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# Impact of Foreign Direct Investment on Welfare in Africa: Empirical Evidence from Guinea

Oumar Keita\* Baorong Yu

School of Insurance and Economics, University of International Business and Economics, Beijing, 100029, China

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ABSTRACT

The recent economic and financial hardship has resuscitated controversies over the role of Foreign Capital in economic growth and welfare enhancement in emerging nations, particularly in Guinea. The literature that scrutinizes the causal interaction among FDI and poverty alleviation is relatively abundant, the fundamental statement shared by these empirical studies is that GDP growth is assumed to be relevant proxy of people well-being. However, Guinea and its FDI attraction policies have not been well approached by some of these paper. This empirical study examines the interaction between FDI inflows and poverty alleviation in Guinea from 1990 to 2017. The Human Development Index (HDI) and the per capita FDI net inflows are respectively employed as key welfare and FDI indicators.

The findings from the Error Correction Model (ECM) confirm that, in the long term the variables converge in the same direction. The outcomes also exhibit that per capita FDI in the long run, negatively impacts welfare but not significantly, while Inflation's coefficient remains positive and significant. With trade openness, we still found the same positive interaction but not significant.

The results from the Auto Regressive Distributed Lag Model (ARDL) exhibit that per capita FDI flows [current value and L2.] have positive but not significant impact on HDI whereas FDI [L1] has a negative interaction with welfare at 10% significance level. The trade openness variable [current value] is negatively but not significantly associated with HDI, while inflation [L1 and L2] influence on human advancement is positive and significant.

Overall, Foreign direct investment in Guinea is still resource seeking investment which impact on the domestic economy is very limited. Hence, government should introduce new policies and incentives in order to attract more market seeking or other types of FDI that may promote inclusive growth and alleviate poverty.

## 1. Introduction

The Sustainable Development objectives (SDOs), also known as the universal Goals, defined 17 commitments to

be reached by all member states of United Nations, as a comprehensive appeal for poverty alleviation, planet protection and ensure that population everywhere enjoy peace and prosperity by 2030. The attainment of these objectives

*\*Corresponding Author:*

Oumar Keita,

School of Insurance and Economics, University of International Business and Economics, Beijing, 100029, China;

Email: Oumar.keita2016@yahoo.com

will significantly improve human advancement and promote social welfare around the globe.

Unfortunately, Guinea at present, as many other African nations, has gone a little off track on reaching these goals and an important amount of capital investment is needed to keep them back on track. A major provenance of this capital can be Foreign Direct Investment (FDI), since in the Guinean context, the private sector has been playing a crucial role in driving economic growth. Hence FDI's main role in the achievement of (SDGs) objectives does not need to be demonstrated. Furthermore, with the existing economic and financial hardship, the attainment of the SDOs objectives is even more compromised since most of the industrialized, capital well-endowed nations are setting fiscal and monetary rules to maintain capital home. WORLD BANK'S report clearly display that remittances from 2009 to 2014 lessened by 8.3% in Sub Saharan African region. Such decline involves potential challenges for Guinea and many other African countries. In addition, with the contingencies and uncertainties which characterized the international environment, some multinational corporations are annulling or delaying investments in Africa; about 70 billion US\$ of FDI towards African countries have been annulled in 2014 (representing 17% of the 393 billion US\$ of total FDI stock).

To entice more foreign capital, new pro-private investment rules and procedures have been established by emerging nations that may help multinationals to open branches and subsidiaries around the world without major difficulties. In this respect, Guinean government makes great effort on attracting foreign capital to promote inclusive growth, reduce unemployment and alleviate poverty. This is grounded on the assertion that inward investment is a mean of gaining capital, know how, best managerial practices and technologies that are not accessible in the recipient country<sup>[1]</sup>.

Strategies and efforts to transform Guinea's economy may be analyzed through different political regimes that the country has known. From 1958-1984, major reforms have been introduced such as: achieving the country's economic independence through the creation of the national currency (Guinean Franc, which later become the Syli). Additionally, Authorities placed great emphasis on building a planned economy and collectivist society throughout the state control of commerce, consolidation of the state monopoly over all the production and distribution channels except the mining concessions which were managed by multinational corporations.

Overall, the outcomes of these reforms were not satisfactory. Apart from the 1974-1976 period corresponding to the mining boom, where growth recorded an average annual rate of nearly 6%, other periods were marked by weak rate

or even negative growth. Economic growth was estimated at -2.9% in 1977, -1.1% in 1981, -5% in 1983 and -1.4% in 1984. Likewise, the outstanding debt as a percentage of GDP was estimated at 74.52% in 1984.

With the military coup in April 1984, the government advocated a new liberal economic, social development model with a great emphasis on: macroeconomic stabilization, openness to investment and liberalization of trade, followed by the state's disengagement from the productive sectors and distribution channels. New fiscal and monetary policies led by the INTERNATIONAL MONETARY FUND (IMF) and world bank were instituted such as the floating regime of the Guinean currency (Guinean franc), rationalization of tax structures, establishment of a new investment code and one-stop shop designed to FDI attraction. Following these institutional reforms, foreign investment inflows moved from 69 million (USD) in 1986 to 1,6 billion (USD) in 2016.

Even though Guinea's foreign investment inflows have considerably augmented since 1990, some remarks and comments are worth mentioning. Primary, foreign direct investment has a positive impact on the recipient country by creating employment, driving GDP growth, alleviating poverty in the long-run. However, among the total population of 12 million in 2014, the vulnerable, fragile and poor were about 7 million, representing 53%. Additionally, about the contribution of foreign direct investment to recipient nations, particularly in developing world, empirical findings propose divergent views. The principal reasons for conflicting results comprise theories such as total factor productivity model described by Solow, the beneficiary national absorptive capacity, capital flight, crowding out of domestic companies, especially with respect to market pursuing investment. While host nations expect a positive effect on their local economies, some empirical studies have found a negative interaction. As illustration,<sup>[2]</sup> noted a positive association between foreign direct investment and poverty reduction in Pakistan, the same outcome found by<sup>[3]</sup> on the impact of foreign capital on Sri Lanka's GDP growth. Inversely,<sup>[4]</sup> conducted an empirical study on the impact of FDI on welfare in seven emerging economies and the results are contrasting. Foreign investment amplified unemployment in Argentina and Turkey but in Thailand reduced it.

Additionally, Guinea's population is comprised of 70% youths. Annually, net job creation is less than 10% while more than ten thousand new graduate students leave tertiary education institutions to labor market. Among new entrant unemployment is about 90%. It has been presumed that a substantial number of jobs for youths who graduated from tertiary institutions to be generated by foreign investment

related projects. So far, no evidence from the ministry of finance confirms that 10% of jobs generated in Guinea are driving by foreign direct investment projects. In Guinea it is usually assumed that GDP growth and welfare occur automatically from FDI related businesses.

There is rich literature that examines the underlying interaction between foreign direct investment and economic advancement,<sup>[5-10]</sup> among many others. All these mentioned studies investigate the influence of foreign capital on economic development estimated by GDP growth. Thus, the implied assumption within this research paper is the adoption of GDP growth as an appropriate estimate for social well-being and economic advancement. Recently, this hypothesis has been questioned. In fact, even if GDP growth is vital to upgrade people living standards, when this growth is not inclusive and pro-poor oriented, it can generate huge income inequalities and worsen social welfare.

Within the literature, the first constraint resides in the definition of economic advancement or welfare. Two popular indicators used to estimate social well-being and prosperity are poverty incidence and per capita GDP. The last one is very common and obtainable for any nation on the yearly basis, but covers only one facet of economic advancement. The first one appears to be a relatively appropriate estimate of inclusive welfare but countries like developing ones lack of consistent and adequate data. Decades ago, United Nation Development Program (UNDP) instituted the Human Development Index (HDI) which appears to be widely recognized as a conventional proxy for human advancement and available for each nation. Some authors have employed the HDI to examine the effect of foreign capital on poverty and these scholars mainly oriented their research on Asian, Latin American nations<sup>[11]</sup>. But, to my awareness, such kind of empirical research has not been undertaken on Guinea exclusively. Yet, investigating and analyzing all these probable implications in the Guinean context is essential.

This empirical paper examines the causal linkage between foreign capital net inflows and poverty alleviation in Guinea. Therefore, we analyze the resulting research question: (1) Does foreign direct investment improve or enhance welfare in Guinea?

To find the answer to this question, we employ main social well-being indicator, the UNDP Human Development Index to apprehend the country social advancement level. For FDI estimate, we employ as key indicator the FDI per capita net inflows.

The contribution of this empirical analysis to the literature is threefold. Primary, this empirical paper expands knowledge on the influence of foreign capital on poverty reduction in Guinea, an emerging nation. Second, the role

of FDI in Guinean context has not previously been assessed econometrically. Thus, this study as pioneer induces an original quantitative record of FDI and its influence on Guinea's economy (even though this research is considering the period 1990-2017). Additionally, this paper enriches theory and knowledge by carrying two variables together into one theoretical framework: FDI (and its impact), and welfare improvement.

The remaining part of this study is structured as following. The literature review on the linkage between foreign capital and social well-being is presented in section 2 while section 3 exhibits the methodology, presents data and the variables employed. Section 4 examines the empirical findings on the causal link between social welfare and FDI in Guinea. Conclusion and policy recommendations are provided in section 5.

## **2. Literature Review on FDI and Welfare Nexus**

Several empirical papers have examined the association between foreign capital and welfare. The key concern to be investigated is to what extent FDI has an influence on a nation's economic advancement. The implied assumption hints that FDI induces GDP growth which also leads to welfare enhancement. Recently, some scholars have challenged that role and the answers to these concerns are mixed. The contradictory outcomes may be due to the differences within methodological, conceptual and econometric frameworks, including the various descriptions of FDI and welfare variables and the absence of a broad consistent dataset.

This part presents a comprehensive review of the theoretical link and most important empirical literature relating to the poverty reduction impacts of inward FDI into Africa. It also includes a review of literature in relation with the poverty reduction effects of inward FDI into developed and developing countries in other regions.

### **2.1 Theoretical Arguments on the Relationship between FDI and Welfare**

From World War II up to date, two major propensities have been observed in the evolution of foreign capital flows into emerging nations. From the end of World War II to the end of the Cold War (in the 1990s), both FDI flows and stocks have augmented globally, particularly in developing world. During that period, foreign capital flows have been driven mainly by ideological and political rather than economic motives. From the 1990s, foreign capital has mainly been directed to countries with favorable FDI incentive policies, such as nations providing massive tax inducements

and other facilities.<sup>[12]</sup> reported that in 2002, within seventy nations that liberalized their economic policies and adopted FDI friendly attitude, 236 out of 248 regulatory modifications were beneficial to FDI inflow, 95 per cent were more favorable to entice FDI. With all these taxes and other inducements offered by the host nations in order to entice more foreign capital, one may question the effectiveness and the extent to which FDI improve social well-being.

The influence of foreign capital on human advancement can be assessed from at least two points of view. From the social perspective, reducing poverty and improving the whole population well-being are emerging countries key concerns. In these countries, authorities' main priority is to upgrade its population living conditions as one of its social functions. Foreign direct investments may be an important tool through which nations can attain these objectives as they generate jobs, promote indigenous skills and carry technical progress. From the economic perspective, the early standpoint is that technical progress is the ultimate locomotive of sustained economic development and societal advancement. However, the emphasis has recently switched to the human capital. The theory of endogenous growth asserts that technology and human capital are essential in development process, they are key contributors to self-sustained growth in terms of per capita GDP. Human advancement therefore becomes a crucial element that raises our primary interest in evaluating the influence of FDI on human social well-being.

Moreover, foreign capital effect on welfare can be direct or indirect. The backward and forward interactions between domestic suppliers, sourcing, customers and FDI related projects may strengthen the export potentiality of the local economy. This is known as spillover effect. Likewise, the utilization of recent and advanced technology can upgrade the overall competitiveness and generate positive spillovers that are indispensable for sustained economic growth and the reduction of extreme poverty. Another direct effect on domestic economy is employment opportunities, but this function only if the employment opportunity ratio is much higher than foreign capital-related unemployment. Therefore, foreign investment is supposed to have great influence on social well-being when it is oriented in labor-intensive industries (e.g., agriculture). These advantages depend on the type of FDI, but the mechanisms and instruments used by the government to regulate foreign investment mixed benefits are also crucial. From the macroeconomic perspective, Foreign capital are presumed to boost the country overall revenue and earning transfer; in this circumstance the linkage may be indirect subject to the inflows enticing ability of net transfer revenue.

Besides, the development stage within the host country

may also affect this correlation. Resource endowments, skilled labor, efficient supply chains, social, political and cultural features of the recipient country can facilitate this interaction too. On the one hand, if foreign capital related projects are oriented in raw materials and extractive industries, then the spillovers and employment opportunities may be very limited. On the other hand, if foreign capital is market seeking type, then its influence on jobs, forward and backward interaction will be higher.

## 2.2 Empirical Review on FDI and Poverty Nexus

At times, predictions seem to be contradictory and complex when assessing the impact of FDI on social well-being. The FDI proponents<sup>[13]</sup> advocate that FDI and poverty nexus could be direct or indirect. FDI through labor market (human capital development and job creation) can directly impact welfare. Foreign capital and welfare indirect linkage could result from increased productivity and economic activities.

Many empirical studies on FDI and welfare association rely on the endogenous growth theory of technological dissemination to illustrate how (i) through FDI, technology can move from the secondary to tertiary sectors rather than the primary sector; and (ii) how welfare conditions of a country can be improved.

The seminal paper by<sup>[14]</sup> displays that through technological dissemination and growth in total factor productivity (TFP), a relatively backward economy may catch up faster those technologically advanced countries when the sectors have strong linkages. However, research has demonstrated that not all the sectors have the capacity to absorb these foreign technologies and improve welfare because of weak industrial linkages.

<sup>[15]</sup> posits that the aptitude of the host country to comprehend multinationals activities as well as the inherent characteristics of their investment strategies may essentially affect FDI impact on poverty (resource seeking, efficiency seeking, market seeking). Through technological diffusion, labor productivity and employment opportunities are likely to be stimulated by efficiency-seeking FDI type. Consequently, it will engender spillovers and adequate linkages (upstream and downstream) with the recipient economy. This mechanism could be beneficial to African nations that are addressing their development agenda and enhancing welfare.

<sup>[16]</sup> elucidated the mechanisms by which linkages and spillovers could be achieved. They pointed out that spillovers from foreign capital could happen through vertical, horizontal, forward and backward linkages. When a stimulation in local firm productivity is due to the presence of a foreign enterprise within the same sector or industry, hori-

zontal spillover is said to occur. On the other hand, when an increase in home firm productivity is attributed to the presence of foreign enterprise in its suppliers, forward linkages are said to happen. When local firm productivity relies on the presence of foreign entities among its customers within the same industry, backward linkages are said to take place. Thus, the resulting rise in productivity will boost employment opportunities, upgrade skills via labor mobility, and subsequently a decline in poverty.

<sup>[17]</sup> states that “FDI has been considered as a powerful engine and a significant catalyst for attaining development, poverty reduction and global integration process. Similarly, <sup>[18]</sup> assert that FDI in social services such as water and energy is the most credible strategy to fight against poverty in developing nations. <sup>[19]</sup> assessed what impacts foreign capital may have on income inequality in 54 countries over the period 1980-2005 and found that FDI negatively affects the income of nations with limited absorptive capacity rather than those with strong absorptive capacity. However, <sup>[20]</sup> argues that contrary to conventional view, there exists little evidence that FDI inflow can cause poverty reduction.

The mechanisms through which FDI affects welfare have been identified to include stock of human capital; technology, innovation and knowledge spillover; income and productivity growth. <sup>[21]</sup> posits that since the single most significant element influencing poverty reduction is GDP growth, foreign capital is crucial in attaining that objective. <sup>[22]</sup> stated that minimum threshold stock of human capital leads to higher productivity of FDI in recipient countries. The study by <sup>[23]</sup> suggests that the instrument by which FDI can lead to welfare enhancement is through labor intensive economic growth with export oriented growth as the most principal engine. Although the study identified other mechanisms such as training programs of human capital or projects financed by government tax revenue and improving access to productive employment, but did not find any proof in support of these three other channels.

<sup>[24]</sup> analyzed how FDI may affect poverty reduction in the south east Asia region and found that at a very minimum examination, there is no evidence in support that FDI either erodes growth or reduces the incomes of the poor. However, a more rigorous estimation displays that FDI inflows are associated with higher income growth of the poor. <sup>[25]</sup> remarked that the magnitude of productivity growth increased more with corporations that have foreign partnership. However, the extent of knowledge dissemination between the domestic and foreign enterprises was not determined. Conversely, in spite of the significance of FDI towards welfare improvement, Africa is yet to take advantage of the huge opportunity offered to host countries probably due to their weak financial market, institutions and level of education.

<sup>[26]</sup> reveals that the growth enhancing and poverty alleviating impacts of FDI are greatly eroded by weak financial markets and political institutions that characterized poor nations. This finding is similar to those of <sup>[27]</sup>; <sup>[28]</sup>. While the prior study shows that FDI enhances welfare through the development of human capital, the latter argues that the financial markets development level is critical for foreign capital to drive poverty reduction. It is therefore worthy of note that strengthening the financial market and repositioning the necessary institutions through appropriate framework could be the needed catalyst for the African continent to promote social welfare and development.

<sup>[29]</sup> posit that foreign capital may affect poverty through the direct, multiplier and spillover effect. When multinational companies establish new branches and subsidiaries, construct factories, recruit and train local workers, purchase machinery from domestic suppliers, direct effect is said to occur. Via this mechanism, unemployment plunges, the stock of capital augment and as a result of increased tax revenues government spending on human capital development (education, health) rise. There is a range of factors that involve amount of wages paid, re-invested profits, number of local workers hired and the volume of initial investment on which the extent of such direct effect relies. The multiplier effect is said to happen when through forward and backward interaction within the value chain the connection between the local branch and the recipient country economic agent become important. This multiplier instrument may stimulate economic growth and employment opportunities via increased output of both distributors and suppliers. The spillover effect takes place when technology, innovation, knowledge and skills moved from the multinational local branch to the corporations in the recipient country. There could be technological spillovers, which lead to technological expansion, and these may take place in a variety of ways such as training of local workers, imitation by domestic companies, and management skills.

### 2.3 Summary

As conversed above, some empirical literature has analyzed the linkage among foreign capital and poverty reduction employing per capita FDI and GDP growth indicators with assorted findings. Fundamentally, the preceding empirical analysis deduces a positive association among economic advancement and social well-being thus, adopt as an appropriate proxy for welfare the GDP growth. However, this implied hypothesis has been recently questioned. Some empirical assessments reveal that poverty prevalence may still be increasing while economic growth is occurring. To transcend this constraint, very few studies recently examined how foreign capital directly interact with poverty.

[30] is part of the rare empirical research that investigates the relationship among foreign investment and poverty adopting Human Development Index as social well-being estimate. Their findings reveal that from 1975 to 1999 foreign capital positively affected HDI in low and middle income economies. As far as we know, such analysis has not been conducted for Guinea exclusively.

### 3. Methodology

#### 3.1 Data

The variables employed to assess the effect of foreign capital on poverty are essentially the FDI net inflows and social well-being indicator. The data cover the period 1990-2017 and all variables are basically from the World Development Indicators released by the WORLD BANK and the UNITED NATION DEVELOPMENT PROGRAM (UNDP). Indicators are annually times series and the choice of time period is dictated by data availability.

#### Foreign Direct Investment Variable

FDI indicator represents the aggregate amount of long and short term capital, equity capital, reinvestment of earnings. For FDI variable: we adopt per capita FDI ratio which is foreign capital net inflows over total population.

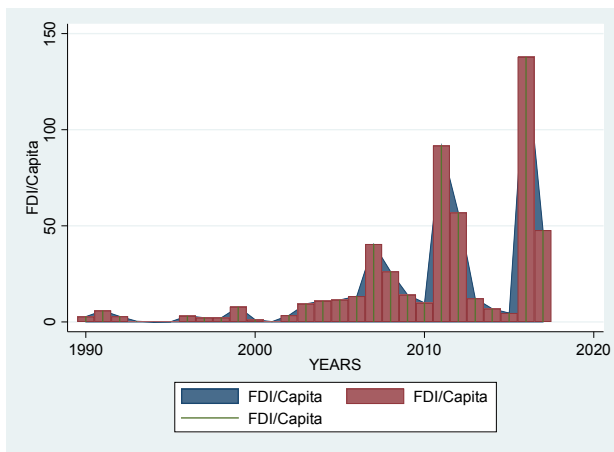


Figure 1. Foreign direct investment per capita (1990-2017)

#### Welfare Variable

Several poverty proxies have been suggested in the literature to examine progress achieved by nations in terms of the poverty prevalence and the per capita GDP measure. On the one hand, while the commonly employed indicator within the literature is per capita GDP, this seizes singularly one facet of social well-being: the economic aspect. However, welfare implies diverse components such

as education and health care and economic advancement is a multi-dimensional concept.

On the other hand, poverty prevalence is an exhaustive indicator of welfare as it incorporates all factors of an individual basic living conditions (nutrition, education, health etc.) and compares it to the threshold needed for a reasonable living standard. Nonetheless, poverty prevalence indicator is not presented on an annual basis. This imperfection does not enable its utilization in empirical research. Therefore, Human Development Index was recently presented as suitable measure of individuals well-being.

For this empirical analysis, our key welfare estimate is Human Development Index. United Nations Development Program defines HDI as a compound indicator that estimates nation's average accomplishments in three elementary sides of human advancement: education, health and decent living standard. Health is measured by life expectancy at birth; education is measured by a combination of the adult literacy rate and the combined primary, secondary, and tertiary gross enrolment ratio; and standard of living by GDP per capita (PPP US\$).

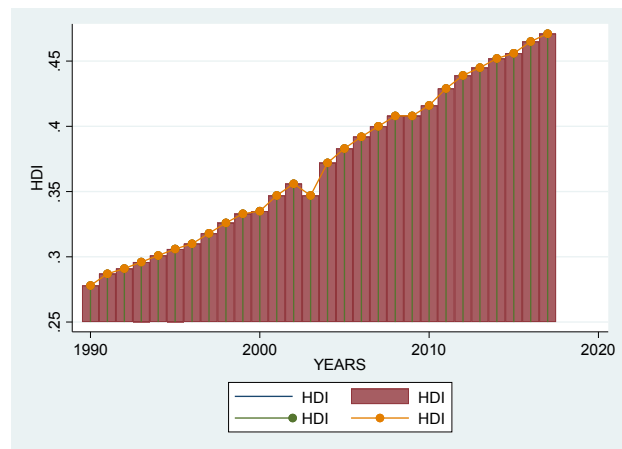


Figure 2. Human Development Index (1990-2017)

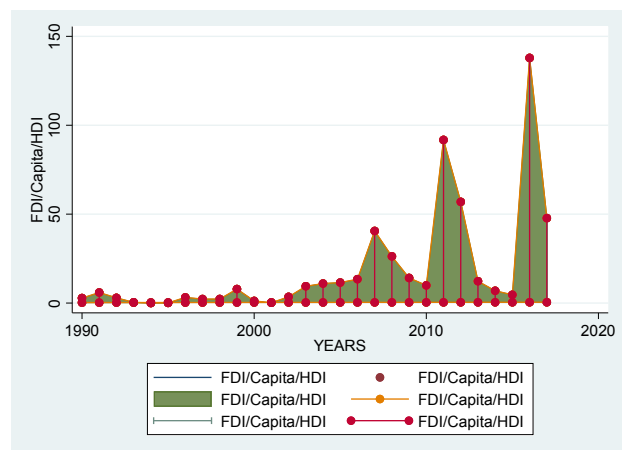


Figure 3. FDI/Capita and HDI Range Plot (1990-2017)

### Control Variables

To ensure that our results are not biased, two control variables are included, namely Inflation and Trade openness. Inflation is integrated to the model to seize macroeconomic unsteadiness, and is assumed to influence well-being negatively, as a high inflation rate may suggest more unsteady macroeconomic environment.

We also include trade openness to the framework, since in preceding empirical research, this proxy has been adopted to control foreign capital effect on economic advancement. Trade Openness is determined by the ratio of total exports plus imports over GDP.

Because HDI incorporates knowledge by definition, in order to avoid spurious regression, we do not integrate education as dependent or control variable in the regression framework.

### 3.2 Regression Model Specification

The study employed Bounds test technique, Auto regressive distributed lag framework and Error correction model to capture the long and short run interaction between foreign direct investment, human development index, inflation and trade openness within the Guinean context.

To assess the relationship among these time series variables, we first go through the process of optimal lag to be selected then we test stationarity level of the time series employing Bounds test framework which assert that series must be integrated in diverse orders. This is about having a combination of I (0) and I (1).

Secondly, we conduct Bounds test of co-integration with determined (n) lags. We deduce the existence of co-integration when the computed F-statistic is greater than the critical value for the upper bound, I (1), meaning that among the variables there exists a long run interaction. We ignore the null hypothesis, determine the long run interaction through the Error correction model.

We conclude that there is no co-integration when the computed F-statistic is lower than the critical value for the lower bound, I (0), meaning that no long run connection exists among the time series variables. We cannot ignore the null hypothesis and the short term association is estimated through the auto regressive distributed lag technique.

We deduce the test inconclusiveness when the computed F-statistic plunges between the lower bound, I (0) and the upper bound I (1).

Once the time series variables are integrated in different orders, we can subsequently go through the following regression model to show how foreign investment influence social welfare in Guinea:

$$\Delta HDI_t = \alpha_0 + \sum_{i=1}^p \alpha_{1i} \Delta HDI_{t-i} + \sum_{i=1}^q \alpha_{2i} \Delta FDI_{t-i} + \sum_{i=1}^q \alpha_{3i}$$

$$\Delta Openness_{t-1} + \sum_{i=1}^q \alpha_{4i} \Delta Inflation_{t-1} + \lambda ECT_{t-1} + e_t$$

- $\lambda = (1 - \sum_{i=1}^p \delta_i)$ , Speed of adjustment parameter with a negative sign

- $ECT = (\Delta HDI_{t-i} - \Theta X_t)$ , the error correction term is the extracted residuals from the regression of the long run equation

- $\Theta = \sum_{i=0}^q \beta_i / \alpha$ , is the long run parameter

- $\alpha_{1i}, \alpha_{2i}, \alpha_{3i}, \alpha_{4i}$  are the short run dynamic coefficients of the model's adjustment long run equilibrium

### 4. Empirical Results

Table 1 presents some descriptive statistics on Guinea for welfare (HDI) and FDI variables. FDI flows have known a timid growth within a decade after 1985 economic liberalization. From 2003, a steady trend is observed and the peak of FDI level was reached in 2016 when Chinese multi-national corporations due to some major turmoil in the minerals market decided to invest heavily in Guinean bauxite mines. We adopt per capita FDI since it shows a broad view on how FDI is allocated among population, and this aspect is relevant when analyzing the influence of FDI on poverty reduction.

Nota Bene: All the numerical values within the tables (below) are monetary units conventionally in (USD).

**Table 1.** Summary statistics of variables

Variables Name	Mean	Std. Dev.	Min	Max
FDI/Capita	1.605714	37.01427	90.10	133.21
HDI	0.0068929	0.0056131	0.009	0.025
Inflation	-0.5992857	7.172406	-18.38	13.91
Openness	1.729643	9.307441	-9.97	37.61

Table 2 indicates that FDI per capita correlation with welfare variable is about 15.62 %. The 84.38 % loss of correlation appears to endorse the assertion that economic growth does not necessarily and entirely translate into welfare enhancement. Foreign investment variable is highly correlated to openness with a coefficient of 64.13 % whereas its correlation coefficient with inflation is about 0.82 %. This lower coefficient may be elucidated by the fact that the great proportion of inward investment in Guinea is concentrated in mining sector which is less sensitive to the macroeconomic environment.

**Table 2.** Correlation Matrix

Variables Name	FDI/Capita	HDI	Inflation	Openness
FDI/Capita	1			
HDI	0.1562	1		
Inflation	0.0082	0.1626	1	
Openness	0.6413	0.2127	0.0864	1

**4.1 Autocorrelation and Partial Autocorrelation of the Variables**

This research paper adopted Autocorrelation and partial autocorrelation to display how stationary are the time series variables.

$H_0$ = Null hypothesis, the null hypothesis is accepted when the variable is stationary at level; when the variable is nonstationary at level the null hypothesis is rejected.

$H_1$ = Alternative hypothesis, we accept alternative hypothesis once the variable is stationary at the first differenced level and we reject it once it's nonstationary at first differenced level.

**Table 3.** Corrogram FDI/Capita, Prob>Q is greater than 5%

LAG	AC	PAC	Q	Prob>Q
1	0.2814	0.2916	2.4638	0.1165
2	-0.0136	-0.1315	2.4697	0.2909
3	0.0247	0.1973	2.4903	0.4770
4	0.3032	0.9359	5.7071	0.2221
5	0.4773	1.2854	14.028	0.0154
6	0.0774	-0.5089	14.257	0.0269
7	-0.0109	-1.0525	14.262	0.0467
8	0.0472	-2.3621	14.355	0.0730
9	0.1076	-0.3129	14.867	0.0947
10	-0.0251	-2.6404	14.896	0.1359
11	-0.0737	-8.4915	15.165	0.1751
12	-0.0660	0.7471	15.393	0.2206

**Table 4.** Corrogram HDI, Prob>Q is less than 5%

LAG	AC	PAC	Q	Prob>Q
1	0.8976	1.0049	25.067	0.0000
2	0.7987	0.3236	45.677	0.0000
3	0.7009	0.2951	62.184	0.0000
4	0.5979	0.0085	74.695	0.0000
5	0.4948	0.0993	83.636	0.0000
6	0.3919	0.3347	89.499	0.0000
7	0.2895	0.0787	92.851	0.0000
8	0.1955	-0.2526	94.456	0.0000
9	0.1078	-0.2590	94.970	0.0000
10	0.0173	0.0153	94.984	0.0000
11	-0.0733	0.1151	95.249	0.0000
12	-0.1531	0.0796	96.480	0.0000

Corrogram D. HDI (First differenced level) Prob>Q is greater than 5%.

LAG	AC	PAC	Q	Prob>Q
1	-0.3013	-0.3017	2.734	0.0982
2	-0.1493	-0.2627	3.432	0.1798
3	0.1630	0.0335	4.2984	0.2310
4	-0.0795	-0.0574	4.5136	0.3409
5	-0.1974	-0.2459	5.9002	0.3161
6	0.2069	0.0075	7.496	0.2774
7	0.1707	0.2674	8.6369	0.2798
8	-0.1172	0.2338	9.2029	0.3255
9	-0.0786	-0.0529	9.4715	0.3949
10	0.0292	-0.1514	9.5108	0.4844
11	-0.0895	-0.0844	9.9028	0.5392

**Table 5.** Corrogram Inflation, Prob>Q is less than 5%

LAG	AC	PAC	Q	Prob>Q
1	0.6274	0.6320	12.246	0.0005
2	0.3749	-0.0314	16.787	0.0002
3	0.0770	-0.2614	16.986	0.0007
4	-0.0827	-0.0810	17.226	0.0017
5	-0.0147	0.2511	17.234	0.0041
6	-0.1390	-0.3826	17.971	0.0063
7	-0.1873	-0.2301	19.374	0.0071
8	-0.3343	-0.2431	24.068	0.0022
9	-0.4459	-0.1615	32.858	0.0001
10	-0.4139	-0.7092	40.852	0.0000
11	-0.4013	-1.2012	48.809	0.0000
12	-0.2765	-1.8168	52.823	0.0000

Corrogram D. Inflation (First differenced level) Prob>Q is greater than 5%.

LAG	AC	PAC	Q	Prob>Q
1	-0.1341	-0.1341	0.54172	0.4617
2	0.1060	0.0884	0.89371	0.6396
3	-0.1375	-0.1205	1.511	0.6797
4	-0.3046	-0.3765	4.6686	0.3230
5	0.2935	0.2598	7.7342	0.1715



LAG	AC	PAC	Q	Prob>Q
6	-0.0698	0.0223	7.9161	0.2443
7	0.1506	-0.0372	8.8045	0.2670
8	-0.1144	-0.2113	9.3434	0.3142
9	-0.1627	0.0193	10.495	0.3119
10	-0.0014	0.0911	10.495	0.3982
11	-0.1070	-0.9847	11.056	0.4386

**Table 6.** Corrgram Openness, Prob>Q is less than 5%

LAG	AC	PAC	Q	Prob>Q
1	0.7386	1.0037	16.97	0.0000
2	0.4921	0.0655	24.793	0.0000
3	0.4624	0.2259	31.978	0.0000
4	0.4720	0.7429	39.776	0.0000
5	0.4525	0.2449	47.254	0.0000
6	0.3257	-0.4525	51.303	0.0000
7	0.1694	-0.0788	52.451	0.0000
8	0.0454	-0.7098	52.538	0.0000
9	-0.0054	-0.2378	52.539	0.0000
10	-0.0162	-0.1048	52.552	0.0000
11	-0.0540	0.2433	52.696	0.0000
12	-0.1726	-0.4660	54.259	0.0000

**Corrgram D. Openness (First differenced level) Prob>Q is greater than 5%.**

LAG	AC	PAC	Q	Prob>Q
1	-0.0383	-0.0383	0.04426	0.8334
2	-0.0875	-0.1891	0.28417	0.8675
3	-0.2612	-0.6207	2.5099	0.4735
4	0.0066	-0.0367	2.5114	0.6426
5	0.2476	0.5880	4.6936	0.4544
6	0.0873	0.2184	4.9781	0.5466
7	0.0962	0.7562	5.3402	0.6185
8	-0.2328	0.2944	7.5727	0.4763
9	-0.0642	0.1994	7.7521	0.5593
10	-0.0644	-0.0392	7.9431	0.6344
11	0.3258	0.5397	13.137	0.2845

Except the per capita FDI, the other variables (HDI, Inflation and trade Openness) get to be stationary at the first differenced level, this allows us to implement the Bounds test for co-integration.

The main condition is that time series must be integrated in diverse orders, this is about having a combination of I (0) and I (1). Under the Bounds test framework, we deduce the existence of co-integration when the computed F-statistic is greater than the critical value for the upper bound I (1), meaning that among the variables there exists a long run interaction. We ignore the null hypothesis, determine the long run interaction through the Error correction model.

We conclude that there is no co-integration when the computed F-statistic is lower than the critical value for the lower bound I (0), meaning that no long run connection exists among the time series variables. We cannot ignore the null hypothesis and the short term association is estimated through the auto regressive distributed lag technique.

We deduce the test inconclusiveness when the computed F-statistic plunges between the lower bound, I (0) and the upper bound I (1).

**Table 7.** Lag selection-order criteria; Sample: 1990 – 2017

Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-194.023	-			172.54	16.5019	16.554	16.6983*
1	-179.194	29.658	16	0.020	194.958	16.5995	16.86	17.5812
2	-163.86	30.669	16	0.015	234.469	16.655	17.1238	18.4221
3	-147.084	33.552	16	0.006	316.587	16.5903	17.2675	19.1428
4	-105.698	82.771*	16	0.000	92.5126*	14.4749*	15.3601*	17.8127

**Endogenous:** HDI, FDI/Capita, Inflation, Openness

$$e(lags)^{[1,4]} = \begin{matrix} \text{HDI} & \text{FDI/Capita} & \text{Inflation} & \text{Openness} \\ 4 & 2 & 2 & 1 \end{matrix}$$

**4.2 Results of Bounds tests for Co-integration**

Ho: No levels relationship

F = 10.156

t = -3.686

Critical Values (0.1 - 0.01), F-statistic

**Table 8.** Pesaran / Shin / Smith (2001) ARDL Bounds Test

	[I_0] L_1	[I_1] L_1	[I_0] L_05	[I_1] L_05	[I_0] L_025	[I_1] L_025	[I_0] L_01	[I_1] L_01
K_3	2.72	3.77	3.23	4.35	3.69	4.89	4.29	5.61

Accept if  $F <$  critical value for I (0) regressors; Reject if  $F >$  critical value for I (1) regressors.

Critical Values (0.1 - 0.01), t-statistic

	[I_0] [I_1] L_1 L_1	[I_0] [I_1] L_05 L_05	[I_0] [I_1] L_025 L_025	[I_0] [I_1] L_01 L_01
K_3	-2.57 -3.46	-2.86 -3.78	-3.13 -4.05	-3.43 -4.37

Accept if  $t >$  critical value for I (0) regressors; Reject if  $t <$  critical value for I (1) regressors.

Since the calculated F-statistic get to be greater than the critical value for the upper bound, I (1) then we deduce the existence of co-integration, suggesting a long run association among the variables. We run the Error correction model (ECM) to capture this long run interaction, then the Auto regressive distributed lag model (ARDL) to seize the short term relationship.

### 4.3 Results of Error Correction Model

Table 9. The Error Correction Model

HDI	Coef.	Std. Err.	t	P > [t]	[95% Conf. Interval]	
<b>ADJ</b>						
HDI						
L1.	-1.90588	0.5171115	-3.69	0.004	3.044034	-0.7677251
<b>LR</b>						
FDI/Capita	-4.34e-06	0.0000511	-0.08	0.934	-0.0001168	0.0001081
Inflation	0.0006468	0.0002222	2.91	0.014	0.0001578	0.0011358
Openness	0.0001151	0.0001103	1.04	0.319	-0.0001276	0.0003579

R-squared = 0.9152; Adj R-squared = 0.8227; Root MSE = 0.0040

The cel. L1 (-1.90588); the speed of adjustment or error correction term towards equilibrium has a negative sign and significant for HDI, we agreed on the existence of long run association between per capita FDI, human development index, inflation and openness.

Table 9 also exhibits the regression outcomes for Guinea when the dependent variable for social well-being is Human Development Index. The results in the long run, display that per capita FDI negatively impacts welfare but not significantly. This finding contradict the classical theories about FDI which state that Foreign direct investments may be an important tool through which developing countries can create jobs, develop local skills, bring new technologies, generate backward and forward linkages with local companies, increase competition and positive spillovers and promote welfare. Another explanation of this phenomenon may be the fact that a large proportion of foreign investment in Guinea is concentrated in extractives industries (Mines) which have a very limited

linkage, spillover and impact on the local economy. Those foreign multi-national corporations basically extract raw materials, commodities and export to their home countries without any transformation and value added to the Guinean economy.

When Inflation variable is incorporated, we find that inflation in the long run, influence positively and significantly the human development index. For the trade openness, the interaction still positive but not significant.

### 4.4 Results of Auto Regressive Distributed Lag Model (ARDL)

Table 10. The ARDL Model

HDI	Coef	Std. Err.	t	P > [t]	[95% Conf. Interval]	
<b>HDI</b>						
L1.	-1.00709	0.2175143	-4.63	0.001	-1.485836	-0.5283445
L2.	-0.7900258	0.2562913	-3.08	0.010	-1.354119	-0.2259326
L3.	0.2688286	0.2115319	1.27	0.230	-0.1967499	0.7344072
L4.	0.6224077	0.2081351	2.99	0.012	0.1643053	1.08051
<b>FDI/Capita</b>						
--	0.0000333	0.0000431	0.77	0.456	-0.0000615	0.000128
L1.	-0.0000988	0.0000469	-2.11	0.059	-0.0002019	4.33e-06
L2.	0.0000573	0.0000465	1.23	0.244	-0.0000451	0.0001597
<b>Inflation</b>						
--	-0.0000276	0.0001619	-0.17	0.868	-0.0003839	0.0003286
L1.	0.0006777	0.0001551	4.37	0.001	0.0003362	0.0010192
L2.	0.0005826	0.0001797	3.24	0.008	0.0001871	0.000978
<b>Openness</b>						
--	-0.0001924	0.0001614	-1.19	0.258	-0.0005477	0.0001629
L1.	0.0004118	0.0001656	2.49	0.030	0.0000473	0.0007764
Cons	0.014253	0.0039136	3.64	0.004	0.0056391	0.0228668

$F(12, 11) = 3.20$ ; Prob >  $F = 0.0317$ ; R-Sq = 0.7775; Adj R-Sq = 0.5347; Root MSE = 0.0040

Table 10 exhibits the short run regression outcomes for Guinea when the dependent variable for social well-being is Human Development Index. The findings display that per capita FDI [current value and L2.] have positive but not significant impact on HDI whereas FDI [L1] has a negative interaction with welfare at 10% significance level. The trade openness variable [current value] is negatively but not significantly associated with HDI, conversely the [L1 value] influence positively and significantly welfare variable.

The results also show that inflation [L1 and L2] interact positively and significantly with human advancement index whereas the [current value] is negatively but not significantly associated with welfare variable. Overall, the long and short run regression results on the interaction between inflation and welfare suggest that social well-being in Guinea goes together with relatively high inflation rate. These findings are contrary to the view of the widely recognized costs of inflation, in terms of its propensity to endanger macroeconomic stability in the short term and its possible harmful effects on economic growth in the long term.

### 4.5 Robustness Tests

For robustness check, we consider several tests to assess the model stability, normality or whether there are serial auto-correlations and heteroskedasticity among the variables.

Durbin-Watson d-statistic: (13, 24) = 1.619459

The Durbin-Watson test outcome (1.619459) clearly exhibits that our model does not present any serial auto-correlation, confirming the consistency of the results.

**Table 11.** Breusch-Godfrey LM test

Lags (p)	Chi2	df	Prob > chi2
4	3.982	4	0.4085

*H<sub>0</sub>*: no serial correlation

The Breusch-Godfrey test confirms the previous finding. Prob > chi2 = (0.4085) is greater than 5% which shows that no serial autocorrelation has been found among the variables.

White’s test for *H<sub>0</sub>*: Homoskedasticity  
 against *H<sub>a</sub>*: unrestricted heteroskedasticity  
 chi2 (23) = 24.00

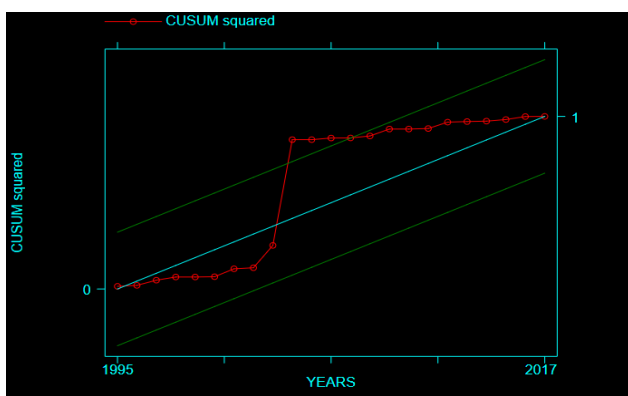
Prob > chi2 = 0.4038

For the White’s test, we found Prob > chi2 = (0.4038) is higher than 5%, then we deduce that the model is not suffering from any heteroskedasticity. Hence we used a desirable framework.

**Table 12.** Cameron & Trivedi’s decomposition of IM-test

Source	Chi2	df	p
Heteroskedasticity	24.00	23	0.4038
Skewness	10.88	12	0.5395
Kurtosis	0.08	1	0.7734
Total	34.96	36	0.5179

The skewness [Prob > Chi2 superior than 5%] and the Kurtosis [Prob > Chi2 greater than 5%] from Cameron & Trivedi’s test show that residuals are normally distributed.



**Figure 4.** CUSUM Squared test

The Cusum squared graph confirms that our model is not suffering from any instability. Hence we employed the desirable framework.

### 5. Conclusions

This empirical study estimates the influence of Foreign Capital (FDI) on social well-being in Guinea from 1990 to 2017. We employed FDI indicator and welfare measure, respectively the per capita FDI net inflows and human development index (HDI).

By performing Error Correction Model, we noticed the existence of long run interaction among the variables. The findings also displayed that per capita FDI in the long run, negatively impacts welfare but not significantly, while with Inflation the coefficient is positive and significant. For the trade openness, we still found the same positive interaction but not significant.

This situation can be explained by the fact that a large proportion of foreign investment in Guinea is concentrated in extractives industries (Mines) which have a very limited linkage, spillover and impact on the local economy; contradicting the classical theories about FDI. Those foreign multi-national corporations basically extract raw materials, commodities and export to their home countries without any transformation and value added to the Guinean economy.

However, in the short run, the outcomes showed that per capita FDI [current value and L2.] have positive but not significant impact on HDI whereas FDI [L1] has a negative interaction with welfare at 10% significance level. The trade openness variable [current value] is negatively but not significantly associated with HDI, while inflation [L1 and L2] influence positively and significantly human advancement.

Other factors such as political stability, governance, institutions and the quality of infrastructures may have great impact on the relationship among foreign direct investment and human development in Guinea.

For policy recommendation, although Foreign capital may reduce poverty in Guinea, instruments employed to entice these inward capital should be tailored on sectors that account for Guinean economy. Instead of investing in extractive industries which have very limited linkages with domestic economy, government should diversify and encourage foreign investors to look at sectors such as agriculture, infrastructure, manufacturing and services that may have strong impact on Guinean economy in terms of inclusive growth, employment opportunities and poverty alleviation.

### Limitations and Areas for Future Research

Due to lack of extensive and reliable data, some of the

variables such as infrastructure and political stability that may count when assessing the impact of FDI on welfare are not measured in this empirical study. Those that were included were determined by data availability such as per capita FDI, human development index, inflation and trade openness where the only available data cover the period 1990-2017. Therefore, further empirical analysis should pay attention to the role of financial market within the linkage between FDI and social well-being as well as the influence foreign capital may have on economic growth within the Guinean context.

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