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Investigating the role of foreign capital inflows and economic freedom in poverty alleviation

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ABSTRACT

Many developing countries are still suffering considerable poverty despite the enormous amounts of international development aid channeled to them. This phenomenon raises the question of what role foreign capital plays in these countries. Our study focused on the role of foreign capital (foreign direct investment and foreign aid) and economic freedom in poverty alleviation in developing and least-developed countries using panel data from 1995 to 2018 for 71 countries. We employed several econometric techniques, such as dynamic ordinary least squares, fully modified ordinary least squares, dynamic fixed effects, and pooled mean group regression methods. Furthermore, we performed the Granger causality test, tested the impulse response function, and conducted variance decomposition analysis. In our long-run estimations, we found that while foreign direct investment could significantly alleviate poverty, it increased poverty in the short run. On the other hand, foreign aid played no significant role in poverty alleviation in either the short or the long run. Moreover, to alleviate poverty, economic growth and economic freedom are essential; our findings consistently demonstrated that they play a crucial role in poverty alleviation. We also found bidirectional causality between poverty alleviation and population growth, while a unidirectional causal linkage was found from poverty alleviation to foreign aid. We conclude that policymakers should develop a new paradigm of developmental assistance, and governments should create an enabling environment for foreign investment to support their growth plan.

Contribution/Originality: This study contributes to the existing literature but presents fresh evidence that economic freedom is a critical component of poverty alleviation. To understand this phenomenon, we evaluated the role of foreign capital (foreign direct investment/official development assistance) in poverty alleviation with the intervening effect of economic freedom.

1. INTRODUCTION

Globally, it is estimated that about 10% of the world's population lives on less than $1.90 per day, thus living in extreme (abject) poverty. Moreover, this figure doubles when health, nutrition, and education are considered, referred to as multidimensional poverty (Sumner, 2020). In 1969, at the Pearson Commission of the United Nations General Assembly, the countries of the world reached an agreement that the world's wealthiest countries should contribute 0.7% of their gross national income (GNI) towards international development assistance or aid. This resolution was made against a backdrop of increasing poverty in the southern world and increasing prosperity in the northern world. The United Nation's 1969 resolution focused on ending global poverty as global poverty was at a higher level in that

era. In the effort to end global poverty, Sumner (2020) argued that the world should come together to curate new and scaled financial commitments to development.

In the past 50 years, the world has seen some progress toward ending poverty, although most developed countries have not met the 0.7% of GNI target for international development aid. Nevertheless, many of the least developed and developing countries witnessed economic growth in the 2000s – not only India and China, but also a number of African countries (Sumner, Gulrajani, Wickstead, & Glennie, 2020). However, with the emergence of the COVID-19 pandemic, all these gains are in jeopardy. Also, a higher level of global ambition has been established with the United Nations Sustainable Development Goals (SDGs), which commit countries to eradicating poverty at all levels by 2030. In 2015, the United Nations General Assembly agreed to 17 SDGs that included 169 indicators (targets) to be achieved by 2030. The number one priority or goal is to end poverty at all levels in every country. All the SDGs are connected such that achieving no poverty means achieving no hunger, which is SDG 2 (Zhou, Moinuddin, & Li, 2017). In the developing world, several middle-income countries have emerged that are home to much of the world's developing populace. However, these nations are recipients of lower levels of aid relative to non-public international flows and domestic resources. Moreover, about 30% of these countries are stagnant in terms of growth due to their high aid dependency. These countries constitute about 10% of the developing world's populace. In contrast, other middle-income developing countries exist that are vulnerable to poverty even though they have escaped the poverty threshold. They are at high risk of falling back into it. These countries are home to about two-thirds of the world's developing population (Sumner et al., 2020). The COVID-19 pandemic is expected to suppress the world's economic output by about $8.5 trillion over the next two years. The global economy was expected to contract by about 3.2% in 2020, the worst contraction since the Great Depression in the 1930s (Wulfhorst, 2020). The pandemic could widen the poverty gap, causing about 37 million people to fall below the poverty threshold due to international cooperation waning, economies shrinking, and public financing drying up, threatening the achievement of the SDGs (Wulfhorst, 2020). Meanwhile, about 734 million of the world's populace live in extreme poverty (Aguilar, Fujs, Lakner, Nguyen, & Prydz, 2019; World Bank, 2020).

Many countries are still in poverty despite the enormous amount of international development aid channeled into developing and least-developed countries. This raises questions about the role foreign capital plays in these countries. Many scholarly works have concluded that official development assistance (ODA) and foreign direct investment (FDI) need to be increased. Moreover, they should be directed toward less developed and developing countries to ensure widespread poverty alleviation (Ben Slimane, Bourdon, & Zitouna, 2015; Magombeyi & Odhiambo, 2018; Mahembe & Odhiambo, 2019). Conversely, foreign capital, i.e., FDI and foreign aid, is also seen as a counteragent to poverty alleviation. Despite the extensive development aid channeled into developing and least-developed countries, they still lag in terms of development, leaving the majority of their population in abject poverty (Mahembe & Odhiambo, 2019). However, from a Marxian economic perspective, scholars have highlighted that economic growth is not the only measure of poverty alleviation. According to Isaiah (1967), socioeconomic factors have a hand in poverty alleviation in that the rich will always benefit from the poor. Therefore, within a capitalist economic system, the implementation of minimum wage laws, enforcement of approaches to eradicate dual labor markets, and the enactment and implementation of anti-discrimination laws are widely seen as tools to reduce poverty (Isaiah, 1967). In this sense, economic freedom is considered a critical ingredient of poverty alleviation. Nevertheless, Sumner et al. (2020) suggested that a new universal development commitment ought to be adopted to ensure the equitable distribution of development assistance due to the previous trend of development aid not being able to fulfill its intended purpose. Based on this assertion, we pose the following question: *what role does foreign capital play in poverty alleviation, and what intervening effect does economic freedom have?*

One of the most important ways developed countries can improve the lives of those in less developed areas is through foreign aid, which has alleviating poverty and reducing economic disparities as its primary objectives. It has been argued that foreign aid's average growth benefits represent a particularly important measure of its efficacy. Even

Burnside and Dollar (2000) conclusion that aid enhances growth can be questioned in light of more recent findings. According to Easterly, Levine, and Roodman (2004), there is no evidence that aid has any effect on growth, even when institutions are of high quality. On the other hand, Rajan and Subramanian (2008) and Bräutigam and Knack (2004) argued that aid can actually contribute to the deterioration of democratic institutions. However, foreign aid may be beneficial in other ways, such as enhancing the standard of living for the poorest segments of the population in the recipient country. It may contribute to poverty alleviation and income distribution equality, even if it does not always have an effect on the economy's average growth rate. There is, to our knowledge, a dearth of formal scientific research on this subject, even though both of these are critical objectives of aid provision. Our study aims to provide insight into this issue by introducing economic freedom into the nexus between foreign capital and poverty alleviation. To understand this phenomenon, we evaluated the role of foreign capital (FDI and ODA) in poverty alleviation with economic freedom as a mediating effect in 71 developing and least developed countries by applying several econometric methodologies. This study's innovation is twofold: (i) to the best of our knowledge, no study has considered the role of economic freedom in the relationship between foreign capital and poverty alleviation, although economic freedom is widely considered a mechanism for poverty alleviation (Fraser Institute, 2020; Kloeppel, 2013); (ii) a simple correlation or even cross-country analysis may be deceptive in this case, and appropriate statistical techniques are required to avoid this. In our empirical approach, which is as rigorous and exhaustive as feasible, panel methods were employed to address any endogeneity issues openly (ARDL dynamic fixed effects and pooled mean group methods). Employing a dynamic panel technique such as this one aided in our comprehension of the subject at hand.

This paper consists of six sections: the first section introduced the present work, and Section 2 provides the theoretical underpinning and literature review. Next, Section 3 outlines the methodological approaches, after which Section 4 presents the study's findings, and Section 5 discusses the results. Lastly, Section 6 concludes the paper.

2. THEORETICAL UNDERPINNING

On the topic of poverty, two primary schools of thought exist: individualistic (classical) theory (Lewis, 1969; Schultz, 1961; Spencer, 1851) and structural (neo-classical) theory (Brady, 2009; Schiller, 1972). The classical theory positions poverty as a human responsibility; it posits that human beings choose to live in poverty as their destiny. The theory claims that a lack of role models and disassociation from people makes one poor. In contrast, the neo-classical theory posits that poverty is beyond the control of the individual, and many factors affect an individual's ability to reduce poverty. The causes of poverty proposed by neo-classical theory include a lack of private assets, market disequilibrium, and difficulties of the poor accessing credit facilities, making their choice of certain things rationally biased. Other factors are barriers to education, challenges associated with immigration status, inadequate healthcare, barriers to employment, and many others (Pineda, 2020).

Many scholars have criticized both the classical and neo-classical theories. They consider them overly monetary and materialistic; however, other factors may also contribute to poverty reduction, such as the sociological impact of "community" contribution. These scholars argue that an individual's needs should not only be classified as material or monetary, solely emphasizing the connection between productivity and income. Recently, a theory that has gained much attention is new Keynesian theory, which focuses on monetary factors and considers governments' effectiveness in providing public goods to address inequality. Compared to the classical and neo-classical theories, new Keynesian theory substantiates the neo-classical theories, which postulate that an upsurge in income is a deliberate and effective measure of poverty reduction (Dollar & Kraay, 2002).

Human capital development in the form of education plays a significant role in the pursuit of economic development. An educated person tends to take up employment opportunities that use the skills they have acquired; this is the assertion of both neo-classical and new Keynesian theorists, unlike classical theory, in which unemployment is seen as a voluntary decision and a cause of poverty. The neo-classical and new Keynesian theories posit that

governments plan to provide jobs for citizens to earn a living to bridge the gap in income inequality to further reduce poverty. Moreover, government inefficiencies in the form of high inflation rates, huge sovereign debts (foreign aid), lack of foreign and domestic investment, and more are macroeconomic factors that weaken aggregate demand and, in the long run, cause poverty (Dollar & Kraay, 2002). In addition, Timothy et al. (2015) argued that one major challenge to poverty is the burgeoning rise in population growth. Dollar and Kraay (2002) posited that the elasticity of a poor person's income-earning is equal to 1; hence, there is an econometric relationship between economic growth and poverty reduction. Such assertions have given rise to the mantra, "Economic growth is good for the poor." Theories on poverty have thus transitioned from thinking about monetary issues to broader perspectives such as political participation and social exclusion. Institutions like the World Bank, the European Commission, and the United Nations define poverty as insufficient physical will and voice, exclusion from social and cultural activities, and lack of participation in decision-making and social, civil, and cultural life.

2.1. Literature Review on Foreign Capital and Poverty Alleviation

In 2016, about 40% of FDI inflows – approximately $1.75 trillion – flowed into the least developed and developing countries. Undoubtedly, this reveals that developing countries are the largest recipients of external financing geared toward job creation, economic growth, and poverty alleviation (UNCTAD, 2018; Vitenu-Sackey & Hongli, 2019; Vitenu-Sackey & Hongli, 2020; Vitenu-Sackey, 2021). Taking the human development index as a proxy of poverty alleviation, ASEAN countries have greatly benefitted from a rise in FDI inflows. The estimated FDI inflows into this region increased by 143% to an impressive $114.11 billion between 2009 and 2012 (UNCTAD, 2018). Gohou and Soumaré (2012) assessed the influence of FDI on poverty alleviation in African countries. They used data from 1990 to 2007 and the Granger causality test to understand the impact. Their findings showed that FDI and poverty reduction had a strong and direct or positive causal relationship, although there was a heterogeneous impact among the selected countries. Similarly, Soumaré (2015) investigated the link between welfare and FDI in the region of Northern Africa. The study spanned from 1990 to 2011 and employed a Granger causality test and dynamic panel data regression. The scholar concluded that FDI could significantly reduce poverty in Northern Africa and consequently improve people's welfare. Furthermore, Magombeyi and Odhiambo (2018) supported the findings of Soumaré (2015) and Gohou and Soumaré (2012). Using an autoregressive distributed lag approach (ARDL), their research focused on South Africa from 1980 to 2014. They found that the effect of FDI on poverty alleviation was quite subtle, as well as time reliant in the short-run or long-run analysis. Furthermore, they asserted that FDI could increase poverty in the short run but reduced poverty in the long run. Their study used the infant mortality rate as a proxy measure of poverty reduction. Dhahri and Omri (2020a) concluded that FDI could reduce poverty by 1.11%, while Dhahri and Omri (2020b) found that FDI could reduce poverty by 5% annually.

Since the 1970s, studies have reported mixed results concerning the foreign aid and poverty alleviation nexus. Nevertheless, aid is a useful tool for eradicating poverty in developing countries. In the late 1990s, the World Bank documented the importance of aid in poverty reduction, noting that "the main aim of aid is to reduce poverty" (World Bank, 2018). Subsequently, the first goal of the millennium development goals (MDGs) was to reduce global poverty by 50%. McGillivray, Feeny, Hermes, and Lensink (2006) reiterated that the bulk of foreign development assistance is used to augment savings constraints and increase domestic investment, which increases the overall degree of growth in the economy and eventually alleviates poverty. For foreign aid to be effective and its benefit of reducing poverty to be realized, Easterly (2009) contended that improved governance, increasing access to public services, and thereby increasing economic growth, could ensure aid effectiveness. Foreign aid is an efficient shock absorber and an imperative social safety net for various least-developed and developing economies (Hunt, 2008).

Furthermore, Gates and Gates (2014) opined that foreign development assistance (aid), by serving as a shock absorber, underpins sustainable economic progress in the long run. Also, Arndt, Jones, and Tarp (2015) argued that foreign aid could improve school enrolment, increase domestic investment, reduce infant mortality, and enhance life

expectancy. Scholarly works have produced mixed results in the effort to empirically understand the relationship between foreign aid and poverty alleviation. Some scholars have argued that there is no significant relationship between foreign aid and poverty alleviation (Arvin & Barillas, 2002; Chong, Gradstein, & Calderon, 2009). Others offer a different opinion, opining that several studies limited themselves to the aggregate impact of aid on poverty alleviation (Abiola & Olofin, 2008). Kaya, Kaya, and Gunter (2013) found that foreign aid channeled into agriculture production tremendously reduced poverty in developing countries. In a recent study, Sabrine and Anis (2020) concluded that foreign aid in the form of agricultural-fishing-forestry aid, investment aid, and social infrastructure aid was positively related to poverty alleviation, unlike non-investment aid, which was insignificantly related to poverty.

2.2. Economic Freedom and Poverty Alleviation

According to Kloeppel (2013), economic freedom is an essential ingredient of poverty alleviation. To buttress her assertion, she emphasized that India and China have become champions in their economic enterprises, and economic freedoms in these countries have improved. In that context, these countries have lifted millions of their citizens out of poverty. Countries with greater economic freedom experience exponential growth. The Fraser Institute (2020) Economic Freedom report indicated that countries with high levels of economic freedom have citizens who live longer and earn more per capita than those in less economically free regions. However, the report contended that income inequality is non-existent in economically free countries because when a country is freer, there is no way wealthy people can live to the detriment of the poor. In the end, the poor achieve more benefits and advantages. Also, economic freedom increases wealth and improves health and mortality rates, most especially among children and women in absolute terms. This report included five leading indicators in its computation of economic freedom in 141 countries: property rights and legal system, government size, sound and safe money, international trade freedom, and regulation. The country's population is the key to poverty; however, equitable delivery of economic freedom more significantly influences poverty alleviation than the redeployment of wealth (Kloeppel, 2013).

Over the past 26 years, the index of economic freedom has measured the liberty and freedom of markets worldwide to assess their impact. A positive relationship has been discovered between economic development (poverty alleviation) and economic freedom. The nine indicators of the economic freedom index are property rights, financial freedom, government spending (government size), investment freedom, monetary freedom, fiscal freedom (fiscal health), freedom from corruption (judicial effectiveness), and trade freedom (Heritage Foundation, 2020).

3. ECONOMETRIC METHODOLOGY AND EMPIRICAL MODEL

The econometric model for the study can be estimated as follows:

$$lnpvt_{it} = \beta_0 + \beta_1 \, foreign \, capital_{it} \begin{bmatrix} lnfdi \\ lnaid \end{bmatrix} + \beta_2 \, lnefio_{it} + \beta_3 \, lnY_{it} + \beta_4 \, lnpopg_{it} + \beta_5 \, lncpi_{it} + \varepsilon_{it} \, (1)$$

In Equation 1, lnpvt represents poverty, β_0 represents the coefficient of the intercept or constant term of the model, β_1 denotes the elasticity coefficient of the independent variable, thus foreign capital, proxied by FDI (lnfdi) and foreign aid (lnaid) to be estimated, β_2 denotes the elasticity coefficient of economic freedom (lnefio) to be estimated, β_3 symbolizes the elasticity coefficient of economic growth (lnY), β_4 represents the elasticity coefficient of population growth (lnpopg) to be evaluated, β_5 denotes the elasticity coefficient of the consumer price index (lncpi), and ε defines the error term or stochastic disturbances that may occur in the model. The extent to which foreign capital significantly impacts poverty alleviation may depend on the level of macroeconomic stability and the environment. Even though findings on the nexus between poverty and foreign capital have been inconclusive, no previous study has considered the role of economic freedom.

We adopted a number of econometric approaches to achieve our objective, including (i) estimation of cross-sectional dependence across the panel to ascertain the existence of cross-sectional dependence, (ii) a unit root test to

cement the stationarity of the data series after cross-sectional dependence was established, (iii) and subsequently, Johansen (1988) combined panel cointegration test to explore the long-run equilibrium or relationship that existed among the study's variables. (iv) Next, a correlation matrix was computed to find out the correlation between the endogenous and exogenous variables and to check for multicollinearity. (v) We then utilized two regression methods to assess the long-run relationships among the study's variables: panel dynamic ordinary least squares (Panel DOLS) and panel fully modified ordinary least squares (Panel FMOLS). Moreover, we used ARDL dynamic fixed effects (DFE) and mean group regression methods to estimate both the short-run and long-run relationships among the study variables. (vi) Next, we performed a Granger causality test to ascertain the direction of causality among the study's variables. (vii) The final step was to employ an innovation accounting approach (IAA) to cement the robustness of the causal linkage among the variables by performing variance decomposition analysis and checking for impulse response functions.

Table 1. Variables' descriptions and data sources.

Indicator	Variable	Description	Source
LNPVT	Poverty alleviation	Cost of closing the poverty gap in int-$ 2011 ($)	World Bank poverty and inequality platform https://pip.worldbank.org/home
Foreign capital:			
LNAID	Foreign aid	Total amount of aid and official development assistance received (US dollars constant as of 2015). Any flow or transfer of money, including grants and low-interest loans, is considered foreign aid, also known as official development assistance (ODA), and it is used to support the socioeconomic development of developing countries. ODA can come from bilateral aid agreements between the donor and recipient countries or from multilateral development organizations.	World Bank - world development indicators
LNFDI	Foreign direct investment	Foreign direct investment (FDI), thus net inflows (BoP, current US$). FDI leads to a flow of improved technology and know-how, management practices, and systems of the home countries of multinational enterprises (MNEs) to their host countries.	World Bank - world development indicators
LNY	Economic growth	GDP per capita, PPP (Constant 2011 international $)	World Bank - world development indicators
LNPOPG	Population growth	Population growth (Annual %)	World Bank - world development indicators
LNCPI	Consumer price index -inflation	Consumer price index (2010 = 100)	World Bank - world development indicators
EFIO	Economic freedom	Economic freedom index – property rights, judicial effectiveness, government integrity, tax burden, government spending, fiscal health, business freedom, labor freedom, monetary freedom, trade freedom, investment freedom, financial freedom	Heritagefoundation.org

The data used in the study spans from 1995 to 2018 for a panel of 71 developing and least developed countries (40 least developed and 31 developing countries). Details of the variables are presented in Table 1.

3.1. Unit Root and Cross-Sectional Dependence Tests

Long-run parameters are assumed to be most likely to exhibit cointegration relationships with a set of I(1) variables (Asteriou, 2009). Despite this, it was anticipated that the macroeconomic variables included in the model

would exhibit unit root and thus non-stationarity (Nelson & Plosser, 1982). Therefore, it was imperative to ascertain the variables' stationarity status to confirm their order of integration. Therefore, the unit root tests of Kao and Chiang (2001), Levin, Lin, and Chu (2002), Im, Pesaran, and Shin (2003) Augmented Dickey-Fuller (ADF), Fischer Chi-square (Maddala & Wu, 1999), and Philips-Perron (PP) Fischer Chi-square (Maddala & Wu, 1999) tests were employed. To avoid fluctuation in the data series, we transformed the data (variables) into their natural logarithm to save the regression results from spurious coefficients. Testing for cross-sectional dependence revealed the existence of contemporaneous correlation across the sampled countries. To be able to perform the cross-sectional dependence test, Pesaran's CD test approach was utilized. Pesaran (2004) proposed the below equation for the CD statistic:

$$CD = \left[\frac{TN(1-N)}{2} \right]^{1/2} \bar{\rho}, \tag{2}$$

In Equation 2, $\bar{\rho} = \left(\frac{2}{N(N-1)} \right) \sum_{i-1}^{N} \sum_{J-1+1}^{N} \hat{\rho}_{ij}$

In the above equation, $\hat{\rho}_{ij}$ denotes the pairwise cross-sectional correlation coefficients of residuals from the conventional ADF regression. Also, N and T are panel and sample sizes, respectively.

Consequently, the cross-sectional dependence test specifies the existence of cross-sectional dependence in the panel. In essence, cross-sectional augmented Dickey-Fuller regression (CADF) was used, and the equation can be written as:

$$\Delta Y_{it} = a_{it} + K_i t + \beta_i Y_{it-1} + \gamma_i \bar{y}_{t-1} + \emptyset_i \Delta \bar{y}_t + \varepsilon_{it},$$
$$t = 1 \dots T \text{ and } i = 1 \dots N \tag{3}$$

Where $\bar{y}_t = N^{-1} \sum_{i-1}^{N} Y_{it}$ is the cross-sectional mean of y_{it}. The main objective of incorporating the cross-sectional mean in the equation above is to check for contemporaneous correlation among y_{it} (Pesaran, 2007).

3.2. Cointegration Test and Correlation Matrix

After the test for unit root and cross-sectional dependence demonstrated significance, the next step was to test for cointegration. Testing for cointegration describes the long-run relationship among the variables selected; hence it is appropriate for assessing the long-run parameters using the chosen regression methods. In the cointegration test, the null hypothesis I(O) assumes that there is no cointegration association among the selected variables. The alternate hypothesis I(1) assumes that there is a cointegration relationship among the variables. Therefore, for H_0, β_1 = 0 is expected to be rejected, and for H_1, $\beta < 0$ is expected to be accepted at a 5% significance level. The cointegration test performed was the Johansen Fischer cointegration test.

The computation of the correlation matrix is essential to purposefully discover the correlation between the endogenous and exogenous variables and check for multicollinearity issues among the variables. The multicollinearity test assumes that no more than two exogenous variables should be highly correlated with endogenous variables exhibiting coefficients of -/+0.70 or more (Hongli & Vitenu-Sackey, 2020; Sun, Tong, & Yu, 2002). Therefore, when two exogenous variables exhibit correlation coefficients of -/+0.70 with the endogenous variable, the problem of multicollinearity could exist in the proposed model.

3.3. Panel Cointegration Regression Methods

After the confirmation of the cointegration relationship among the variables, the next step was to estimate the variables' long-run parameters, thus the exogenous variables against the endogenous variable. The ordinary least squares (OLS) method is not considered appropriate when a cointegration relationship exists among the variables, as it might lead to spurious coefficients. However, several other econometric approaches are recommended, such as the dynamic ordinary least squares (DOLS) approach, as it is assumed to produce better results than OLS for cointegrated panels. However, DOLS has a major weakness: a cross-sectional heterogeneity problem (Kao & Chiang, 2000). The estimator that solves the cross-sectional heterogeneity problem is the fully modified ordinary least squares (FMOLS)

method proposed by Pedroni (2000) and Pedroni (2001). FMOLS is thought to reliably handle problems of endogeneity, cross-sectional heterogeneity, and serial correlation.

3.4. Robustness Check: ARDL Pooled Mean Group (PMG) and Dynamic Fixed-Effects Models (DFE)

FMOLS and DOLS have one common shortcoming, the inability to estimate short-run coefficients or relationships of variables (Murthy, 2007). In that regard, the alternative approaches are mean group regression (MG), pooled mean group (PMG), and the DFE model; DFE can thus be used to estimate the various levels of heterogeneity across panels while estimating the long-run and short-run coefficients or effects concurrently. The DFE model enforces homogeneity limitations on the short-run and long-run measurements, allowing the intercept to differ. The homogeneous nature of the macroeconomic foundations of developing and least developed countries justifies the use of the DFE model. However, temporal shocks have heterogeneous effects in different economies due to their domestic laws, structural adjustment programs, political dispensation, and regulatory quality. In light of this, the heterogeneity is apprehended by country-specific intercepts.

In practice, contemporaneous correlation through residuals arises from omitted common dynamics. However, adjustments for time-specific influences in the estimated regressions are made by eliminating these common effects.

3.5. Granger Causality Test

It is necessary to perform further statistical tests when variables exhibit first difference stationarity, i.e., [I(1)], as it becomes appropriate to assess the causality of the relationship of the variables (Granger, 1969). According to Shahbaz, Zeshan, and Afza (2012), examining the causal linkage's particular direction among the study variables enables more insight into the findings from which to draw policy implications.

3.6. Impulse Response Function and Variance Decomposition

The Granger causality test has some limitations, for instance, (i) it cannot provide reliable estimates concerning the causal strength of linkages among variables beyond the sample period under consideration, and (ii) it only provides the path of the connection, not the corresponding sign. Therefore, we applied the Innovation Accounting Approach (IAA) to solve these issues, specifically, generalized impulse response function and variance decomposition. In particular, the generalized impulse response function is unresponsive to the vector error correction model (VECM). However, it is preferable to the simple Choleski fractionalization impulse response function. Since the generalized impulse response function is insensitive to the VECM, it indicates the impact of innovations, whether they have long-run or short-run effects, and whether they are positive or negative (Bernanke, 1986; Sims, 1980; Sims, 1986).

Despite the impulse response function's ability to ascertain the impact of one standard deviation shock on the future and current standards of all dependent (endogenous) variables through the dynamic composition of the VECM, it is unable to provide the extent of that impact. The variance decomposition function estimates each innovation's contribution in terms of percentage to *h-step* ahead of the forecast error variance of the endogenous variable. It offers a way to determine the absolute importance of shocks in explaining variation in the endogenous variable; hence, it is a reliable method in that context. Moreover, the variance decomposition function provides more consistent outcomes than traditional procedures or approaches (Engle & Granger, 1987).

4. RESULTS

Table 2 presents the summary statistics of the variables selected for the study. The standard deviations reveal that the data series is symmetric and homogenous. The averages of the variables are as follows: poverty increased at an annual average rate of 19.84%, FDI inflows increased at an average yearly rate of 18.15%, foreign aid inflows increased at an annual average of 19.54%, economic growth (gross domestic product per capita) grew at an average yearly rate of 8.15%, the consumer price index increased at an annual average of 4.16 index points, and population

growth stood at 0.53% per annum. Finally, economic freedom increased at an average yearly rate of 3.8 index points during the sample period of 1995 to 2018. The Jarque-Bera test confirmed that the data series did not have a normal distribution; hence, the use of OLS would not produce reliable results.

Table 2. Summary statistics.

	LNPVT	LNFDI	LNAID	LNY	LNCPI	LNPOPG	EFIO
Mean	19.841	18.150	19.536	8.151	4.164	0.527	3.800
Median	20.335	19.318	19.808	8.130	4.427	0.700	4.009
Maximum	24.948	24.518	23.151	9.956	7.916	2.094	4.349
Minimum	11.830	0.000	0.000	6.301	-7.265	-4.564	0.000
Std. dev.	2.295	4.843	1.975	0.858	1.145	0.669	0.871
Skewness	-0.763	-2.818	-6.255	-0.009	-3.312	-2.056	-3.981
Kurtosis	3.786	10.987	62.221	2.139	18.590	10.533	17.502
Jarque-Bera	208.968	6785.375	260117.800	52.601	20371.630	5229.607	19433.990
Probability	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sum	33808.39	30927.28	33289.85	13888.61	7095.803	898.1512	6475.805
Sum sq. dev.	8971.612	39950.71	6643.603	1254.306	2230.758	762.9525	1290.99
Observations	1704	1704	1704	1704	1704	1704	1704

Note: Lnpvt=Poverty alleviation, Lnfdi=Foreign direct investment, Lnaid=Foreign aid, lnY= Gross domestic product per capita, Lncpi=Consumer price index, Lnpopg=Population growth, efio=Economic freedom index. Ln represents the natural logarithm of the variables.

Table 3 shows the unit tests performed to unravel the stationarity status of the data series. We performed the tests at the level form and the first difference, considering individual intercepts. The results revealed that at level form, all the variables showed stationarity except LNY (gross domestic product per capita), which displayed unit root for all the tests performed. Also, LNPOPG (population growth) failed to show stationarity in one of the four tests performed, the LLC (Levin, Lin & Chu) test. Subsequently, we performed the tests at the first difference, and nearly all of them showed stationarity. Therefore, at a 1% significance level at the first difference, the null hypothesis of unit root is rejected, confirming the variables' stationarity in the data series.

Next, the test for cross-sectional dependence of the variables confirmed that there was cross-sectional dependence of the variables at a 1% significance level.

Table 4 portrays the results of the cointegration test. From the results, it was evident that there was a long-run cointegration or relationship among the variables. The trace and maximum eigenvalue tests revealed that from none to at most 7, the variables were cointegrated at a 1% significance level. Therefore, the null hypothesis that there was no cointegration relationship among the variables was rejected.

Table 3. Panel unit root tests.

Variables	LNPVT	LNFDI	LNAID	LNPOPG	LNCPI	LNY	EFIO
Level							
LLC	-5.530***	-9.525***	-5.731***	-1.516	-14.302***	0.977	-177.205***
IMS	-2.055**	-9.780***	-5.619***	-5.380***	-9.224***	8.325	-106.780***
ADF	228.919***	384.673***	295.321***	524.552***	881.368***	90.009	3092.130***
PP	256.062***	422.321***	285.243***	246.331***	358.902***	73.769	3508.380***
First difference							
LLC	-31.080***	-38.696***	-37.685***	-8.379***	-25.142***	-28.273***	-465.831***
IMS	-2.8819***	-41.110***	-38.298***	-15.720***	-21.210***	-21.876***	-201.203***
ADF	975.330***	1425.090***	1286.460***	636.647***	902.962***	916.771***	4068.640***
PP	1179.560***	4261.210***	3230.900***	398.180***	1036.480***	734.879***	4630.560***
CD	43.946***	69.903***	37.793***	19.452***	224.447***	145.920***	38.134***

Note: *** indicates a 1% significance level, ** indicates a 5% significance level. LLC = Levin, Lin & Chu test, IMS = Im, Pesaran & Shin test, ADF and PP test = Maddala and Wu (1999) tests. CD = Cross-sectional dependence. LNPVT=Poverty alleviation, LNFDI=Foreign direct investment, LNAID=Foreign aid, LNY= Gross domestic product per capita, LNCPI=Consumer price index, LNPOPG=population growth, EFIO=Economic freedom index.

Table 4. Johansen Fischer cointegration test.

Johansen Fisher panel cointegration test				
Unrestricted cointegration rank test (Trace and maximum eigenvalue)				
Hypothesized	Fisher stat.		Fisher stat.	
No. of CE(S)	(From trace test)	Prob.	(From max-eigen test)	Prob.
None	2718***	0.000	268.8***	0.000
At most 1	1189***	0.000	1189***	0.000
At most 2	4622***	0.000	2475***	0.000
At most 3	2871***	0.000	1526***	0.000
At most 4	1755***	0.000	985.5***	0.000
At most 5	1072***	0.000	695.4***	0.000
At most 6	586.3***	0.000	519.4***	0.000
At most 7	241.5***	0.000	241.5***	0.000

Note: *** indicates a 1% significance level.

Table 5 presents the correlation matrix of the variables, thus the endogenous variable against the exogenous variables. The results show that LNFDI, LNAID, LNPOPG, and EFIO had a positive and statistically significant correlation with poverty alleviation, while LNY and LNCPI had a negative and statistically significant correlation with poverty alleviation. Furthermore, no multicollinearity was witnessed between the endogenous and exogenous variables. The variable with the highest coefficient was reported as -0.588, followed by 0.543. These coefficients were below the coefficient of -/+0.70, which stipulates high correlation hence collinearity.

Table 5. Correlation matrix.

Correlation							
Probability	LNPVT	LNFDI	LNAID	LNY	LNCPI	LNPOPG	EFIO
LNPVT	1						
LNFDI	0.073**	1					
LNAID	0.420***	0.100***	1				
LNY	-0.588***	0.113***	-0.353***	1			
LNCPI	-0.095***	0.094***	0.035	0.124***	1		
LNPOPG	0.543***	-0.046*	0.264***	-0.444***	-0.045*	1	
EFIO	0.061**	0.134***	0.110***	0.121***	0.125***	-0.043*	1

Note: *** indicates a 1% significance level, ** indicates a 5% significance level, * indicates a 10% significance level. LNPVT=Poverty alleviation, LNFDI=Foreign direct investment, LNAID=Foreign aid, LNY= Gross domestic product per capita, LNCPI=Consumer price index, LNPOPG=Population growth, EFIO=Economic freedom index.

Table 6. Results of dynamic ordinary least squares (DOLS) and fully modified least squares (FMOLS): full sample.

	DOLS			FMOLS		
LNFDI	0.004 (0.586)		0.013 (1.266)	-0.001 (-0.358)		-0.001 (-0.341)
LNAID		0.015 (0.689)	-0.002 (-0.047)		0.021** (1.982)	0.021** (1.978)
EFIO	0.023 (-0.803)	0.026 (0.616)	-0.029 (-0.489)	0.018 (-0.674)	0.017 (-0.61)	0.016 (-0.607)
LNY	-1.631*** (-13.497)	-1.73*** (-14.151)	-1.635*** (-8.510)	-2.052*** (-20.445)	-2.052*** (-20.721)	-2.048*** (-20.435)
LNPOPG	0.054 (-0.956)	-0.009 (-0.146)	0.152** (2.049)	0.035 (-0.726)	0.037 (-0.764)	0.037 (-0.763)
LNCPI	0.088*** (3.773)	0.051** (2.151)	0.092** (3.166)	0.08*** (3.897)	0.078*** (3.775)	0.078*** (3.783)
R-squared	0.998	0.996	0.999	0.969	0.969	0.969
Adjusted R-Squared	0.991	0.989	0.991	0.967	0.967	0.967
Obs.	1491	1491	1491	1633	1633	1633

Note: *** indicates a 1% significance level, ** indicates a 5% significance level. LNPVT=Poverty alleviation, LNFDI=Foreign direct investment, LNAID=Foreign aid, LNY= Gross domestic product per capita, LNCPI=Consumer price index, LNPOPG=Population growth, EFIO=Economic freedom index. DOLS=Dynamic ordinary least squares, FMOLS=Fully modified ordinary least squares. T-statistics are in parentheses.

Table 6 presents the long-run estimates from the DOLS and FMOLS regression methods. The results of the DOLS estimation showed that foreign capital, thus FDI and foreign aid, had a relatively insignificant impact on poverty alleviation, with a negligible influence on economic freedom. Meanwhile, economic growth (lnY) played a critical role in poverty alleviation; thus, there was an inverse and statistically significant relationship between economic growth and poverty alleviation. Moreover, in our FMOLS estimation, we observed a positive and statistically significant relationship between foreign aid and poverty alleviation. In contrast, FDI was insignificant, as was the intervening role of economic freedom. Economic growth displayed a consistently negative and statistically significant relationship with poverty alleviation in both DOLS and FMOLS estimations, as did the consumer price index.

Table 7 displays the results of our estimation with DFE and PMG regression methods. The results suggest that in the short run, FDI positively and significantly affects poverty alleviation, while foreign aid has an insignificant impact on poverty alleviation. Moreover, economic freedom showed an insignificant mediating effect between foreign capital (foreign aid and FDI) and poverty alleviation. The DFE and PMG estimations showed similar results, affirming the relationship between the endogenous and the exogenous variables. In the long-run computations, we observed that FDI could negatively and significantly affect poverty alleviation. Economic freedom positively intervened between foreign capital (foreign aid and FDI) and poverty alleviation. In essence, economic growth negatively and significantly affected poverty alleviation, both in the short and the long run. Meanwhile, population growth and the consumer price index (inflation) played an insignificant role in poverty alleviation in the long run. Still, in the short run, they negatively and significantly affected poverty alleviation.

Table 8 presents the results of the study's sub-sample, the developing countries. These results revealed that in both the DFE and PMG estimations, foreign capital (FDI and foreign aid), economic growth, the consumer price index, and economic freedom insignificantly affected the cost of closing the poverty gap (poverty alleviation) in the short run. However, population growth seemed to have a negative effect on poverty alleviation. In contrast, in the long-run estimations, we observed that FDI negatively and significantly affected the cost of closing the poverty gap (poverty alleviation) in developing countries. Moreover, economic growth appeared to reduce poverty, and economic freedom positively influenced the relationship between FDI and poverty alleviation. In the long run, economic freedom and economic growth consistently affected the cost of closing the poverty gap (poverty alleviation). Moreover, the consumer price index and population growth negatively affected the cost of closing the poverty gap (poverty alleviation).

Table 7. Results of dynamic fixed effect and pooled mean group estimations: full sample.

	Dynamic fixed effect						Pooled mean group					
	Long run			Short run			Long run			Short run		
Error correction				-0.132*** (-5.395)	-0.209*** (-6.811)	-0.206*** (-6.729)				-0.132*** (-5.395)	-0.209*** (-6.811)	-0.206*** (-6.729)
ΔLNFDI				0.015* (1.755)		0.016** (2.128)				0.015* (1.755)		0.016** (2.128)
ΔLNAID					0.021 (1.067)	0.011 (0.701)					0.021 (1.067)	0.011 (0.701)
ΔEFIO				0.038 (0.386)	0.141 (1.502)	0.106 (1.057)				0.038 (0.384)	0.141 (1.502)	0.106 (1.057)
ΔLNY				-0.866*** (-3.310)	-0.435 (-1.522)	-0.503* (-1.858)				-0.866*** (-3.310)	-0.435 (-1.522)	-0.503* (-1.858)
ΔLNPOPG				-2.001** (-2.697)	-1.733** (-2.649)	-1.718** (-2.477)				-2.001** (-2.697)	-1.733** (-2.649)	-1.718** (-2.477)
ΔLNCPI				-0.343* (-1.689)	-0.381** (-2.409)	-0.332** (-1.919)				-0.343* (-1.689)	-0.381*** (-2.409)	-0.332** (-1.919)
LNFDI	0.004 (0.977)		-0.006* (-1.824)				0.004 (0.977)		-0.006* (-1.824)			
LNAID		-0.005 (-0.648)	-0.002 (-0.234)					-0.005 (-0.648)	-0.002 (-0.234)			
EFIO	1.732*** (7.818)	0.392*** (4.620)	0.462*** (5.308)				1.732*** (7.818)	0.392*** (4.620)	0.462*** (5.308)			
LNY	-0.758*** (-6.522)	-1.957*** (-43.818)	-1.968*** (-41.906)				-0.758*** (-6.522)	-1.957*** (-43.818)	-1.968*** (-41.906)			
LNPOPG	0.817*** (6.412)	-0.010 (-0.823)	-0.003 (-0.299)				0.817*** (6.412)	-0.010 (-0.823)	-0.003 (-0.299)			
LNCPI	-0.011 (-0.281)	0.017 (1.534)	0.015 (1.261)				-0.011 (-0.281)	0.017 (1.534)	0.015 (1.261)			
Constant				2.472*** (5.514)	7.136*** (6.899)	6.999*** (6.808)				2.472*** (5.514)	7.136*** (6.899)	6.999*** (6.808)
Obs.	1633	1633	1633	1633	1633	1633	1633	1633	1633	1633	1633	1633

Note: *** indicates a 1% significance level, ** indicates a 5% significance level, * indicates a 10% significance level. LNPVT=Poverty alleviation, LNFDI=Foreign direct investment, LNAID=Foreign aid, LNY= Gross domestic product per capita, LNCPI=consumer price index, LNPOPG=Population growth, EFIO=Economic freedom index.

Table 8. Results of dynamic fixed effect and pooled mean group estimations: developing countries.

	Dynamic fixed effect						Pooled mean group					
	Long run			Short run			Long run			Short run		
Error correction				-0.163*** (-3.383)	-0.277*** (-6.038)	-0.223*** (-4.334)				-0.163*** (-3.383)	-0.277*** (-6.038)	-0.223*** (-4.334)
ΔLNFDI				0.018 (1.405)		0.024 (1.942)				0.018 (1.405)		0.024 (1.942)
ΔLNAID					0.009 (0.411)	0.016 (0.747)					0.009 (0.411)	0.016 (0.747)
ΔEFIO				0.084 (0.382)	0.339* (1.669)	0.125 (0.548)				0.084 (0.382)	0.339* (1.669)	0.125 (0.548)
ΔLNY				-0.073 (-1.486)	-0.546 (-0.964)	-0.467 (-0.930)				-0.073 (-1.486)	-0.546 (-0.964)	-0.467 (-0.930)
ΔLNPOPG				-2.992** (-2.146)	-2.012** (-2.508)	-2.102** (-2.196)				-2.992** (-2.146)	-2.012** (-2.508)	-2.102** (-2.196)
ΔLNCPI				0.126** (2.736)	-0.493 (-1.511)	-0.351 (-0.865)				0.126** (2.736)	-0.493 (-1.511)	-0.351 (-0.865)
LNFDI	0.007** (1.888)	-0.028*** (-3.882)					0.007** (1.888)	-0.028*** (-3.882)				
LNAID		-0.000 (-0.017)	0.010 (0.712)					-0.000 (-0.017)	0.010 (0.712)			
EFIO	1.206*** (4.899)	0.058*** (9.538)	0.375*** (3.614)				1.206*** (4.899)	0.058*** (9.538)	0.375*** (3.614)			
LNY	-1.219*** (-7.380)	-1.692*** (-15.596)	-1.290*** (-11.030)				-1.219*** (-7.380)	-1.692*** (-15.596)	-1.290*** (-11.030)			
LNPOPG	1.295*** (7.821)	-0.015 (-1.098)	-0.033*** (-3.681)				1.295*** (7.821)	-0.015 (-1.098)	-0.033*** (-3.681)			
LNCPI	0.126*** (2.736)	-0.070 (-1.435)	-0.349*** (-6.180)				0.126** (2.736)	-0.070 (-1.435)	-0.349*** (-6.180)			
Constant				3.725*** (3.467)	9.088*** (6.236)	6.509*** (4.367)				3.725*** (3.467)	9.088*** (6.236)	6.509*** (4.367)
Obs.	713	713	713	713	713	713	713	713	713	713	713	713

Note: *** indicates a 1% significance level, ** indicates a 5% significance level, * indicates a 10% significance level. LNPVT=Poverty alleviation, LNFDI=Foreign direct investment, LNAID=Foreign aid, LNY= Gross domestic product per capita, LNCPI=Consumer price index, LNPOPG=Population growth, EFIO=Economic freedom index.

Table 9. Results of dynamic fixed effect and pooled mean group estimations: least developed countries.

	Dynamic fixed effect						Mean Group					
	Long run			Short run			Long run			Short run		
Error correction				-0.094*** (-3.276)	-0.153*** (-4.391)	-0.110*** (-3.222)				-0.094*** (-3.276)	-0.153*** (-4.391)	-0.110*** (-3.222)
ΔLNFDI				0.011 (1.091)		0.012 (1.174)				0.011 (1.091)		0.012 (1.174)
ΔLNAID					0.027 (0.858)	0.008 (0.327)					0.027 (0.858)	0.008 (0.327)
ΔEFIO				0.159** (2.467)	0.026 (0.600)	-0.076 (-1.355)				0.159** (2.467)	0.026 (0.600)	-0.076 (-1.355)
ΔLNGDPPC				-1.126*** (-4.618)	-0.928** (-3.197)	-0.629** (-2.665)				-1.126*** (-4.618)	-0.928** (-3.197)	-0.629** (-2.665)
ΔLNPOPG				-0.555 (-0.724)	-0.981 (-1.382)	-0.597 (-0.804)				-0.555 (-0.724)	-0.981 (-1.382)	-0.597 (-0.804)
ΔLNCPI				-0.172 (-1.237)	-0.242* (-1.783)	-0.214 (-1.409)				-0.172 (-1.237)	-0.242* (-1.783)	-0.214 (-1.409)
LNFDI	0.020 (1.432)		-0.058*** (-3.645)				0.020 (1.432)		-0.058*** (-3.645)			
LNAID		0.012 (0.993)	0.017 (0.520)					0.012 (0.993)	0.017 (0.520)			
EFIO	0.402** (2.817)	0.700*** (6.043)	3.220*** (6.202)				0.402** (2.817)	0.700*** (6.043)	3.220*** (6.202)			
LNGDPPC	-0.820*** (-4.536)	-0.709*** (-12.768)	-1.474*** (-14.727)				-0.820*** (-4.536)	-0.709*** (-12.768)	-1.474*** (-14.727)			
LNPOPG	0.011 (0.261)	-0.042 (-0.543)	0.721*** (5.013)				0.011 (0.261)	-0.042 (-0.543)	0.721*** (5.013)			
LNCPI	0.678*** (9.964)	0.037** (2.500)	-0.023*** (-1.416)				0.678*** (9.964)	0.037** (2.500)	-0.023*** (-1.416)			
Constant				2.116*** (3.229)	3.598*** (4.494)	2.228*** (3.265)				2.116*** (3.229)	3.598*** (4.494)	2.228*** (3.265)
Obs.	920	920	920	920	920	920	920	920	920	920	920	920

Note: *** indicates a 1% significance level, ** indicates a 5% significance level, * indicates a 10% significance level. LNPVT=Poverty alleviation, LNFDI=Foreign direct investment, LNAID=Foreign aid, LNY= Gross domestic product per capita, LNCPI=Consumer price index, LNPOPG=Population growth, EFIO=Economic freedom index.

Table 9 presents the results of the study's other sub-sample, the least developed countries. From the results, we observed that the characteristics of the variables under investigation present symmetric and homogenous coefficient signs, similar to the results observed in the sub-sample of developing countries, hence FDI could reduce the cost of closing the poverty gap in the long run through the positive effects of economic freedom and efforts channeled towards economic growth.

Table 10 presents the results of the Granger causality test. The test found unidirectional Granger causality links between poverty alleviation and foreign aid, economic growth and poverty alleviation, and the consumer price index and poverty alleviation. In contrast, a bidirectional Granger causality link was observed between population growth and poverty alleviation. The bidirectional Granger causality link suggests that any variation in population growth affects poverty alleviation and vice versa. The unidirectional Granger causality links suggest that a variation in economic growth could affect poverty alleviation, the consumer price index could affect poverty alleviation, and poverty alleviation could affect foreign aid but not vice versa.

Table 10. Granger causality tests.

Pairwise Granger causality tests				
Null hypothesis	**Obs.**	**F-statistic**	**Prob.**	**Sig.**
Poverty Alleviation				
LNFDI does not granger cause LNPVT	1562	2.099	0.123	
LNPVT does not granger cause LNFDI		0.689	0.502	
LNAID does not granger cause LNPVT	1562	0.897	0.408	
LNPVT does not granger cause LNAID		36.416	0.000	***
EFIO does not granger cause LNPVT	1562	0.267	0.766	
LNPVT does not granger cause EFIO		0.274	0.761	
LNGDPPC does not granger cause LNPVT	1562	29.157	0.000	***
LNPVT does not granger cause LNGDPPC		1.044	0.352	
LNCPI does not granger cause LNPVT	1562	5.352	0.005	**
LNPVT does not granger cause LNCPI		0.968	0.381	
LNPOPG does not granger cause LNPVT	1562	4.135	0.016	**
LNPVT does not granger cause LNPOPG		11.034	0.000	***

Note: *** indicates a 1% significance level, ** indicates a 5% significance level. LNPVT=Poverty alleviation, LNFDI=Foreign direct investment, LNAID=Foreign aid, LNY= Gross domestic product per capita, LNCPI=Consumer price index, LNPOPG=Population growth, EFIO=Economic freedom index.

Figure 1 presents the impulse response function analysis. Based on this analysis, we can observe that the standard deviation of the cost of closing the poverty gap (poverty alleviation) leads to a positive increase in the future cost of closing the poverty gap (poverty alleviation). The relationship between the cost of closing the poverty gap (poverty alleviation) and increases in FDI, foreign aid, economic growth, population growth, economic freedom, and the consumer price index shows positive and significant signs of diverse magnitude. However, the accumulated responses of the cost of closing the poverty gap (poverty alleviation) to the exogenous variables demonstrate positive and significant responses.

In Table 11, we present the results of the variance decomposition analysis of poverty alleviation. The study outlines a 24-year forecasting horizon. In an account of the 5-year forecast horizon, we observed that its innovations constituted 96.1% of the one-step forecast variance in the cost of closing the poverty gap (poverty alleviation). Only 3.9% was accounted for by foreign capital (FDI and foreign aid), economic freedom, economic growth, population growth, and the consumer price index. In the long run, the innovation shocks of the cost of closing the poverty gap (poverty alleviation) decline to about 87.78%, while the responses of foreign capital (foreign aid and FDI), economic freedom, economic growth, population growth, and the consumer price index altogether are expected to increase to 12.22% in a 24-year forecast horizon from the five-year forecast horizon increase of 3.9%. Concerning the 12.22% variance, 5.79% of the variance is a result of shocks in economic growth, and 4.3% of the variance is due to shocks in population growth. Also, 1.21% of the variance is due to shocks in the consumer price index, 0.497% of the variance is due to shocks in FDI, 0.412% of the variance is due to shocks in foreign aid, and 0.026% of the variance is due to

shocks in economic freedom. Our findings emphasize that while economic growth has a strong and consistent forecasted impact on the cost of closing the poverty gap, the effects of population growth and the consumer price index are likely to manifest in the future. Moreover, the forecasted effects of FDI, foreign aid, and economic freedom are weak.
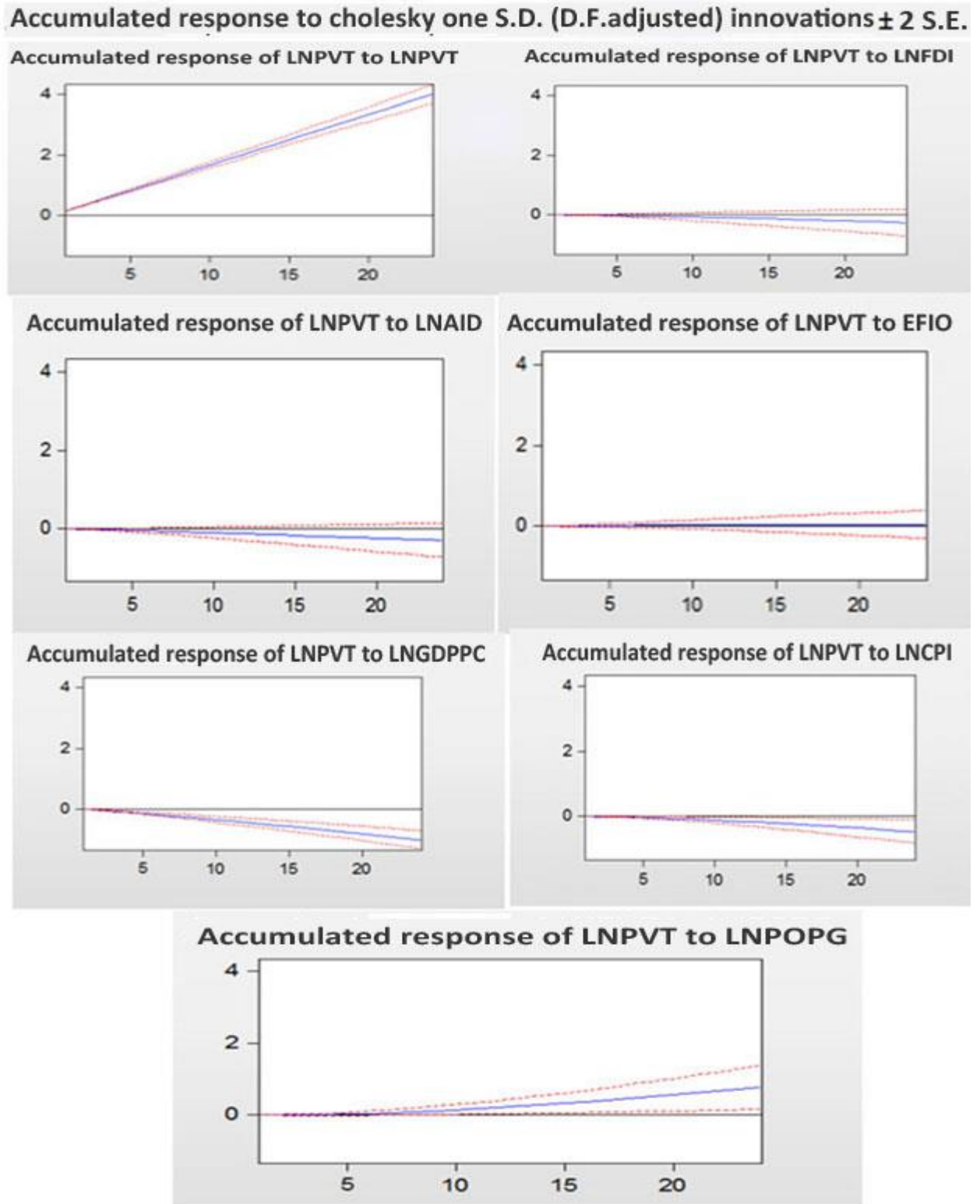

Figure 1. Impulse response function of poverty alleviation to the exogenous variables.

Table 11. Variance decomposition of poverty alleviation.

Variance decomposition of poverty alleviation for developing and least developed countries: 1995 - 2018								
Period	S.E.	LNPVT	LNAID	LNFDI	LNY	LNCPI	LNPOPG	EFIO
1	0.164	100.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.234	98.658	0.045	0.030	1.225	0.012	0.017	0.012
3	0.289	97.593	0.098	0.037	2.143	0.043	0.054	0.031
4	0.336	96.772	0.159	0.057	2.748	0.091	0.128	0.046
5	0.378	96.100	0.214	0.076	3.169	0.149	0.237	0.055
6	0.416	95.508	0.262	0.098	3.482	0.214	0.376	0.060
7	0.451	94.963	0.302	0.121	3.729	0.284	0.541	0.061
8	0.484	94.448	0.334	0.143	3.933	0.355	0.726	0.061
9	0.515	93.953	0.361	0.165	4.108	0.426	0.927	0.058
10	0.544	93.474	0.383	0.186	4.263	0.497	1.141	0.056
11	0.573	93.006	0.401	0.207	4.403	0.567	1.364	0.052
12	0.600	92.549	0.417	0.227	4.532	0.633	1.593	0.049
13	0.626	92.102	0.429	0.245	4.654	0.698	1.826	0.045
14	0.651	91.665	0.440	0.263	4.769	0.759	2.061	0.042
15	0.676	91.237	0.450	0.281	4.879	0.817	2.297	0.039
16	0.700	90.818	0.458	0.297	4.986	0.872	2.532	0.037
17	0.723	90.408	0.465	0.313	5.091	0.924	2.765	0.034
18	0.745	90.006	0.471	0.329	5.193	0.973	2.995	0.032
19	0.768	89.614	0.477	0.344	5.295	1.019	3.221	0.031
20	0.789	89.230	0.482	0.358	5.395	1.063	3.444	0.029
21	0.811	88.855	0.486	0.372	5.494	1.103	3.662	0.028
22	0.831	88.488	0.490	0.386	5.593	1.141	3.875	0.027
23	0.852	88.129	0.494	0.399	5.691	1.177	4.083	0.026
24	0.872	87.778	0.497	0.412	5.790	1.210	4.287	0.026

Note: LNPVT=Poverty alleviation, LNFDI=Foreign direct investment, LNAID=Foreign aid, LNY= Gross domestic product per capita, LNCPI=Consumer price index, LNPOPG=Population growth, EFIO=Economic freedom index.

5. DISCUSSION

To achieve our objective of understanding the role that foreign capital plays in poverty alleviation, we applied numerous econometric methodologies. To draw statistically sound conclusions, we utilized robust estimations and approaches; hence, we employed DOLS and FMOLS methods in one step, DFE and PMG estimators in another step, and the Granger causality test as well as impulse response function and variance decomposition analyses in the final step. Evidence from our findings suggests that foreign capital could play a significant role in poverty alleviation when coupled with consistent economic growth. Our DOLS and FMOLS estimations revealed that economic growth had a negative and statistically significant relationship with the cost of closing the poverty gap (poverty alleviation), while that of FDI was insignificant. On the other hand, foreign aid had a positive and significant relationship with the cost of closing the poverty gap (poverty alleviation).

Subsequently, we employed DFE and PMG estimators to resolve the problems of heterogeneity and homogeneity that the FMOLS method may not have solved in the panel data. The results of the DFE and PMG estimators were the same throughout the analyses. We observed that estimation for all samples showed that FDI positively and significantly affected the cost of closing the poverty gap (poverty alleviation) in the short run. However, foreign aid had no significant impact, nor could a mediating role of economic freedom be observed. Nevertheless, for the cost of closing the poverty gap to be reduced, economic growth must consistently increase annually. Our results from both developing countries and least developed countries were similar as foreign capital played an insignificant role in poverty alleviation in the short run in both sub-samples. Nevertheless, FDI plays a negative and significant role in poverty alleviation in the long run. Therefore, FDI inflows could significantly reduce the cost of closing the poverty gap in the long run.

Interestingly, economic growth played a significant role in poverty alleviation in all our samples. This affirms the mantra, "Economic growth is good for the poor" (Dollar & Kraay, 2002; Vitenu-Sackey & Barfi, 2021). We note

that for foreign capital to play a significant role in developing and least-developed countries, it must support these countries' economic growth agenda. Moreover, economic freedom seems to play a substantial role in poverty alleviation in the long run. It reaffirms the necessity for governments to ensure judicial effectiveness, integrity, financial freedom, investment freedom, monetary freedom, labor freedom, property rights, and fiscal health; most importantly, they must reduce the tax burden and spend judiciously.

It has been asserted that the nexus between FDI and poverty alleviation is not unimodal due to the fact that it manifests differently in various developing countries. It is, perhaps, highly dependent on the host country's ability to design and implement robust and actionable policies (Mold, 2004; Vitenu-Sackey, 2019; Vitenu-Sackey, 2020). These policies should not be centered solely on attracting FDI but ensure that regulations are in place and the benefits are channeled toward the poor (Ndikumana & Verick, 2008; Yushang, Bako, & Vitenu-Sackey, 2019). Supporting this view, Sabrine and Anis (2020) concluded that FDI significantly contributes to poverty alleviation in developing countries, although the effect is reliant on the host country's policy initiatives. Moreover, they contended that non-investment aid insignificantly contributes to poverty alleviation in developing countries. Our findings aligned with theirs in that foreign assistance (aid) insignificantly impacts poverty alleviation both in the short and long run.

6. CONCLUSION AND POLICY IMPLICATIONS

Our study focused on foreign capital's role in poverty alleviation in the least developed and developing countries. The study used 71 countries as its sample and categorized them as developing and least developed countries to critically understand the role of foreign capital in poverty alleviation. To achieve our research objective, we employed various econometric methodologies, such as a panel unit root test and a cross-sectional dependence test, as well as a cointegration test, correlation matrix, dynamic ordinary least squares, fully modified least squares, ARDL dynamic fixed effect and PMG regression methods, a Granger causality test, impulse responses function, and variance decomposition analysis. We found that foreign capital, proxied by FDI and foreign aid, could reduce the cost of closing the poverty gap (poverty alleviation) when it took the form of FDI. However, foreign aid insignificantly contributed to poverty alleviation. On the other hand, economic freedom positively influenced the role of FDI in reducing the poverty gap, and economic growth played a critically significant role in the quest to reduce poverty (Sabrine & Anis, 2020; Sumner., 2020).

Since the nexus between FDI and poverty alleviation is unimodal, policymakers and governments should create a conducive and enabling environment that helps businesses to flourish and propagate economic growth. Moreover, the political climate ought to be stabilized and the availability of infrastructure should be ensured (Sabrine & Anis, 2020). Foreign aid effectiveness in poverty alleviation is dependent on policymakers' and governments' distribution of developmental assistance (aid) to humanitarian and social sectors that make poverty alleviation a priority rather than sectors that do not support the poverty alleviation agenda Sabrine and Anis (2020). Social aid is effective development assistance that reliably supports poverty alleviation by contributing to health programs, educational aid, sanitation, and water supply (Ding et al., 2021; Ding & Vitenu-Sackey, 2021; Hirano & Otsubo, 2014; Hongli & Vitenu-Sackey, 2020; Mary, Matus, & Paloma, 2018; Sabrine & Anis, 2020).

Most importantly, a new paradigm of foreign developmental assistance funds should be looked at, in which all countries contribute to that fund and it is equitably distributed to further the sustainable development goals, as suggested by Sumner et al. (2020). Due to the ineffectiveness of current development aid initiatives, they proposed that all countries make a universal development commitment in which developed countries contribute 0.7% of GNI, upper-middle-income countries contribute 0.3% of GNI, lower-middle-income countries contribute 0.2% of GNI, and least developed countries contribute 0.1% of GNI towards the timely achievement of the SDGs.

The absence of a correlation between foreign aid and income inequality or poverty appears to be analogous to the absence of a correlation between foreign aid and economic growth. Although there is no clear explanation, corruption and weak institutions appear to be contributing to foreign aid's failure to improve poverty and inequality.

For instance, donor countries frequently require recipient governments to contract with their enterprises and experts. Foreigners' incomes will not be reflected in panel data, and if they were, it could lead to the conclusion that aid encourages inequality, as it may be used for non-economic purposes. Additionally, officials in aid-giving countries may have preferences that are not aligned with the goal of alleviating poverty and inequality in developing countries, but rather with national security or local politics.

Despite the contributions of our work, we acknowledge that the study has certain limitations. We only examined the aggregate impact of FDI and foreign aid on the cost of closing the poverty gap without considering the disaggregate impact; this was for reasons of data availability in some of the countries under study. Also, data on the cost of closing the poverty gap was not consistent in terms of yearly provision, as the data available up to 2013 was collated in 3-year periods. Also, the economic freedom index had a lot of missing data in the computation of the overall index for certain factors, including fiscal health, judicial effectiveness, and financial freedom. Despite these limitations, we have managed to unravel the impact of foreign capital, i.e., FDI and foreign aid, on the cost of closing the poverty gap. Nevertheless, we believe that it should be further studied and that future studies should include the variables of judicial effectiveness, fiscal health, and financial freedom due to data limitations for these factors.

Dataset: Vitenu-Sackey (2020), "Poverty alleviation in developing and least developed countries: Do foreign capital and economic freedom matter?", Mendeley Data, V1, doi: 10.17632/fr2fcvftpj.1

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