7th International Students Science Congress
12-13 May 2023, İzmir - Türkiye

Impact of Foreign Direct Investment on Poverty in Ghana: A Johansen Co-integration Analysis

Abdul Rahman Mohammed Muntaka, School of Graduate Studies, Ibn Haldun Univ., Istanbul, Türkiye
*Oluwaseun Adeoye Oyebamiji *, Graduate School of Science, Ege Univ., İzmir, Türkiye*
Abiola Adeniyi, Regentropfen College of Applied Sciences, PMB, Kansoe-Namoo, Ghana
**Corresponding author: seun.bamiji.adeoye@gmail.com*

Abstract

In the past years, Ghana has witnessed a significant increase in Foreign Direct Investment which is expected to translate into transformative growth that reduces poverty and inequality; however, the country's poverty and income inequality profile remain high. Foreign direct investment (FDI) and poverty research are important because FDI can have both positive and negative effects on poverty levels in host countries [1]. The positives imply that FDI can bring in capital, technology, and job opportunities, which can help reduce poverty by boosting economic growth and raising people's living standards. On the other hand, FDI can displace local businesses, exacerbate income inequality, and have environmental consequences that harm the poorest members of society. Understanding the relationship between FDI and poverty can assist policymakers and businesses in making informed decisions that promote inclusive and sustainable economic growth and reduce poverty. This study investigates the impact of FDI on poverty in Ghana using a 29-year data set from (1990 to 2018). Analysis was done using the Johansen Cointegration technique. The literature informed the variables used for this study. The Gini coefficient (which serves as a proxy for poverty and its parts of the FGT poverty indices family), foreign direct investment (FDI), GDP per Capita, exchange rate, trade openness, and inflation rate were all cointegrated. The results of the study showed that FDI, GDP per capita, inflation rate, and exchange rate widen the income inequality gap, hence, increasing the poverty incidence. In contrast, an increase in trade openness reduces the Gini coefficient implying a reduction in income inequality and poverty.

Keywords: Foreign direct investment, poverty, Gini coefficient, income inequality

Introduction

As a pervasive global issue with various causes and effects, poverty affects everyone regardless of geographic location, and for a considerable amount of time now, governments and international organizations have aimed at discovering practical methods that can assist in tackling poverty while ensuring sustainability. In this context, Foreign Direct Investment (FDI) has garnered significant attention as a promising catalyst for improving the economy and alleviating poverty levels. Foreign direct investment (FDI) refers to the investment made by individuals or companies from one country into business interests located in another, FDI has become an increasingly important factor in economic development and growth, with many countries actively seeking FDI to stimulate their economies and enhance the quality of human resources [1]. At the same time, poverty continues to be a significant global challenge, affecting millions of people worldwide.

The existing research regarding the effects of FDI on poverty evidences a complex relationship resulting from varied outcomes, and some studies indicate that foreign direct investments (FDIs) may be helpful in terms of reducing poverty by creating jobs leading to higher wages resulting in improved livelihoods for people. [2] argue that FDI can positively affect economic growth and social welfare through increased financial resources for technological progress resulting from enhanced human capital. However, many studies have pointed out challenges and roadblocks associated with FDI as a tool for alleviating poverty, including the issue of income inequality and the depletion of resources, which significantly affect society. Moreover, dependence on foreign firms and inadequate spill-over effects for technological advancements within domestic industries are subjects that need addressing, and investigations carried out by [3] imply that the positive impacts of FDI in alleviating poverty, differ based on individual contextual settings, including host country specificities like the institutional environment or absorptive capacity.

Global FDI has increased for the past two decades until the COVID-19 pandemic hit the world [4]. Since the Covid-19 pandemic, the United Nations Conference on Trade and Development (UNCTAD) projected a damaging decline in FDI flows; this is expected to significantly impact developing nations. Foreign direct investment (FDI) contributes to economic growth in developing countries in numerous ways: breaking the vicious cycle of poverty, creating employment, technological and innovation pooling and sharing, and forging and promoting political stability. Over the past decades, the patterns in global FDI flows and the distribution of their related effects across the world's regions have been the focus of empirical decisions [4]. In 2018, global foreign direct investment (FDI) declined by 13 percent to $1.3 trillion. The decline–the third consecutive year of FDI decline–was mainly due to the large-scale repatriation of accumulated foreign earnings by US multinationals in the first two quarters of 2018, following tax reforms enacted at the end of 2017 [5]. The year 2020 had great expectations, with advanced and emerging economies adopting the idea of Industry 4.0, a mantra for the Fourth Industrial Revolution [6]. Despite the persistent slide in global FDI flows, Africa has enjoyed some of the highest global returns on foreign direct investment (FDI) in the global investment sphere [7]. Africa stood in sharp contrast compared to developed economies, whose FDI inflows dropped by 27% (their lowest level since 2004) [8]. A logical explanation could be attributed to the changes in the type of FDI inflow from resource-seeking to skills and technology-driven FDI, which most Sub-Saharan African countries lack.

In 2020, Ghana was optimistic about attracting more FDI inflows owing to the prospects and benefits of the government's efforts to strengthen the local market climate and implement the African Continental Free Trade Area (AfCFTA) in May 2019. The AfCFTA is expected to raise intra-African trade to 25% by 2040 [9]. However, during the second quarter of 2020, FDI flows to Ghana deviated from the projected global decline pattern, resulting in a substantial increase in FDI inflows for the year's first half [4]. In the first half of 2020, gross investments amounted to US$869.47 million, with a total FDI value of US$785.62 million [9]. The general trading sector reported an enormous value of US$246.05 million in terms of the estimated cost of investments. This was followed by the mining and manufacturing industries, with projected costs of US$231.02 million and US$170.67 million, respectively [9].

Poverty is a state or situation in which the financial resources and necessities for a basic standard of living are lacking for an individual or a society. Poverty means that the income level from work is so poor that it is difficult to meet basic human needs. Poverty-stricken individuals and families may lack adequate housing, clean water, nutritious food, and medical care. Each nation may have a threshold of its own that defines how many people live in poverty [11,12]. Poverty's social and economic effects profoundly hinder progress toward equality and inclusion by exacerbating already present disparities and hampering socio-mobility. Intersecting factors like gender disparities, unfairness, and limited access to resources or opportunities often exacerbate marginalization in terms of poverty. Overcoming poverty is made even harder for individuals and communities due to this further complicating matters [13].

The [14] describes poverty in absolute terms. The bank describes extreme poverty as living on less than US$1.90 a day and moderate poverty as living on less than $3.10 daily. In 2008, 1.4 billion people were reported to have consumption levels below US$1.25 per day, and 2.7 billion lived on less than US$2 per day. Poverty in Ghana is multidimensional, and cuts across different parts of Ghanaian society. The Ghana Statistical Service, in its 2020 multidimensional report, considers multidimensional poverty as the widely divergent deprivations faced by poor people in Ghana. Multidimensionally poor are often considered as those who lack education, adequate health and nutrition, suitable housing, and safe water; these are examples of their drawbacks to a meaningful standard of living. These deprivations indicate many poor people's living conditions and their challenges in seeking and achieving practical skills [15].

The multidimensional poverty (MP) report of Ghana prepared by[15] revealed that 45.6 percent of Ghana's population is multidimensionally poor. The indicators that contributed most to multidimensional poverty in Ghana are lack of health insurance coverage, under-nutrition, school lag, and households with non-educational qualifications. The report also showed that the intensity of poverty is 51.7 percent, meaning that poor people experience, on average, more than half of the weighted deprivations (thus, the 12 indicators which were used for study and categorized under education, health and nutrition, housing, and safe water). The multidimensional poverty index (MPI), which is the product of the incidence and intensity of poverty, is 0.236. Ghana managed to reduce its incidence of MP from 55 percent in 2011 to 46 percent in 2017, thus, a nine percentage points decrease. The intensity of poverty also fell from 54.2% in 2011 to 51.7% in 2017, reflecting a slight improvement. The MPI dropped from 0.298 in 2011 to 0.236 in 2017, showing a 0.062 reduction. The differences in incidence and intensity of MP are statistically significant, suggesting significant progress in reducing multidimensional poverty over time in the Country [15].

From a theoretical perspective, economic theories[1] have been put forward to understand the main determinants of economic growth and how that growth translates into prosperity. Robert Solow pioneered the modern understanding of the growth-development model; he demonstrated around the 19th century that a sustained rise in capital spending would temporarily increase the rate of growth, which explains the difference in growth rates between countries. Most FDI theories[2] focus more on the relationship between the investment made by multinational companies and the economic growth of the host countries. Most of the analyses try to emphasize the transfer of technology, skills, and impact on the macroeconomic indicators of the host countries. For this study, we are mostly interested in exploring poverty via the lens of spatial disparity and how FDI exacerbates poverty in Ghana.

The geographical disparity is old literature that clarifies the root causes and factors exacerbating poverty. It explains the dichotomy of developed and less developed economies. The theory suggested by [16] drew attention to the fact that in many places, individuals, institutions, and cultures lacked the objective tools needed to produce well-being and wealth and the power to demand redistribution [17].

As Bradshaw [18] pointed out, "Space is not a background for capitalism, but rather is restructured and contributes to the system's survival." The geography of poverty is thus a spatial representation of the capitalist system [18]. That poverty is most acute in some areas is an old observation and an abundance of reasons in the development literature why regions lack the economic foundation to compete. Recent explanations include disinvestment, proximity to natural resources, density, innovation diffusion, and other factors. To fully grasp the impact of FDI on poverty reduction initiatives in developing countries requires an understanding of geographical disparity theory's relevance, and this assists us in recognizing why these outcomes are distinct across different areas. Therefore, a comprehensive analysis incorporating geographical disparity theory alongside other relevant frameworks and factors is necessary to gain a more nuanced understanding of the relationship between FDI, poverty, and regional disparities in developing countries. Ghana's economic indicators are being analyzed in relation to the impact of FDI and poverty for a better understanding of these issues.

Empirically, [19] used time series data for Portugal between 1973 and 2016 to investigate how inward foreign direct investment (FDI) contributes to income inequality and poverty. Their results stipulated that increased inward FDI flow is associated with less unequal income distribution and lower poverty rates. Further, they posited that more unequal income distributions significantly and negatively impact inward FDI in the long run. They concluded that, among other things, human capital is a crucial determinant in mitigating income inequality and circumventing poverty, indirectly contributing to fostering additional FDI inflows.

[20] studies the impacts of Foreign Direct Investment (FDI) in the mining sector on rural poverty in Ghana. Using qualitative research techniques and New Institutionalist and Marxist theoretical perspectives, the study noted that large-scale mining activities in Ghana have intensified with an increase in foreign capital involvement within the mining industry. This he attributed to the mining sector reforms in 1986. He further posited that mining could potentially reduce rural poverty through revenue generation, employment creation, and Corporate Social Responsibility (CSR). However, he acknowledges that weak institutional capacity, ineffective and corrupt mining support institutions, capital-intensiveness of mining activities, and limited scope of CSR, have thwarted the ability of mining to reduce poverty in mining communities in Ghana.

[21] investigated the influencing factors of poverty in Pakistan and discussed the theoretical linkages between poverty and its main macroeconomic variables. They applied the Johansen co-integration technique with multi-diagnostics tests. The results of their study showed that all these variables (agricultural ratio to gross domestic product (GDP), the ratio of Foreign Direct Investment (FDI) to GDP, the ratio of primary education, the ratio of the domestic credit to the private sector and military expenditure as a percentage of GDP) had a significant effect on poverty. They explained that an increase in agricultural output leads to decreased poverty. The result posited that education enrollment significantly negatively impacted poverty in the long run. More so, domestic credit had a significant negative impact on poverty; however, military expenditure had a significant positive impact on poverty in Pakistan.

[22] made an extensive collection of literature that explains the linkages of the benefits of FDI for poverty reduction. They posited some benefits of FDI for poverty reduction, including increased

[1] Solow (1956): Solow Growth Model; Growth driven knowledge spillover and technological progress Romer (1986); Growth driven human capital Lucas (1988); Growth based on new knowledge (Romer, 1990, Grossman and Helpman, 1991); Growth based on innovation (Aghion and Howitt, 1992); Growth driven by public infrastructure (Barro, 1990).

[2] Vernon (1966): Production life Cycle; Itagaki (1981) and Cushman (1985): TheTheory of Exchange Rates on Imperfect Capital Markets; Buckley and Casson (1976), Hennart (1982) and Casson (1983): The Internalisation Theory; (Dunning,1973,1980,1988): The Eclectic Paradigm (O-L-I).

investment capital essential for economic growth and employment opportunities. However, they agree that the effect of FDI on poverty in the host country is not a simple relationship but varies depending on several factors. [17] integrated the understanding of linkages and spillovers into sectoral poverty analysis – FDI inflows nexus debate, foreign direct investment inflows, increased external earnings, trade openness, overall market size, favorable exchange rate, low external debt, increased foreign aid, and technology would significantly reduce poverty in a country. On the contrary, the lack of these economic indicators would lead to significant regional poverty.

A key finding from our understanding of the trends of FDI and Poverty and inequality in Ghana informs that FDI inflow into Ghana has not been pro-poor. The sectoral distribution of the inflow of Foreign Direct Investment to Ghana shows that most FDI was not targeted at sectors of the economy that could have reduced the MPI. The service sector recorded the highest growth share, followed by the manufacturing and export sectors [15]. The impact of FDI in the service industry on reducing poverty is a complex issue with both positives and negatives. Still, FDI can help drive economic expansion and expand opportunities for employment by investing in the services sector. However, its capacity for reducing poverty directly can sometimes be limited. Researchers such as [23] have shown that FDI benefits the manufacturing sector when invested in financial services but negatively impacts it when invested in trade services. The impact of FDI in the service sector on reducing poverty is context-dependent and involves a complex relationship. The Ghanaian economy is primarily driven jointly by the informal and agricultural sectors, which employ about 70 percent of the population, more than half of 45.6 percent of Ghana's multidimensionally poor population are equally domiciled in these sectors. Intuitively, these are the sector where FDI can indeed be pro-poor. However, the agricultural sector of Ghana has benefitted from as low as 1.% in FDI inflow [15].

The effect of foreign direct investment (FDI) on poverty remains uncertain. It requires more comprehensive research for us to gain a clear picture of this relationship. Still, in undertaking this study, our aim is not only to enhance but also to contribute new perspectives on the link that exists between FDI and poverty reduction. This study is unique in that it considers contextual factors and country-specific characteristics of Ghana, this study seeks to provide valuable insights into the role of FDI in poverty reduction through a comprehensive analysis that integrates theoretical frameworks, empirical evidence, and robust methodologies, this study seeks to contribute to the existing literature on the relationship between FDI and poverty. The research will explore the mechanisms through which FDI affects poverty levels, considering contextual factors such as the institutional environment, sectoral composition, and absorptive capacity of recipient countries. The findings of this research will inform evidence-based policy-making and contribute to poverty alleviation efforts.

Methodology

The variables to be employed for this study include the Gini coefficient (serving as a proxy for poverty), Gross Domestic Product per Capita (GDPC), Foreign Direct Investment (FDI), the Exchange rate (EXC), Inflation rate (INF), and Trade Openness (TOP). The log of these variables was taken to have a common base for better analysis. From the log form, the econometric model below was constructed. The model employed was a modification of [21] model.

$$lngini_t = \beta_0 + \beta_1 lnfdi_t + \beta_2 lngdpc_t + \beta_3 lnexc_t + \beta_3 lntop_t + \beta_4 lninf_t + \mu_t$$

where: $Lngini_t$: log of Gini coefficient (serving as a proxy for poverty), $Lnfdi_t$: the log of net inflow of FDI as a percentage of GDP, $Lngdpc_t$: the log of GDP per Capita, $Lnexc_t$: the log of the exchange rate, $Lntop_t$: the log of trade openness (which is the ratio sum of export and import over GDP), $Lninf_t$: the log of inflation rate (consumer price inflation), β_0 is the intercept of the model. β_1, β_2, β_3, β_4, and β_5 are the coefficients of the variables. μ_t is the error term. The data used for the analysis is a 29-year data series covering 1990 to 2018. Most data were collected from the World Bank's World Development Indicators (WDI), International Monetary Fund (IMF), UNCTAD, and Ghana Statistical Service.

Unit root test

A test for co-integration among variables is primarily required in the above model. The Augmented [24] unit root test technique was used to check for the unit root of the variables. The ADF test is an auxiliary regression developed by [24] to check the existence of a unit root for each variable of a model.

$$\Delta Y_t = \alpha + \delta_t + \beta Y_{t-1} + \sum_{i=1}^{k} \gamma \Delta Y_{t-1} + \mu_t$$

The aforementioned auxiliary regression tests for the possible presence of a unit root in Yt. The variable ΔYt−1, indicates the lagged first differences and shows the serial correlation errors, and α, δ, β *and* γ are the parameters of the equation which are to be estimated. The null and alternative hypotheses for the above equation can be written as: Ho: β=0, Hε: β<0. The t-statistics criterion is commonly used to test the null hypothesis. According to this approach, the null hypothesis (β=0) cannot be rejected if the t-statistics are lower than the critical values.

Co-integration and long-run model

To understand the long-term relationship between variables, the Johansen Co-integration test is designed for non-stationary variables. [25] introduced the co-integration method, and the fundamental purpose of this test was to protect losses from long-run data information that occurs due to the time series. The linear combination of variables is I (1) and I (0), so variables are said to be cointegrated and require data from time series to be non-stationary at the first difference and stationary levels. For the above model, the Johansen co-integration test was employed. The co-integration of two or more series means they have a long relationship. The co-integration analysis captures the dynamic relationship among the variables. Assume that the process Y_t is defined by an unrestricted vector autoregressive system of order (n×1).

$$Y_t = \pi_1 Y_{t-1} + \pi_2 Y_{t-2} + \ldots + \pi_k Y_{t-k} + \mu_t \quad (1)$$

where, Y_t = (n×1) vector, of I (1) variables π_1 = (n×n) matrix of unknown parameters, to be estimated (I = 1, 2, 3 … k) μ_t. The independent variables and identically distributed (n×1) vector of error terms (1, 2, 3 …. m) observations. Using $\Delta = (I - L)$ where L is the lags operator. The above equation can be transformed into the error correction form below:

$$\Delta Y_{t-1} = \sum_{i=1}^{k-1} \Gamma_i \Delta Y_{t-1} + \pi Y_{t-k} + \mu_t \quad (2)$$

where, ΔX_t is an I (0) vector. I is an (n×n) identity matrix.

$$\Gamma_i = \sum_{i=1}^{k-1} \pi_{i-I}, \text{ i=1, 2…..k-1, and} \quad (3)$$

$$\pi = \sum_{j=1}^{k-1} \pi_{j-1} \quad (4)$$

The fourth equation is a vector error correction equation.

Johansen's approach, along with the independent errors, is an estimator of the co-integration vector, the autoregressive process. The vector (n x n) can also be seen as the multiple of α and β, two (n x r) of each rank, where α indicates the integration of r co and β shows the elements of weighting and thus the above equation is written as:

$$\Delta X_t = \sum_{i=1}^{k-1} \Gamma_i \Delta X_{t-1} + (\beta\alpha) X_{t-k} + \mu_t \quad (5)$$

Here the hypothesis of r co-integration relation among the element of Y_t. The null hypothesis of no co-integration relations (r=0) means that π=0; thus, the co-integration test is the estimations of π are significantly different from 0 and test for the number of co-integrations. On the other hand, when there is no co-integration relation, where $0 \leq \Gamma < n$. If there is no cointegration relation, then the linear combination variables are stationary. The order of Γ is estimated using likelihood ratio (LR) trace test statistics suggested by [26].

$$\lambda_{trace(q,n)} = -T \sum_{i=q+1}^{k} \ln(1 - \lambda_i) \quad (6)$$

For Γ =0, 1, 2 …k−1. T represents the number of observations used for estimation is i[th] largest estimated Eigenvalue.

$$\lambda_{max(q,q+1)} = -Tln(1 - \lambda_{q+1}) \quad (7)$$

Trace statistics reject the null hypothesis of co-integration among the variables ($\Gamma = 0$) does not reject the null hypothesis, that there is one cointegrating relation between the variable ($\Gamma \leq 1$).

Data Analysis and Result

The augmented Dickey-Fuller test was estimated to verify the stationarity variables at the level as well as at the first difference, and the results of the ADF test are listed below:

Table 1. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Year	27	2003	7.937	1990	2016
lnGINI	27	1.625	.013	1.603	1.64
lnRGDP	27	.69	.172	.338	1.148
lnGFCF	27	1.307	.122	1.071	1.466
lnTOP	27	-.135	.117	-.372	.065
lnINF	27	1.459	.614	.335	2.315
lnUMP	27	.793	.106	.665	1.015
lnFDI	27	.41	.451	-.6	.976
lnEXC	27	.301	.621	-.592	1.487
lnHUC	27	.332	.031	.273	.386

Table 2. Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) lnGINI	1.000					
(2) lnFDI	0.784*	1.000				
	(0.000)					
(3) lnRGDP	0.331	0.288	1.000			
	(0.092)	(0.145)				
(4) lnEXC	-0.972*	-0.769*	-0.209	1.000		
	(0.000)	(0.000)	(0.296)			
(5) lnTOP	0.415*	0.355	0.182	-0.557*	1.000	
	(0.032)	(0.069)	(0.362)	(0.003)		
(6) lnINF	0.989*	0.785*	0.280	-0.991*	0.496*	1.000
	(0.000)	(0.000)	(0.157)	(0.000)	(0.008)	

**** p<0.01, ** p<0.05, * p<0.1*

Table:3 Augmented Dickey-Fuller test

Variables	Level		1ST difference		Order level
	Constant	Trends	Constant	Trends	
lngini	-2.862*	1.625	-2.577	-3.323*	I (1)
lnfdi	-2.340	-2.619	-4.240***	-4.279**	I (1)
lngdpc	-2.759*	-3.888**	-6.340***	-6.225***	I (0)
lnexc	-1.846	-1.458	-3.571**	-3.892**	I (1)
lntop	-2.346	-1.919	-4.665***	-5.526***	I (1)
lninf	-2.754*	-4.637**	-2.586	-3.133	I (0)

**** p<0.01, ** p<0.05, * p<0.1*

The critical values at 1%, 5%, and 10% are -4.339, -3.587, and -3.229, respectively. The values of the variables are greater in absolute terms than the critical values and stationary at the first difference level except for lninf (inflation) whose variable was stationary at level. Thus, *lngini*, *lnfdi*, *lngdpc*, *lnexc, and lntop* are integrated of the order I (1) level. The *lninf* is integrated of order I (0) level.

Cointegration and Short-Run Model

The co-integration technique helps to determine the existence of an equilibrium relationship between the variables employed [27]. All variables included in the analysis were integrated; hence, the cointegrated relationship between the variables was tested. With a maximum lag of 1, Akaike Information Criterion, the lag length of unrestricted VAR model, the Johansen co-integration test was conducted.

The Trace and Maximum Eigen statistics are the two test statistics for co-integration vectors. The number of cointegrated equations in the model is given in both tests. The null hypothesis cannot be rejected if the t-statistics are greater than the 0.5 critical values. This means there is no co-integration among the values, and an unrestricted VAR model should be conducted. However, when the t-statistics is less than 0.5 critical values, reject the null hypothesis, and the VECM (Vector Error Correction Model) is conducted.

If there is no co-integration among variables, then there is a long-run relationship on the averages between the variable, ceteris paribus. If there is co-integration among the variables, it indicates a short-run relationship between the variables on average, ceteris paribus.

Table 4 shows the Trace and Max Eigen statistics results after running the Johansen Co-integration test. Table three provides the normalized co-integration results.

Table 4. Johansen Cointegration test result

Trace Statistics				Max-Eigen Statistics			
H0	Trace	CV (95%)	Prob.	H0	Max-Eigen	CV (95%)	Prob.
r = 0*	127.2030	95.75366	0.0001	r = 0*	44.29362	40.07757	0.0158
r = 1*	82.90939	69.81889	0.0032	r = 1	30.95226	33.87687	0.1074
r = 2*	51.95713	47.85612	0.0196	r = 2	22.55296	27.58434	0.1934
r = 3	29.40418	29.79707	0.0554	r = 3	15.27665	21.13162	0.2700
r = 4	14.12753	15.49471	0.0795	r = 4	13.88805	14.26460	0.0572
r = 5	0.239482	3.841465	0.6246	r = 5	0.239482	3.841465	0.6246

*The trace statistics showed that there are 3 cointegrated equations at the 0.5 level of significance. The Maximum Eigenvalue indicates only 1 cointegrated equation at the 0.5 level of significance.

From the above table, the Max-Eigen statistic results show that there is only one co-integration equation at none (r = 0), which means that the null hypothesis is rejected, suggesting a short-run relationship among the variables on average, ceteris paribus. Therefore, the VECM model should be conducted. However, with the trace statistics, there are three cointegrated equations and three non-cointegrated equations. At this point, the null hypothesis cannot be rejected or accepted, and both the unrestricted VAR and VECM models should be run.

Table 5. Normalized co-integration results from the Johansen Co-integration for the long-run relationship

	Dependent variable: lngini				
	Lnfdi	lngdpc	Lnexc	lntop	lninf
Coefficients	-0.003884	0.008811	-0.028608	0.052802	0.008004
Standard Error	0.00028	0.00090	0.00042	0.00193	0.00048

**** p<0.01, ** p<0.05, * p<0.1*

From the results above, FDI and exchange rate positively impact (reduces) gini coefficient in the long run by 0.3% and 2.8% respectively on average, *ceteris paribus*. This result is in tandem with the works of [28] and [29] in which they employed the VAR method in exploring the impact of FDI on poverty reduction. They found similar results where FDI reduce poverty in the long run. Howerver, GDP per capita, trade openness, and inflation harm (increase) gini coefficient by 0.8%, 5.2% and 0.8% respectively, on average, *ceteris paribus*. The VECM model was estimated, and the long and short-run relationship results are provided in Tables 6 and 7.

Table 6. Vector Error Correction Model results based on Johansen Co-integration (Long run results)

	Dependent variable: lngini				
	Lnfdi (-1)	lngdpc (-1)	lnexc (-1)	lntop (-1)	lninf (-1)
Coefficients	-0.011256	0.030063	-0.033955	0.091459	0.017083
St. Errors	0.00173	0.00514	0.00249	0.01083	0.00306
T Statistics	-6.51926**	5.85162	-13.6162**	8.44454**	5.57604*

**** p<0.01, ** p<0.05, * p<0.1*

From the table above, the long effects results are presented. In the long run, FDI is statistically significant and reduces income inequality by 1.125% ceteris paribus, hence reducing poverty levels per the arguments of the FGT poverty measurement. This results in line with the works of [28,29,30,31]. They all found FDI to harm poverty in the long run. Similarly, the exchange rate (exc) hurts Gini coefficient. Thus, it reduces inequality and hence poverty. This could link to the impact of FDI. This is more of an indirect impact through the positives of FDI inflows – more net inflows, economic growth and stable financial systems. However, inflation (lninf) and trade oppeness (lntop) are significant and positive relationship with gini coefficient in the long run. In the long run, inflation increases and trade oppeness increases poverty by 1.7% and 9.1% respectively, ceteris paribus. GDP per capita was insignificant but has increases gini coefficient by 3% in the long run.

Table 7. Vector Error Correction Model results based on Johansen Co-integration (Short-run result)

	Dependent variable: lngini						
	ConintEq1	Constant	lnfdi (-1)	lngdpc (-1)	lnexc (-1)	lntop (-1)	lninf (-1)
Coefficient	-1.1565	-0.0126	0.0102	0.0502	0.1022	-0.0079	0.0127
St. Errors	0.9942	0.0093	0.0153	0.0999	0.0861	0.0992	0.0158
T Stats	1.1632	-1.3555	0.6651***	0.5028**	1.1876*	-0.0796**	-0.8027**

R^2 = 0.194010

F stats = 0.653356

**** p<0.01, ** p<0.05, * p<0.1*

The VECM short-run results stipulate that FDI, GDP per capita, exchange rate, and inflation positively correlate with gini coefficient and statistically significant in the short-run. However, trade openness has a negative relationship with gini coefficient and statistically significant in the short-run. The cointegration equation (CointEq) shows that the previous year's deviation from long-run equilibrium is corrected at a speed of 115.6%. Thus, it show the speed of adjustment in the long run from the short run. In the long run, the variabeles will be at equilibrium with a 115.6% speed of adjustment.

The results show that a percentage change in FDI will lead to a 1.02% increase in the Gini coefficient in the short run. In effect, the net inflows of FDI widen the income inequality gap in the short run, hence pushing more people to fall below the safety net. This could be attributed to two issues. First, the kind of inflows which are brought into Ghana. Most of the inflow is not employment generative. They rather complement existing employment systems and industry less employment is created. Additionally, most of these inflows come from purchases within the financial sector, which crowds out domestic bond purchases. Second, the inflows are mostly targeted to areas where most Ghanaians are not participating. Thus. Per the demographics of Ghana, most people work within the informal sector and in the agricultural sector. However, according to the [9], most of the investments are in the service and oil and gas sectors. These findings are consistent with the works [22,32,33].

The result also postulates that GDP per capita, exchange rate, and inflation positively impacts gini coefficient by 5.02%, 10.22%, and 1.27% respectively. [22,28] also had similar results. Therefore, there is a need to stream policies that will ensure that the distribution of resources are Pareto optimal. In this regard, growth in per capita income will mean that more people will join the middle class of income earners.

Moreover, some diagnostics tests were conducted to test for heteroscedasticity and autocorrelation. The Breusch-Pagan LM test was conducted to ascertain the heteroscedasticity, and the Durbin Watson Autocorrelation test was conducted. The results are shown in Tables 8 and 9, respectively.

Table 8. Heteroscedasticity test result

Chi-Square	Degree of freedom	Prob
292.8969	294	0.5072
*No heteroscedasticity		

From the above results, the p-value is greater than the 1%, 5%, and 10% significance levels. The null hypothesis of no homoscedasticity is rejected. Therefore, there is no heteroscedasticity in the module. This implies that the model is homoscedastic.

Table 9. Autocorrelation test result

Lags	LRE*stat	d/f	Prob	RaoFstat	d/f	Prob
1	25.96665	36	0.8914	0.636670	(36, 37.9)	0.9117
2	26.96424	36	0.8620	0.667650	(36, 37.9)	0.8869

Null hypothesis: There is no serial correlation at lag h

From the autocorrelation LM diagnostics test above, the p values for the lags (1 and 2) are higher than the 5% significance level, which means there is no autocorrelation. Thus, the null hypothesis of no serial correlation cannot be rejected. This implies that the variables within the model are not serially correlated and are independent of each other.

Discussions, Conclusion, and Policy Implication

Poverty has been a nebulous and contentious phenomenon whose accurate quantification is daunting. While [34] argues that poverty is linked with an individual's capability to choose a life that he or she has a reason to value, [35] views poverty as the lack of ability to in a particular way of life. [36] opined that most research on income inequality and poverty explains the difference in income and consumption between people by focusing on the differences in individual household characteristics.

The analysis results indicate that FDI does not reduce the inequality gap; instead, it increases the gap by 1.02%. This can be attributed to the fact that the inflows of FDI into Ghana for the past years have been in the economy's service sector. It is worth noting that the informal and agricultural sectors of the Ghanaian economy are the most significant contributors to job creation in Ghana. These two sectors provide a living for the majority of the middle and lower classes, who are often poor. Over the years, the share of agriculture to GDP and employment is declining, meaning more people are becoming poorer. The Ghana Investment Promotion Center's 2020 2nd quarter report shows evidence of this. The report stipulated that in terms of sectoral distribution of investment cost and FDI value, the general

trading sector recorded an immense value of US$246.05 million. This was followed by the mining exploration and manufacturing sectors, with an estimated cost of US$231.02 million and US$170.67 million, respectively. The figure below shows the sectoral distribution of FDI value and the estimated cost in US dollars.

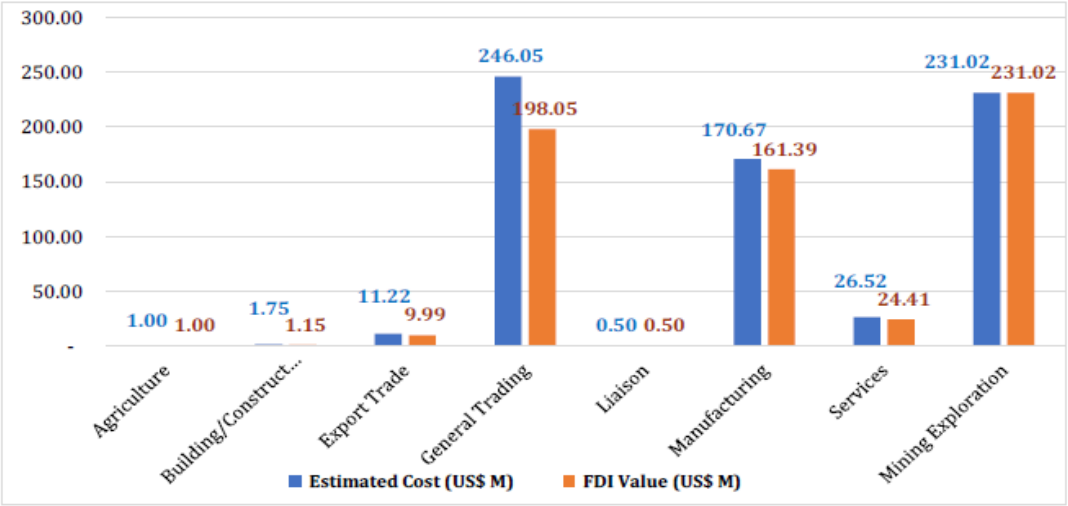

Figure 1. Sectoral distribution of FDI value and estimated cost in us dollars [15]

This accounts for the high multidimensional poverty in Ghana. The inequality gap between cities and villages and within cities is very high. As most cities become urbanized, inequality and urban poverty increase, increasing multidimensional poverty indices. The situation is worse in the rural part of Ghana, where the primary source of income is farming. This is because most of the FDI inflows remain within the cities, and the figure above demonstrates the abysmal performance of the agricultural sector in attracting FDI.

According to [15], 45.6% of 30 million Ghanaians are multidimensionally poor. This is a staggering 13.68 million Ghanaians who are multidimensionally poor. It is essential to state that the current government policy of one district, one factory (1D1F), and planting for food and jobs have attracted more FDI into the country concerning the former policy; most of these are in the manufacturing and mining sectors. In contrast, local investments are instead increasing in the latter policy.

As expected, inflation also increases the inequality gap, thereby making the poor poorer. When prices of goods and services increase without a parallel increase in income, more people will be pushed to live below the lifeline threshold. Therefore, the result of the study is consistent in that a percentage increase in the inflation rate creates a 1.27% increase in inequality (Gini coefficient); hence, the poverty index rises. When people are unable to afford a life they value due to increases in the inflation rate, it renders the individual incapable of living a life he or she values. This was what Sen was concerned about.

Similarly, the exchange rate is in sync with the inflation rate within a country. When a state's currency performs poorly against the primary trading currency, it leads to price hikes, especially in import-dependent countries. Ghana's import has been exceeding its exports for some time now, and anytime the Ghana cedis (GHS) performs poorly against the major trading currencies such as dollars, pounds, and euro, the prices of imported goods, especially rice, cooking oil, chicken, and other basic needs items goes up. This increases the number of people living below the World Bank safety net of US 2 dollars.

However, the inequality gap is reduced by 0.79 percent when trade openness increases by 1%. This could be attributed to the integration of trade within the Economic Community of West African States (ECOWAS) economic bloc. Whiles major cooperation and big business are taking advantage of this, middle- and low-level-income earners also increase their income through intercountry trading. Most traders in Ghana at the middle and low-income levels take advantage of the duty-free port in Togo to import their trading items. Others move to Nigeria to buy goods. Some provide service within the border towns or even move to other neighboring countries to establish a business where they enjoy some tax weaves and economic advantages.

Conclusion and Policy Implication

This study investigates the impact of FDI on poverty in Ghana using a 29-year data set (1990 - 2018). A Johansen Co-integration technique was employed to estimate the impact of FDI, and some diagnostics tests were conducted. The study concludes that FDI, GDP per capita, inflation rate, and exchange rate increase the Gini coefficient, increasing income inequality and poverty. In contrast, trade openness reduces the Gini coefficient, implying a reduction in income inequality and poverty.

The finding of this study that FDI does not reduce poverty is in tandem with the findings of [20,38]. With this backdrop, the following policy recommendations are suggested to policymakers:

1. FDI inflows need to be targeted toward sectors that involve a majority of middle and low-income earners.
2. Through the GIPC, the government can incentivize investors whose targets are the informal and agricultural sectors. This is because a majority of the poor people work within these sectors.
3. The 1D1F policy should be intensified as it can potentially revolutionize the agricultural and manufacturing sectors. This can reduce our import dependency. This project's expansion and sustainability plan should be a priority for the government. More jobs will be provided, and more livelihoods will be transformed as their earnings increase if the policy is sustained and appropriately planned. Additionally, for 1D1F to thrive skillfully, governments should commit to providing basic infrastructures like electricity, water, roads, hospitals, and good internet services. This infrastructure has a high potential of attracting FDI into Ghana. Moreover, the government should improve the institutional mechanism for a transparent business environment. This will enhance the ease of doing business in Ghana.
4. The inflation rate has been one of the bottlenecks in reducing income inequality and poverty. There is the need to maintain consistent single-digit inflation while frantic efforts should be made to reduce it further. This has a high potential of making people live a life they value and making their life better. It also suggests that investors' stability leads to steady economic growth and is thus worth an important focus point. Likewise, a stable currency exchange regime signals the robustness of the Ghanaian economy. The currency's stability against major foreign currencies was positive throughout 2020 despite the pandemic, and it is imperative to keep this robust performance consistent. This provides confidence as well as reduces negative speculations. More so, the stability of currency reduces price hikes, reducing the cost of living over time and improving the standard of living.

References

[1] Wang X, Xu Z, Qin Y, Skare M. Foreign direct investment and economic growth: a dynamic study of measurement approaches and results. Economic research-Ekonomska istraživanja. 2022 Dec 31;35(1):1011-34.

[2] Agya Adi AT, Friday Ogbole OG. Foreign direct investment in China: It's sectoral and aggregate impact on Economic growth. MPRA. 2013.Online at https://mpra.ub.uni-muenchen.de/62166/

[3] Muhammad B, Khan MK, Khan MI, Khan S. Impact of foreign direct investment, natural resources, renewable energy consumption, and economic growth on environmental degradation: evidence from BRICS, developing, developed and global countries. Environmental Science and Pollution Research. 2021 May;28:21789-98.

[4] Unctad. World investment report 2021: Investing in sustainable recovery. UN; 2021. https://unctad.org/system/files/official-document/wir2021_en.pdf

[5] Unctad. World investment report 2018: Investing in new industrial policies. UN; 2018. https://unctad.org/system/files/official-document/wir2018_en.pdf

[6] Giroud A, Ivarsson I. World Investment Report 2020: International production beyond the pandemic: United Nations Conference on Trade and Development, Geneva and New York, 2020, 247 pp. ISBN: 978-9211129854. https://unctad.org/system/files/official-document/wir2020_en.pdf

[7] Unctad. World Economic Situation Prospects: Investing in Sustainable Recovery. UN; 2019. https://www.un.org/development/desa/dpad/wpcontent/uploads/sites/45/WESP2019_BOOK-web.pdf

[8] Giroud A, Ivarsson I. World Investment Report 2020: International production beyond the pandemic: United Nations Conference on Trade and Development, Geneva and New York, 2020, 247 pp. ISBN: 978-9211129854.

[9] [9] Ghana Investment Promotion Center. Quarterly Investment Report: Second Quarter Report April-June 2020. https://www.gipcghana.com/press-and-media/downloads/reports.html obtained on 2 December 2020.

[10] Oyebamiji, O. A. Child labour, productivity and poverty in Osunstate, Nigeria. International Students Science Conference, p. 5, 2017, İzmir, Turkey.

[11] Milanovic B. Global inequality: A new approach for the age of globalization. Harvard University Press; 2016 Apr 11.

[12] Kyzyma I. How poor are the poor? Looking beyond the binary measure of income poverty. The Journal of Economic Inequality. 2020 Dec;18(4):525-49.

[13] Gweshengwe B, Hassan NH. Defining the characteristics of poverty and their implications for poverty analysis. Cogent Social Sciences. 2020 Jan 1;6(1):1768669.

[14] World Bank. Poverty and shared prosperity 2020: Reversals of fortune. The World Bank; 2020 Nov 19.

[15] Mensah F, Agyaho JF, Kofinti RE, Sebu J. Multidimensional Poverty-Ghana. Ghana Statistical Service; 2020.

[16] Shaw KL. An empirical analysis of risk aversion and income growth. Journal of Labor Economics. 1996 Oct 1;14(4):626-53.

[17] Anigbogu TU, Edoko TD, Okoli IM. Foreign direct investment and poverty reduction in Nigeria. International Journal of Business and Management Invention. 2016 Jun;5(6):19-28.

[18] Bradshaw TK. Theories of poverty and anti-poverty programs in community development. Community Development. 2007 Mar 1;38(1):7-25.

[19] Teixeira AA, Loureiro AS. FDI, income inequality and poverty: a time series analysis of Portugal, 1973–2016. Portuguese Economic Journal. 2019 Oct;18(3):203-49.

[20] Adu G. Impacts of foreign direct investment (FDI) on rural poverty in developing countries: The case of mining FDI in Ghana. Major Papers. 2018 Jun. 19.

[21] Akhtar R, Hongman Lİ, Amjad AL. Influencing factors of poverty in Pakistan: Time series analysis. International Journal of Economics and Financial Issues. 2017 Jan 6;7(2):215-22.

[22] Magombeyi MT, Odhiambo NM. Foreign direct investment and poverty reduction. Comparative Economic Research. Central and Eastern Europe. 2017;20(2):73-89.

[23] Doytch N, Uctum M. Spillovers from foreign direct investment in services: Evidence at sub-sectoral level for the Asia-Pacific. Journal of Asian Economics. 2019 Feb 1;60:33-44.

[24] Dickey DA, Fuller WA. Distribution of the estimators for autoregressive time series with a unit root. Journal of the American statistical association. 1979 Jun 1;74(366a):427-31.

[25] Engle RF, Granger CW. Co-integration and error correction: representation, estimation, and testing. Econometrica: journal of the Econometric Society. 1987 Mar 1:251-76.

[26] MacKinnon JG, Haug AA, Michelis L. Numerical distribution functions of likelihood ratio tests for cointegration. Journal of applied Econometrics. 1999 Sep;14(5):563-77.

[27] Dolado JJ, Jenkinson T, Sosvilla-Rivero S. Cointegration and unit roots. Journal of economic surveys. 1990 Sep;4(3):249-73.

[28] Rochman F, Sylviana W. Analysis of foreign direct investment (FDI) impact on poverty in Indonesia 2010 until 2014. PalArch's Journal of Archaeology of Egypt/Egyptology. 2020 Dec 8;17(3):1519-28.

[29] Anetor FO, Esho E, Verhoef G. The impact of foreign direct investment, foreign aid and trade on poverty reduction: Evidence from Sub-Saharan African countries. Cogent Economics & Finance. 2020 Jan 1;8(1):1737347.

[30] Hoa NT, Hemmer HR. Contribution of Foreign Direct Investment to Poverty Reduction: the case of Vietnam in the 1990s. Discussion Papers in Development Economics, Institute for Development Economics. 2002.

[31] Kedir R. The Impact Of Foreign Direct Investment On Poverty Reduction In Ethiopia: Cointegrated Var Approach. Adis Ababa University. 2012 Dec.

[32] Arabyat YA. The impact of foreign direct investment on poverty reduction in the developing countries. International Finance and Banking. 2017;4(2):92-111.

[33] Israel AO. Impact of foreign direct investment on poverty reduction in Nigeria (1980–2009). Journal of Economics and Sustainable Development. 2014;5(20):34-45.

[34] Sen A. Development as freedom. Oxford Paperbacks; 2001 Jan 18.

[35] Levine DP, Rizvi SA. Poverty, work, and freedom: Political economy and the moral order. Cambridge University Press; 2005 Jun 30.

[36] Bigman D, Fofack H. Geographical targeting for poverty alleviation: An introduction to the special issue. The World Bank Economic Review. 2000 Jan 1;14(1):129-45.

[37] Spicker P. Social policy: Theory and practice. Bristol: Policy Press; 2014 Mar 20.

[38] Ogunniyi MB, Igberi CO. The impact of foreign direct investment on poverty reduction in Nigeria. Journal of Economics and Sustainable Development. 2014;5(14):78-83.