

$$Y_{it} = \alpha + \beta x_{it} + \epsilon_{it} \quad (1)$$

Where Y is the dependent variable, X the independent variable, α and β are coefficients, i and t are indices for individuals and time and lastly ϵ_{it} for the error term. The current study' main purpose is to analyze FDI and HDI correlation. This will clarify if FDI' contribution to HDI improvement on the African continent, which will employ the following regression analysis:

Where Human Development is the dependent variables representing the HDI, X_{it} is the independent variable representing FDI, Z_{it} is for the control's variables defined in TABLE 2.

First of all, to test the correlation between the dependent and the independent variables, the regression was estimated using fixed effect model (FEM) and Random effect model (REM). Fixed effect model was executed in two ways. Firstly, without dummies and secondly with regional dummies to pick up unobserved regional dummies using LS on purpose to observe alpha since the latter couldn't be directly observed. Later, random effect model was also executed but, without dummies because it could not be executed using dummies. To conclude, the Hausman-test was conducted to study the correlation between dependent and independent

variables. Hausman test null hypothesis stipulated H_0 = Random Effect Model is appropriate while Alternative Hypothesis H_1 = Fixed Effect Model is appropriate. In addition, the test statistic had an asymptotic which specified the hypothesis which fit the test. When the computed chi-square value exceeds the critical chi-square value for given d.f and the level of significance, we concluded that REM is not appropriate because the random error term is probably correlated with one or more regressors. Thus, FEM is appropriate, meaning, the existence of a correlation between independent and dependent variables.

Table 3: Results of Panel Data Model

	FEM	REM	Hausman test
Without dummies			
FDI	-0.000848 [-1.155312] (0.2489)	0.000970 [-1.01055] (0.1484)	-
GDPGR	0.009562 [4.539263] (0.0000)*	0.008234 [9.983288] (0.0001)*	
GDPPC	-0.010449 [-4.875464] (0.0000)*	0.009247 [-4.329571] (0.0000)*	
GCF	0.001164 [4.208415] (0.0000)*	0.001330 [4.863522] (0.0000)*	
CIVILLIB	-0.004795 [-0.926212] (0.3551)	-0.008271 [-1.740479] (0.0828)***	
R-square	0.897685	0.151958	
chi-square value	-	-	20.813798
chi-square d.f	-	-	5
Prob	-	-	(0.0009)*
With dummies			
FDI	-0.002773 [-2.376041] (0.0181)*	No test	No test
GDPGR	-0.005801 [-2.015225] (0.0447)**	-	-
GDPPC	0.004312 [1.440935] (0.1506)	-	-
GCF	0.002757 [7.578930] (0.0000)*	-	-
CIVILLIB	-0.026050 [-6.148097] (0.0000)*	-	-
R-square	0.656671	-	-

Note:*, ** and *** indicate stationarity at 1%, 5%, and 10% significance levels, respectively. Values in parentheses indicate the possibilities and in bracket the t-statistic.

3.1.2 Analysis of Panel data results

The aim of the empirical analysis is to see if FDI contributes to human development in the African region. The first step of our study tested the correlation between FDI and HDI through FEM and REM without regional dummies. Results showed that unlike REM, the FEM equation was statistically right with an R-squared of 89% and FDI was negatively insignificant at 24.89% although the control variables presented excellent insights as predicted the outcomes. The Hausman test applied revealed that FEM was the most appropriate model thus, FDI and HDI positively correlated.

Based on the FEM, statistical insignificance at 24.89% meant no correlation between the dependent and independent variables and the Hausman test's result testified the existence of a correlation, this contrast is confirmed in previous studies with FDI's regional efficiency as a result, as estimated with regional dummies for FEM (TABLE 3). As result, on the continent, FDI is negatively significant at 1.81%. In the northern part of the continent, FDI was positively significant at 0.00001% while in the southern part the results were inclusive. At each increase of FDI inflow, the HDI in the north region increase by 9.7%. In the west and east part of the continent, a negative significance at 0.0001% in both regions was observed; where as FDI inflow increased, the HDI decrease by 9.6% and 8.9%, respectively. The results indicate that the presence of conditions such as the control variables used provided excellent insights and predicted the outcomes. GDPPC was an exception because of its insignificance (Appendix TABLE 4).

3.2 Analysis based on Panel Co-integration

After obtaining results using the panel regression model, further analysis using the Panel co-integration between the main variables of the current study (HDI and FDI) was done. For an accurate result, stationarity of the variables was tested using panel unit root tests.

3.2.1 Panel Unit Root Test

Recent studies have proposed several test methods for unit root test in panel data. This study used the summary test for more conclusive results. The summary test method included Levin, Lin and Chu (2002) LLC, Breitung (2000) and Im, Perasan and Shin (2003) and Fisher type test using ADF and PP. The test as null hypothesis, H_0 = the existence of unit root in the variable. The results are presented in TABLE 5.

Table 5: Results of Panel Unit Root Tests

Summary Test Method		I(0)				I(1)			
Variables		LLC	IPS/ Breitung	ADF	PP	LLC	IPS/Breitung	ADF	PP
CIVIL LIB	Individual Intercept	(0.008) -2.384*	(0.020) -2.048**	(0.030) 35.988**	(0.1726) 28.092	(0.000) -6.900*	(0.000) -7.737*	(0.000) 80.501	(0.000) 93.012*
	Individual intercept and trend	(0.0001) -3.801*	(0.039) -1.764**	(0.045) 41.846**	(0.094) 38.206***				
FDI	Individual Intercept	(0.000) -7.356*	(0.000) -6.699*	(0.000) 117.738*	(0.000) 110.431*				
	Individual intercept and trend	(0.000) -6.867*	(0.000) -6.110*	(0.000) 105.763*	(0.000) 121.872*				
GDPP C	Individual Intercept	(0.000) -6.887*	(0.000) -5.731*	(0.000) 110.205*	(0.000) 138.162*				
	Individual intercept and trend	(0.000) -7.558*	(0.000) -5.208*	(0.000) 99.984*	(0.000) 143.028*				
GDPP R	Individual Intercept	(0.000) -4.042*	(0.000) -5.112*	(0.000) 110.392*	(0.000) 141.313*				
	Individual intercept and trend	(0.000) -7.654*	(0.000) -5.620*	(0.000) 100.716*	(0.000) 145.592*				
GCF	Individual Intercept	(0.049) -1.695*	(0.5706) 0.1780	(0.733) 34.073	(0.825) 31.640	(0.000) -12.766*	(0.000) -10.823*	(0.000) 179.32	(0.000) 231.775
	Individual intercept and trend	(0.0090) -2.367*	(0.097) -0.217**	(0.078) 53.250***	(0.3837) 42.014	(0.000) -12.834*	(0.000) -9.938*	(0.000) 157.31	(0.000) 213.514
HDI	Individual Intercept	(0.000) -4.333*	(0.06) -1.500**	(0.063) 54.493***	(0.126) 50.338	(0.000) -16.805*	(0.000) -15.129*	(0.000) 248.24	(0.000) 481.359
	Individual intercept and trend	(0.0000) -11.849	(0.000) -7.247*	(0.000) -7.802*	(0.000) 124.221*	(0.000) -16.919*	(0.000) -5.758*	(0.000) -13.640	(0.000) 211.314

Note:*, ** and *** indicate stationarity at 1%, 5%, and 10% significance levels, respectively. Values in parentheses indicate the possibilities. Lag length is selected automatically according to the Schwarz criterion.

3.2.1.1 Analysis of Panel Unit Root Test result

TABLE 5 includes the level and first difference level results of unit root tests applied using Summary method test respectively with HDI, GCF, FDI, GDPPC, GDPGR and CIVILLIB. As presented, firstly the control variables GDPGR and GDPPC as well as the independent variable (FDI) were already stationary at I(0). According to the literature, when a variable is stationary at I(0), it has a high probability of being stationary at I(1) (a). Secondly, the results for the variables GCF and HDI also showed their stationarity at I(1) in the absence of stationarity at I(0) in some tests; IPS/Breitung (individual intercept) and ADF for GCF and PP (individual intercept with and without trend) for HDI. Lastly, the CIVILLIB variable, considering hypothesis (a), the variable' PP result at individual intercept at I(0) and its results at I(1), we can confirm that CIVILLIB is also stationary at I(1). Based on literature and the logic of Bartlett sustaining the indifference between test with only individual intercept and intercept with trend and hypothesis of co-integration; the results in this study confirm the existence of stationarity for all variables at the same level I (1) thus, implying their integration at the same

order. Therefore, there is existence of co-integration among them. From our study standpoint, the independent variable (FDI) strongly impacted the dependent variable (HDI). Concerning the control variables, the current outcome also helps to confirm our earlier argument (control variable mechanism of influence on HDI during their selection). Therefore, GDPPC strongly helps control the individual real income impact on HDI, while GDPGR helps to control the national real income influence on HDI, GCF the size of government investment influence on HDI and finally CIVILLIB, the political activism freedom influence on HDI.

3.2.2 Panel Co-integration Test

3.2.2.1 Panel Co-integration Test applying Pedroni (1999)

The stationary status of the variables led to a co-integration analysis which was applied to investigate the existence of a long-run relationship between variables, especially FDI and HDI. The Pedroni (1999) Co-integration Test was applied in this study to explain the long-run relationship between FDI and HDI, firstly in the presence of control variables and later without control variables. FDI and HDI data for the period 2010-2015 for the 20 African selected countries was used. This test developed by Pedroni (1999, 2004) proposed seven panel co-integration statistics under null hypothesis $H_0: \pi = 0$. The seven tests are based on individual intercept. The co-integration panel model of the relationship between HDI and FDI of the countries was described using equation (2) in presence of control variables and without control variables (3). Results are presented in TABLE 6 and 7, respectively.

$$HDI_{it} = \beta_{0it} + \beta_{1it} FDI_{it} + \beta_{2it} GDPGR_{it} + \beta_{3it} GDPPC_{it} + \beta_{4it} GCF_{it} + \beta_{5it} CIVILLIB_{it} \quad (2)$$

Table 6: Results of Panel Co-integration Test applying Pedroni Residual Co-integration Test with control variables

Panel Statistics				
	Statistic	Prob.	Statistic	Prob.
	-1.806568	(0.9646)	-2.997991	(0.9986)
Panel v-Statistic	2.348639	(0.9906)	2.721678	(0.9968)
Panel rho-Statistic	-8.883857*	(0.0000)	-12.67875*	(0.0000)
Panel PP-Statistic	-7.048267*	(0.0000)	-8.192373*	(0.0000)
Panel ADF-Statistic				
Group Statistics				
	4.289923	(1.0000)	-	-
Group rho-Statistic	-15.45269*	(0.0000)	-	-
Group PP-Statistic	-7.785854*	(0.0000)	-	-
Group ADF-Statistic				

Note:*, ** and *** indicate stationarity at 1%, 5%, and 10% significance levels, respectively. Values in parentheses indicate the possibilities.

$$HDI_{it} = \beta_{0it} + \beta_{1it} FDI_{it} + \beta_{2it} GDPGR_{it} + \beta_{3it} GDPPC_{it} + \beta_{4it} GCF_{it} + \beta_{5it} CIVILLIB_{it} \quad (3)$$

Table 7: Results of Panel Co-integration Test applying Pedroni Residual Co-integration Test without control variables

Panel Statistics				
	Statistic	Prob.	Statistic	Prob.
	-1.198097	(0.8846)	-1.372223	(0.9150)
Panel v-Statistic	-1.983759**	(0.0236)	-1.695957**	(0.0449)
Panel rho-Statistic	-3.312775*	(0.0005)	-3.257090*	(0.0006)
Panel PP-Statistic	-1.887735**	(0.0295)	-2.620229*	(0.0044)
Panel ADF-Statistic				
Group Statistics				
	0.288226***	(0.6134)	-	-
Group rho-Statistic	-3.113276*	(0.0009)	-	-

Group PP-Statistic

Group ADF-Statistic -2.425395* (0.0076) - -

Note:*, ** and *** indicate stationarity at 1%, 5%, and 10% significance levels, respectively. Values in parentheses indicate the possibilities.

3.2.2.1.1 Analysis of Panel Co-integration Test Results applying Pedroni (1999)

Pedroni Co-integration Test which investigates the long-term relationship between variables especially FDI and HDI in the presence of control variables rejected the hypothesis $H_0 =$ no co-integration between the variable. The four of the panel statistics results were statistically significant at level of 1% while two of the group statistics were also statistically significant at 1% level (TABLE 6).

For an accurate result, Pedroni Co-integration Test was also conducted on FDI and HDI variables, without control variables. The hypothesis $H_0 =$ no co-integration between the variables was also rejected. Three of the test results of the panel statistics were statistically significant at level 1%, while two others were statistically significant a level of 2.36% and 2.95%, respectively. Two of the group statistics are statistically significant at 1% level.

Therefore, the existence of a co-integrated relationship between the variables FDI and HDI was noted. There was a significant relationship between FDI and Human Development in the long term. Hence, FDI and Human Development on the African continent act together in long-term and this analysis indicated and confirmed the existence of a long-run relationship between the variables.

3.2.2.2 Panel Co-integration Test applying Kao test (1999)

For accurate results, Kao test (1999) was also applied to confirm the Co-integration relationship between FDI and HDI in the presence and absence of control variables. The null hypothesis was $H_0 =$ No co-integration. The relationship between HDI and FDI for the co-integration panel model was given by the following equations:

1- With control variables :

$$HDI_{it} = \alpha_i + \beta_1 x_{1it} FDI_{it} + \beta_2 x_{2it} GDPGR_{it} + \beta_3 x_{3it} GDPPC_{it} + \beta_4 x_{4it} GCF_{it} + \beta_5 x_{5it} CIVILLIB_{it} + \epsilon_{it}, \quad i = 1 \dots N \text{ and } t = 1 \dots T \quad (4)$$

2- Without control variables:

$$HDI_{it} = \alpha_i + \beta_1 x_{it} FDI_{it} + \epsilon_{it}, \quad i = 1 \dots N \text{ and } t = 1 \dots T \quad (5)$$

Table 8: Results of Panel Co-integration Test applying Kao Test without control variables

Kao (1999)		
	Statistic	Prob.
Augmented Dickey-Fuller Test Equation (ADF)	6.799687	0.0000

Table 9: Results of Panel Co-integration Test applying Kao Test without control variables

Kao (1999)		
	Statistic	Prob.
Augmented Dickey-Fuller Test Equation (ADF)	7.603691	0.0000

3.2.2.2.1 Analysis of Panel Co-integration Test Results applying of Kao Test

Kao test performed with null hypothesis $H_0 =$ No co-integration on one hand under control variable and on the other without; both cases resulted in significance at 1%. The results implied the co-integration existence between FDI and Human Development on the African continent thus, indicating a long-run relationship between the variables on the continent. Given that the variables are co-integrated, the next step was to estimate the long-run equilibrium relationship with fully modified OLS estimator (FMOLS) and dynamic OLS estimator (DOLS).

3.2.3 Panel Co-integration test with modified and dynamic OLS

The OLS estimator is a biased and inconsistent estimator when applied to the co-integrated panel. For this reason, a fully modified OLS estimated (FMOLS) which becomes a dynamic OLS estimator (DOLS) to give dimension to the “group mean” in the long run relationship as suggested by Pedroni. These estimators allow for a larger flexibility in the presence of heterogeneity in the examined co-integrated vectors (Pedroni 1999, 2000, 2001, 2004).

Table 10: Panel Co-integrated Regressions using Panel FMOLS and DOLS

Dependent Variable: Applied equation (4)		
Method	FMOLS	DOLS
FDI	[-1.608535] (0.1093) -0.002442***	[-2.909003] (0.0039) -0.009763*

Note: *, ** and *** indicate stationary at 1%, 5%, and 10% significance levels, respectively. Values in parentheses indicate the possibilities and in bracket the t-statistic

3.2.3.1 Analysis of Panel FMOLS and DOLS results

Results of panel FMOLS and DOLS models are presented in the Table 10. Panels FMOLS and DOLS results for the 20 selected African countries suggest that; in presence of the FMOLS panel test, FDI series is negative and statistically significant at 10% level. Thus, an increase of FDI by one percent would create a decrease of HDI by 0.244 percent. According to the panel DOLS panel test results, FDI was negatively significant at 1% level. The results also showed that an increase of FDI by one percent would create a decrease of HDI by 0.976 percent for the selected African countries sample. Theoretically, the results mean the existence of a negative long-run relationship between FDI and human development. In other words, FDI presents the existence a negative long-run relationship with human development on the African continent.

3.3 Analysis base on Vector Error Correction model (VECM)

After determination of the existence of the co-integration between dependent and independent variables and confirmation of a long-term relationship between them, direction of causality should be checked to determine at which percentage the return to equilibrium can be realized between the variables. The Vector Error Correction model (VECM) has been used for this purpose. The Panel Vector Error Correction was estimated in presence of control variables using a two-period lag length with the help of Schwarz criterion. The results are reported in TABLE 11 (see appendix).

Secondly, to determine the existence of the direction of causality on the long run equilibrium, literature recommended determination of the P value using the equation (6) below:

$$D(HDI)=C(1)*(HDI(-1))+0.104267018798*FDI(-1)+0.101147728673*GDPGROWTH(-1)-0.048721382257*GDPCAPITA(-1)+0.0141410990601*GCF(-1)+0.0218681949632*CIVILLIBERTIES(-1)-1.74787267795)+C(2)*D(HDI(-1))+C(3)*D(HDI(-2))+C(4)*D(FDI(-1))+C(5)*D(FDI(-2))+C(6)*D(GDPGROWTH(-1))+C(7)*D(GDPGROWTH(-2))+C(8)*D(GDPCAPITA(-1))+C(9)*D(GDPCAPITA(-2))+C(10)*D(GCF(-1))+C(11)*D(GCF(-2))+C(12)*D(CIVILLIBERTIES(-1))+ C(13)*D(CIVILLIBERTIES(-2)) + C(14) (6)$$

The results are reported in TABLE 12 (see appendix). In this latter, two models with different dependent variables can be seen respectively in C (1) and C (2). Considering the first equation, C (1); its error correction term. Theoretically, when C (1) is negative and significant, there is a long run causality running from independent variable to dependent variable or we suggest there is a speed of adjustment towards long-run causality. The results present in Table 12 are negative and insignificant for C (1). In this case, we can see there isn't a speed of adjustment towards long-run causality.

IV. CONCLUSION

Sustainable Development is considered as development against environmental negative externalities due to human being economical behaviour in our society and encourages an integrated economic, social and environmental politics for a stable development. The concept, have been officially introduced to the international community in 1987 through Brundtland report. To complete Sustainable Development, African countries have started to consider FDI as a factor able to contribute to its achievement. To prove the fact, several empirical studies were conducted on different African countries or regions to analyse the positive relationship between Foreign Direct Investment and Sustainable Development achievement. Analyses were from different standpoints; economic, social and environment, and respectively used different dependent variables as GDP or economic growth, welfare, human capital development and halo or haven pollution index. For most cases, studies were conclusive of the existence of a positive relation between Foreign Direct Investment and Sustainable Development. Nevertheless, few African countries showed the existence of a negative relationship between foreign direct investment and sustainable development.

To complete the literature on the role played by FDI on SD achievement on the African continent and especially from the social standpoint, the present study focused on the less empirically studied area; the participation of foreign direct investment in human development.

According to the SDGs, Human Development is a crucial point in SD achievement. Human Development Index (HDI) is the most used index to express the former achievement. It is a composite of education, health and income status. As showed by literature, FDI in most cases was found as a vehicle of social improvement through economic means. In fact, FDI economically boosts countries real income and taxes income thus, also participates in individual income improvement. Those outcomes, later help the government to achieve their social attributions through hospitals and education facilities construction. To the individual, it helps in providing the necessary purchasing power to acquire social services (health-care, education) and goods needed for human well-being. Hence, to confirm or reject the previous assumption between FDI and HD in Africa, analysis on FDI relationship and role on Human development achievement using FDI as independent variable and HDI as dependent variable was conducted on the African continent with a sample of 20 African countries using only economic variables as control one.

For accurate result and political realities on the continent, a special politic control variable has been added; CIVILLIB. Variables have been selected in function of their mechanism of influence on human development (section 2.3). Besides, three empirical methodologies have been applied. The first methodology, Panel data model, indicates FEM as the best model. In the presence of regional dummies, it reveals the existence of a negative relationship between FDI and Human Development Index for the whole Africa while north and south region of the continent denoted the existence of a positive relationship. The results showed that each one percent increase of FDI on the African continent decrease the HDI by a scale of 0.277 percent. The second methodology, Panel co-integration, showed that the existence of co-integration in the long run between FDI and human development on the continent in absent or not of control variables. As required for our analysis, in presence of controls variables, it confirmed the existence of a negative long-run relationship between FDI and HDI. The results also showed that each one percent increase of FDI towards the continent decreased the HDI at a scale of 0.24-0.97 percent. The third methodology, tested the readjustment to equilibrium on the long run was inclusive thus, indicating the difficulty of readjustment to equilibrium between HDI and FDI.

HDI, the dependent variables is known as a composite of income, health and education which translates to human development status. The better it is, better is the lifespan, the education level and the GDP per capita thus, human development. Interestingly, our results revealed that FDI (which is supposed to have a positive impact on the HDI because of its economical role in individual real income increase (GDP per capita)), negatively impacted the variable. Considering the aspects taken into account by the HDI and the economic role of FDI, the existing negative impact of FDI on HDI on the African continent may be justified by the absence of FDI' social responsibility (schools and hospitals facilities construction) or the presence of some FDI which doesn't really contribute to the individual and national real income as presented in the literature. In other words, most of the FDI received by the continent may be industry and services oriented with lack of social responsibility contributing to human development improvement or some may pay a wage inferior to the standard of living. This reduces the real income of the economic agent and chance of satisfying its health-care, education or social needs.

Hence, despite FDI help towards human development through the economic means, it still needs to create favourable social conditions for human development promotion on the continent. Concerning FDI participation in SD achievement on the continent, the present study using the HDI showed that FDI had a negative impact on Africa's social Sustainable Development thus, on its Sustainable Development. For better equilibrium and full positive role of Foreign Direct Investment in the process of Sustainable Development especially from human development standpoint, proper measures have to be taken.

V. RECOMMENDATIONS

Sustainable Development has defined to enclose mutual achievement in three sectors: economic, environment and social. Facing the reduced number of literature on FDI' social achievement to analyse the latter participation on SD achievement, the present research focus was on the social impact of FDI through its participation on human development. With regards to results obtained, African countries still need severe economic and social measures to consider for more social FDI' efficiency to achieve SD.

The following recommendations were suggested:

- 1) Political framework should be implemented to control and ensure that Industrial or services oriented FDI effectively create qualified employment opportunities for the population.
- 2) Policies should be created to direct industrial or services oriented FDI to consider their social responsibilities for human development through participation in education or health sector facilities construction thus, helping African government who sometimes lack of financial resources to fulfill their social responsibilities.

- 3) Priority should be given to social-oriented FDI especially those pairing with the social SDGs directed at human development achievement.
- 4) African countries should ensure that social oriented FDI or social responsibilities of industrial or services oriented FDI are pairing with host African countries social needs for human development.
- 5) National accountability should be created to follow FDI inflows contribution to human development in the host African country.
- 6) African countries should also play an active role in their population human development purposely to create pre-conditions to facilitate FDI better achievement on the matter.
- 7) African countries should create policies able to make FDI create a better environment for human abilities (health, knowledge and better life living) enhancement.
- 8) Countries should direct FDI in a way that the latter should help governments in their goal to achieve SD' social goals.
- 9) Governments should ensure a minimum wage pairing with social realities of the host countries to be paid by investors. This will help the economic agent to have an average income to cover it health, his education or child education and satisfy is others basic need for its well-being satisfaction.
- 10) African countries should create periodical evaluation on the human development status in purpose to have an idea about the social needs of their population.

VI. Limitations and perspectives

Despite the empirical methodologies used to be able to have the present results, it is important to note that the present study had some limitations. First of all, it only considered the 25 first high ranked human development index' countries thus, limiting the number of countries per region. Secondly, the question of human development has been studied as a whole and not divided in its three dimensions (education, health and income). Thus, for further studies, in maintaining the same variables, attempts to enlarge the number of countries and conducted a study towards continental and regional impact of FDI in Africa or see which dimension of the human development received more positive or negative effects from FDI and which African countries are more affected (negatively and positively).

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Appendix

Table 4: Results of Panel Data Model with dummies (full results)

Dependent Variable: HDI
 Method: Panel Least Squares
 Date: 04/04/18 Time: 01:23
 Sample: 2000 2015
 Periods included: 16
 Cross-sections included: 20
 Total panel (balanced) observations: 320
 HDI=C(1)+C(2)*FDI+C(3)*GDPGROWTH+C(4)*GDPCAPITA+C(5)*GCF
 +C(6)*CIVILLIBERTIES+C(7)*D1+C(8)*D2+C(9)*D3+C(10)*D4

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.628307	0.027328	22.99161	0.0000
C(2)	-0.002773	0.001167	-2.376041	0.0181
C(3)	-0.005801	0.002879	-2.015225	0.0447
C(4)	0.004312	0.002992	1.440935	0.1506
C(5)	0.002757	0.000364	7.578930	0.0000
C(6)	-0.026050	0.004237	-6.148097	0.0000
C(7)	0.097622	0.013883	7.032009	0.0000
C(8)	0.016714	0.018191	0.918820	0.3589
C(9)	-0.096561	0.016277	-5.932541	0.0000
C(10)	-0.089362	0.015199	-5.879581	0.0000
R-squared	0.656671	Mean dependent var		0.549317
Adjusted R-squared	0.646703	S.D. dependent var		0.115927
S.E. of regression	0.068906	Akaike info criterion		-2.481408
Sum squared resid	1.471873	Schwarz criterion		-2.363648
Log likelihood	407.0253	Hannan-Quinn criter.		-2.434384
F-statistic	65.88041	Durbin-Watson stat		0.602837
Prob(F-statistic)	0.000000			

Table 11: Panel Vector Error Correction Estimates

Error Correction:	D(HDI)	D(FDI)	D(GDPGROWTH)	D(GDPCAPITA)	D(GCF)	D(CIVILLIBERTIES)
CointEq1	-0.003245 (0.00384) [-0.84563]	-1.804402 (0.27561) [-6.54700]	-1.579033 (0.43680) [-3.61501]	-1.637746 (0.42368) [-3.86554]	-1.861772 (0.50206) [-3.70829]	0.057743 (0.03656) [1.57929]
D(HDI(-1))	-0.582359 (0.06150) [-9.46961]	-6.182886 (4.41678) [-1.39986]	6.971060 (6.99997) [0.99587]	5.881534 (6.78971) [0.86624]	18.89712 (8.04575) [2.34871]	-0.821750 (0.58594) [-1.40245]
D(HDI(-2))	-0.355084 (0.06089) [-5.83164]	-11.92271 (4.37308) [-2.72639]	1.794001 (6.93072) [0.25885]	3.639391 (6.72254) [0.54137]	-1.906973 (7.96616) [-0.23938]	-0.757135 (0.58014) [-1.30509]
D(FDI(-1))	0.000691 (0.00074) [0.92822]	-0.317516 (0.05345) [-5.93993]	0.102385 (0.08472) [1.20855]	0.089524 (0.08217) [1.08946]	0.074533 (0.09737) [0.76542]	-0.009739 (0.00709) [-1.37339]
D(FDI(-2))	0.000533 (0.00067) [0.79232]	-0.021231 (0.04832) [-0.43934]	0.116077 (0.07659) [1.51563]	0.104887 (0.07429) [1.41194]	0.768022 (0.08803) [8.72470]	0.009028 (0.00641) [1.40825]
D(GDPGROWTH(-1))	0.005351 (0.00455) [1.17576]	0.387422 (0.32685) [1.18533]	0.344580 (0.51801) [0.66520]	0.225597 (0.50245) [0.44900]	-0.500592 (0.59540) [-0.84077]	0.000272 (0.04336) [0.00627]

D(GDPGROWTH(-2))	0.000637 (0.00463) [0.13763]	0.782155 (0.33261) [2.35158]	0.196718 (0.52714) [0.37318]	-0.406855 (0.51130) [-0.79572]	1.886233 (0.60589) [3.11315]	-0.009033 (0.04412) [-0.20473]
D(GDPCAPITA(-1))	-0.006335 (0.00467) [-1.35791]	-0.354494 (0.33508) [-1.05792]	-0.863525 (0.53106) [-1.62603]	-0.730795 (0.51511) [-1.41872]	0.412952 (0.61040) [0.67652]	-0.006306 (0.04445) [-0.14185]
D(GDPCAPITA(-2))	-0.000616 (0.00477) [-0.12922]	-0.739471 (0.34252) [-2.15889]	-0.581607 (0.54285) [-1.07139]	0.044948 (0.52655) [0.08536]	-1.714099 (0.62395) [-2.74715]	0.007957 (0.04544) [0.17511]
D(GCF(-1))	-0.000505 (0.00040) [-1.27253]	0.007655 (0.02849) [0.26871]	0.089600 (0.04515) [1.98462]	0.082568 (0.04379) [1.88550]	-0.036334 (0.05189) [-0.70019]	0.004342 (0.00378) [1.14887]
D(GCF(-2))	-0.000273 (0.00036) [-0.76635]	0.030777 (0.02558) [1.20318]	-0.055201 (0.04054) [-1.36163]	-0.051682 (0.03932) [-1.31430]	-0.177656 (0.04660) [-3.81257]	0.008002 (0.00339) [2.35804]
D(CIVILLIBERTIE S(-1))	0.010611 (0.00594) [1.78494]	-0.021101 (0.42694) [-0.04942]	-1.412588 (0.67663) [-2.08767]	-1.392316 (0.65631) [-2.12143]	1.554823 (0.77772) [1.99921]	-0.139096 (0.05664) [-2.45587]
D(CIVILLIBERTIE S(-2))	0.009867 (0.00573) [1.72262]	0.554274 (0.41136) [1.34741]	-0.349911 (0.65195) [-0.53671]	-0.510553 (0.63237) [-0.80736]	-0.267530 (0.74935) [-0.35702]	-0.026322 (0.05457) [-0.48233]
C	0.012947 (0.00225) [5.74494]	-0.009479 (0.16185) [-0.05856]	-0.105925 (0.25651) [-0.41294]	-0.154491 (0.24881) [-0.62093]	0.372383 (0.29483) [1.26303]	-0.012130 (0.02147) [-0.56493]
R-squared	0.351890	0.389471	0.412049	0.415848	0.522884	0.145475
Adj. R-squared	0.317640	0.357207	0.380979	0.384978	0.497671	0.100318

Table 12: Results of P-value estimation

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.003245	0.003837	-0.845634	0.3979
C(2)	-0.582359	0.061498	-9.469609	0.0000
C(3)	-0.355084	0.060889	-5.831639	0.0000
C(4)	0.000691	0.000744	0.928223	0.3534
C(5)	0.000533	0.000673	0.792319	0.4283
C(6)	0.005351	0.004551	1.175756	0.2399
C(7)	0.000637	0.004631	0.137633	0.8905
C(8)	-0.006335	0.004666	-1.357910	0.1747
C(9)	-0.000616	0.004769	-0.129223	0.8972
C(10)	-0.000505	0.000397	-1.272528	0.2034
C(11)	-0.000273	0.000356	-0.766347	0.4436
C(12)	0.010611	0.005945	1.784941	0.0745
C(13)	0.009867	0.005728	1.722620	0.0852
C(14)	0.012947	0.002254	5.744936	0.0000
C(15)	-1.804402	0.275608	-6.546997	0.0000
C(16)	-6.182886	4.416776	-1.399864	0.1618
C(17)	-11.92271	4.373081	-2.726386	0.0065
C(18)	-0.317516	0.053454	-5.939925	0.0000
C(19)	-0.021231	0.048324	-0.439341	0.6605
C(20)	0.387422	0.326848	1.185330	0.2361
C(21)	0.782155	0.332609	2.351575	0.0188
C(22)	-0.354494	0.335085	-1.057923	0.2903
C(23)	-0.739471	0.342525	-2.158885	0.0310
C(24)	0.007655	0.028486	0.268709	0.7882
C(25)	0.030777	0.025580	1.203179	0.2291
C(26)	-0.021101	0.426935	-0.049424	0.9606
C(27)	0.554274	0.411363	1.347407	0.1781
C(28)	-0.009479	0.161851	-0.058564	0.9533
C(29)	-1.579033	0.436799	-3.615006	0.0003
C(30)	6.971060	6.999974	0.995869	0.3195
C(31)	1.794001	6.930723	0.258848	0.7958
C(32)	0.102385	0.084718	1.208545	0.2270
C(33)	0.116077	0.076587	1.515632	0.1298
C(34)	0.344580	0.518008	0.665202	0.5060

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C(35)	0.196718	0.527139	0.373180	0.7091
C(36)	-0.863525	0.531062	-1.626033	0.1042
C(37)	-0.581607	0.542854	-1.071388	0.2842
C(38)	0.089600	0.045147	1.984621	0.0474
C(39)	-0.055201	0.040541	-1.361629	0.1735
C(40)	-1.412588	0.676633	-2.087672	0.0370
C(41)	-0.349911	0.651953	-0.536711	0.5915
C(42)	-0.105925	0.256512	-0.412943	0.6797
C(43)	-1.637746	0.423679	-3.865535	0.0001
C(44)	5.881534	6.789709	0.866242	0.3865
C(45)	3.639391	6.722538	0.541372	0.5883
C(46)	0.089524	0.082173	1.089461	0.2761
C(47)	0.104887	0.074286	1.411938	0.1582
C(48)	0.225597	0.502448	0.448995	0.6535
C(49)	-0.406855	0.511305	-0.795719	0.4263
C(50)	-0.730795	0.515110	-1.418715	0.1562
C(51)	0.044948	0.526547	0.085363	0.9320
C(52)	0.082568	0.043791	1.885504	0.0596
C(53)	-0.051682	0.039323	-1.314296	0.1890
C(54)	-1.392316	0.656309	-2.121435	0.0341
C(55)	-0.510553	0.632370	-0.807364	0.4196
C(56)	-0.154491	0.248807	-0.620929	0.5347
C(57)	-1.861772	0.502056	-3.708293	0.0002
C(58)	18.89712	8.045754	2.348707	0.0190
C(59)	-1.906973	7.966158	-0.239384	0.8108
C(60)	0.074533	0.097375	0.765423	0.4441
C(61)	0.768022	0.088028	8.724700	0.0000
C(62)	-0.500592	0.595397	-0.840770	0.4006
C(63)	1.886233	0.605892	3.113147	0.0019
C(64)	0.412952	0.610402	0.676525	0.4988
C(65)	-1.714099	0.623955	-2.747153	0.0061
C(66)	-0.036334	0.051892	-0.700191	0.4839
C(67)	-0.177656	0.046597	-3.812572	0.0001
C(68)	1.554823	0.777721	1.999205	0.0458
C(69)	-0.267530	0.749353	-0.357015	0.7211
C(70)	0.372383	0.294834	1.263025	0.2068
C(71)	0.057743	0.036563	1.579294	0.1145
C(72)	-0.821750	0.585937	-1.402454	0.1610
C(73)	-0.757135	0.580140	-1.305089	0.1921
C(74)	-0.009739	0.007091	-1.373387	0.1698
C(75)	0.009028	0.006411	1.408249	0.1593
C(76)	0.000272	0.043360	0.006274	0.9950
C(77)	-0.009033	0.044125	-0.204727	0.8378
C(78)	-0.006306	0.044453	-0.141853	0.8872
C(79)	0.007957	0.045440	0.175115	0.8610
C(80)	0.004342	0.003779	1.148872	0.2508
C(81)	0.008002	0.003393	2.358043	0.0185
C(82)	-0.139096	0.056638	-2.455874	0.0142
C(83)	-0.026322	0.054572	-0.482333	0.6296
C(84)	-0.012130	0.021471	-0.564926	0.5722

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