



Conflict and Foreign Aid as Drivers of Economic Growth: Panel Evidence for the Remaining Least Developed Countries

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ABSTRACT

The least developed countries constitute an unique group of economies, characterized by persistent macroeconomic and structural vulnerabilities, weak institutional capacity and a high incidence of armed conflicts leading to the loss of human lives. This study examines, using static and dynamic panel data models, the extent to which economic growth in a special group of the least developed countries, namely remaining least developed countries, was influenced over the period 2000-2023 by the number of conflict related deaths, population displacement, official development assistance and inflation. Empirical results indicate that armed conflicts, humanitarian burden and inflation negatively influence economic performance. Financial aid, as official development assistance, exert a positive effects on growth if it is granted as mechanisms for priority access to grants and favorable lending conditions. The findings provide important policy implications and underline the need to strengthen institutional quality, maintain low and stable inflation, reduce armed conflicts and their negative consequences on economic growth.

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1. Introduction

A special group of states named the Least Developed Countries (LDCs) is one of the most disadvantaged categories of countries classified worldwide and which have severe structural constraints on development. This category has been established by the United Nations since the early 1970s and includes states that are characterized by low levels of per capita income, insufficient human capital, and economic and environmental vulnerabilities. A total of 44 countries is in this category and they are distributed in Africa (32), Asia (8), Caribbean region (1) and Pacific (3) (UNCTAD, 2026). The Least Developed Countries category is in turn divided into several subgroups that reflect the stage of each country in the development process and exit from the LDCs category and do not reflect levels of development per se: 6 countries graduating LDCs (which have an official graduation date set), 3 countries recommended for graduation (only waiting for an institutional decision for graduation), 2 countries deferred to 2007 review (met the graduation criteria several times, but the process was postponed), 3 countries first-time threshold achievers (to be reassessed in 2007), 3 countries previously in graduation process, no longer met criteria (were in graduation, but later did not meet the criteria), 8 countries already graduates (left the LDCs category) and 21 remaining LDCs (remain in the LDCs category).

The Remaining LDCs group constitute the most vulnerable group, as they have neither met the United Nations Organization thresholds for graduation nor come sufficiently close to initiating, the graduation process. Moreover, they continue to face severe structural deficiencies that constrain their development prospects. This group includes countries frequently characterized by armed conflict, political instability, very low per capita incomes, economic vulnerability, climate problems and fragile institutions. The graduation process involves that every three years a special committee of the United Nations Organization verifies the situation of that state. The last revision took place in 2024 and the next one will be in 2027. The criteria underlying the establishment of the categories of LDCs are for inclusion of income below USD 1088 per capita and for graduation above USD 1306 per capita, as well as two other specific indicators on human capital and the environment. The Human Assets Index, with values between 0 (low) and 100 (maximum), measures under-5 mortality, maternal mortality, adult literacy and gender parity in secondary school and must exceed a threshold of 66 for graduation. The Economic and Environmental Vulnerability Index, also with the same type of scale 0-100,

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composes geographical, economic factors, exposure to natural disasters, small populations, etc. and has a graduation threshold of 32. If a country initially meets the conditions for graduation at a triennial review, if it will also meet the conditions at the next triennial review, graduation may be recommended, so the process involves a minimum of 6 years.

The present study analyzes an insufficient perspective explored in the specialized literature regarding how the economic growth of 18 countries in the Remaining Least Development Countries (LDCs) category is influenced in the period 2000-2023 by armed conflicts and their humanitarian consequences, reflected by the number of deaths resulting from them and of the refugee population and under the protection of the Office of United Nations High Commissioner for Refugees. These states benefit from a special mechanism of voluntary commitments of developed states as donors, which grants them Official Development Assistance (ODA), as "government aid designed to promote the economic development and welfare of developing countries" (UN, 2026a). While ODA is promoted as a key tool for the development of LDCs, the economic literature remains divided on its real impact on long-term economic growth, raising questions about the efficiency of allocation, the conditionalities imposed, the channels through which these aids influence economic performance, and highlighting both positive effects (financing of human capital, infrastructure and productive investments) and negative effects (inefficient allocation of resources). substitution of private investments and structural dependence on external assistance, the so-called aid trap). Although many studies separately look at the effects of armed conflict or foreign financial aid on economic growth, the literature provides little empirical evidence on the simultaneous impact of the human costs of conflict and foreign aid on economic performance. The model proposed by this study explains the economic growth of these states through factors of conflict and foreign aid and controls for macroeconomic stability through inflation.

Remaining Least Development Countries (LDCs) are Afghanistan, Burkina Faso, Burundi, Central African Republic, Chad, Democratic Republic of the Congo, Eritrea, Ethiopia, Guinea-Bissau, Lesotho, Liberia, Madagascar, Malawi, Mali, Mozambique, Niger, Sierra Leone, Somalia, South Sudan, Sudan and Yemen. The present study analyzes 18 of them, without including Eritrea, Somalia and South Sudan in the analysis, for which there are no data available, amid a reduced statistical capacity given by armed conflicts.

The reminder of this study is organized as follows: Section 2 reviews theoretical background, Section 3 contains the data collection and methodology, Section 4 covers results and discussions, and Section 5 summarizes conclusions.

2. Literature Review

In order to identify the trends and dominant directions of the published studies on the relationship between economic growth, institutional and conflict determinants, a bibliometric analysis was carried out using the Web of Science database. Although the terms Official Development Assistance (ODA) and Least Development Countries (LDCs) are essential for the objectives of the study, their inclusion in the search phrase significantly reduced the number of identified publications and implicitly the relevance of the bibliometric analysis. Consequently, the term governance (or institutions) was chosen, which captures the dimension of the quality of institutions, factors recognized in the literature as fundamental determinants of the use of official development assistance. In this way, the search strategy allowed the identification of an extensive body of publications to highlight the main research directions, and the empirical analysis will be focused on the remaining LDC countries and on the role of armed conflicts, humanitarian pressure, foreign financial aid and inflation on the economic growth of 18 such states, in the period 2000-2023.

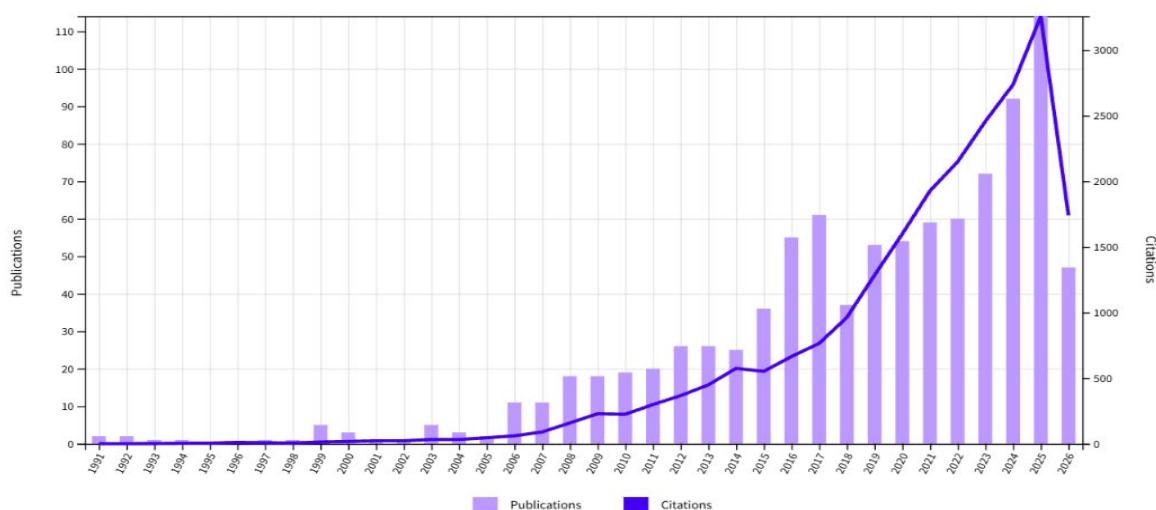


Figure 1. Evolution of publications and citations for the literature on the relationship between economic growth, governance and conflict

Source: authors' processing according to Web of Science publications

displacement and the population under the protection of the Office of the United Nations High Commissioner for Refugees, do not appear as dominant themes in the bibliometric network (Figure 3). The absence of these terms suggests that the humanitarian impact of conflicts is insufficiently integrated into models that analyze the determinants of economic growth.

Figure 3. Relationship between foreign aid, inflation and economic growth

In the least developed countries, armed conflicts are extremely frequent, socioeconomically devastating, and often part of a vicious cycle that is difficult to break. Two-thirds of LDCs have experienced armed conflict since 1991 and these conflicts are, for the most part, (intra-state) civil wars, often recurrent, which keep these nations in a "conflict trap" (Kim & Sauter, 2017). Sub-Saharan African countries have the highest concentration of internal conflicts among LDCs: Rwanda, civil war and genocide between 1990 and 1994 (Bataeva et al., 2020), as well as another conflict between 2009 and 2012 (Kim & Sauter, 2017); Burundi, prolonged civil war between 1993 and 2005 (Bataeva et al., 2020); Sierra Leone, civil war between 1991 and 2002 (Bataeva et al., 2020); Democratic Republic of Congo, major conflicts between 1997 and 1999, the instability continued after this period, being marked by the conflict in the east of the country intensified by tensions with Rwanda (Ogbe et al., 2024); In Somalia, the conflict evolved through several phases - the Ogaden War (1977-1978), followed by the warlord-dominated civil war (1991-2006) and the al-Shabaab insurgency (2006-present) (Hassan & Saidy, 2026) (Ogbe et al., 2024); South Sudan, the conflict began in December 2013 following internal political struggles and has continued for years, causing massive population displacements as well as newer tensions starting in 2023 (Ogbe et al., 2024) (Jundi, 2024); Sudan, conflict in 2012 and recent tensions in 2023 (Bataeva et al., 2020); Angola, prolonged civil war and intense activity of UNITA rebels and their impact on economic growth between 1980 and 2022 (Ajayi, 2024); Ethiopia, the war with Somalia (1977), the border war with Eritrea (1998-2000) and the recent conflict in the Tigray region (Ogbe et al., 2024) (Dunne & Tian, 2019); Liberia, phase of active conflict between 2002 and 2003 (Kim & Sauter, 2017); Guinea-Bissau, armed clashes in 1998-1999 (Bataeva et al., 2020); Mali, instability and conflicts marked by the presence of fundamentalist groups, especially after 2009 (Bataeva et al., 2020) (Ogbe et al., 2024). As for countries in Asia, conflicts have been recorded in states such as Afghanistan, over four decades of continuous conflict, including the USSR-led war (1979-1989), the civil war between anti-communist factions (1992-2001) and the US-led war on terrorism (2001-2021) (Meng et al., 2024) and in Yemen, a significant conflict in 1994 related to the unification of the North with the South, followed by structural instability and severe modern conflicts (Kim & Sauter, 2017). Conflicts in low-income countries generate a decrease in GDP per capita, with the intensity of conflicts having long-term negative effects on economic growth (Le et al., 2022). Many of these states also face a "conflict debt" and persistent poverty, which recover very slowly even after the cessation of hostilities (Mueller & Techasunthornwat, 2020).

people forced to leave their homes is often much higher than that of direct victims of the fighting, with an average year of civil war generating more than 600000 cross-border refugees and a much higher number of internally displaced people (Mueller & Techasunthornwat, 2020).

According to the United Nations High Commissioner for Refugees, as it could be shown in Figure 4, there were 41.6 million refugees worldwide at the end of 2025 and additionally, there were 9 million asylum seekers awaiting a decision on their asylum claims and 68.7 million individuals were internally displaced as a result of violence or conflict (UNHCR, 2026). One in every 70 people worldwide – equivalent to approximately 1.4% of the global population – is currently forcibly displaced (UNHCR, 2026). This challenge is particularly acute in the Least Developed Countries, which face disproportionate pressure as both major host and origin countries for refugees.

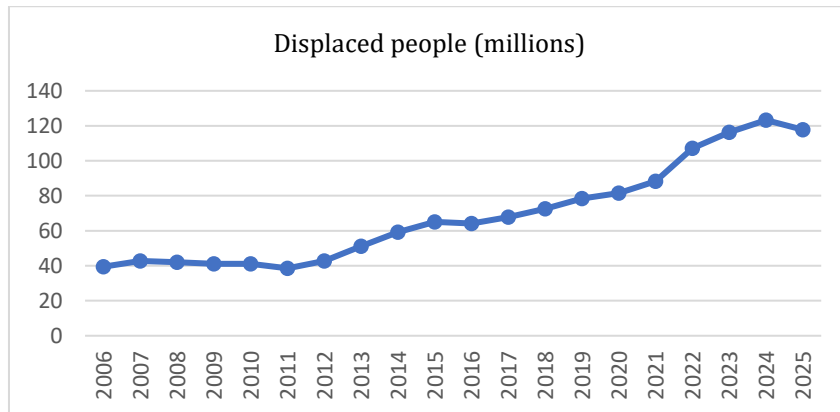


Figure 4. Evolution of the global forcibly displaced population, 2006-2025

Source: authors' processing based on UNHCR, 2026

The displacement of refugees is not only a consequence of armed conflicts, but also a main driver of development in the opposite direction, destroying the social and economic networks necessary for long-term stability (Kim & Sauter, 2017; Meng et al., 2024; Jundi, 2024). The influence of displaced populations on GDP is profoundly negative and multidimensional, acting both by directly destroying the workforce and by disrupting consumption and production structures. Conflicts lead to massive loss of life, injury and displacement, which reduces the available workforce and diminishes overall productivity (Kim & Sauter, 2017; Jundi, 2024). In the least developed countries, agriculture is often the pillar of the economy, and the displacement of populations in areas of armed conflict leads to significant economic losses (Jundi, 2024). Conflicts press investors and skilled human force out of the affected areas, generating a brain drain and capital, which reduces investment, decreases productive capacity and reduces GDP (Bataeva et al., 2020; Kim & Sauter, 2017). In general, the richest segments of the population and the middle class are the ones who leave the conflict zones first, and their departure collapses the demand for imported goods and services, affecting state revenues and although it may seem like a benefit for the trade balance, in reality, it indicates a massive contraction of domestic economic activity (Bataeva et al., 2020).

Grounded in theoretical and empirical literature, we test this hypothesis:

H2: *A large share of the population under the protection of the United Nations High Commissioner for Refugees (UNHCR) is associated with lower economic growth in the remaining least developed countries.*

The impact of Official Development Assistance (ODA) on economic growth is a topic of intense debate, offering a nuanced perspective ranging from clear positive effects in specific case studies to more reserved conclusions in global analyses. In countries facing instability or war, ODA plays a critical role in supporting economic survival and reconstruction and affects economic growth through channels such as:

- Financing reconstruction, ODA assistance needed to support rehabilitation projects in places affected by violence, allowing economies to reuse their resources and human capital (Abbas et al., 2024).
- Macroeconomic stabilization, taking into account that ODA can help stabilize general economic conditions in low-income countries, compensating for the lack of domestic tax revenues (Hameed et al., 2022; Hassan & Saidy, 2026).
- Infrastructure and services, given that ODA assistance is crucial for the restoration of critical infrastructure (roads, bridges, hospitals) destroyed during crises (Jundi, 2024).

With all these benefits, and despite occasional local successes, the overall effectiveness of ODA remains a controversial topic. ODA assistance does not always succeed in significantly improving growth or reducing poverty on a large scale (Kotsadam et al., 2018). In Least Developed Countries (LDCs), a large share of ODA is directed towards humanitarian assistance and social infrastructure (45.9% between 2008-2017), while investments in productive capacity and economic infrastructure receive a much lower share (9.9%), which can slow down long-term structural transformation (Gay, 2021). While ODA can serve as a lifeline and engine of growth in the context of post-conflict reconstruction (as in Somalia or Afghanistan), its long-term impact

depends on the quality of local institutions and the directing of funds to productive capacities rather than just ad hoc humanitarian assistance (Hassan & Saidy, 2026).

Considering the preceding discussion, we propose this hypothesis:

H3: *Higher levels of Official Development Assistance (ODA) positively impact on economic growth in the remaining least developed countries.*

Inflation has a negative and significant impact on economic growth in low-income and fragile countries, being a major indicator of macroeconomic instability that discourages investment (Ogbe, 2025). In sub-Saharan African countries, the data indicate that inflation reduces economic growth by about 0.234 percentage points, although in some countries directly in conflict a marginally positive correlation has sometimes been observed, suggesting atypical economic dynamics under war conditions (Ogbe, 2025). In fragile countries, inflation acts mainly through a "cost-push" channel, driving up the prices of essential inputs such as seeds, fertilizers and fuel (Ibey et al., 2026). This erodes farmers' real incomes and their ability to invest in productivity-enhancing technologies, severely affecting long-term economic growth (Ibey et al., 2026). As prices rise, people's money is worth less and less and their purchasing power decreases. For this reason, the population buys fewer goods and services, which directly leads to a decrease in total demand in the economy and, implicitly, to a decrease in GDP (Hameed et al., 2022; Ibey et al., 2026). Case studies on countries such as Afghanistan demonstrate an asymmetric impact, positive inflationary shocks (price increases) reduce GDP per capita much more than price declines can stimulate the economy (Hameed et al., 2022). The long-term effects of inflation are much more devastating than the short-term ones in these contexts (Hameed et al., 2022).

Based on these arguments, we test the following hypothesis:

H4: *Greater inflation negatively influences economic growth in the remaining least developed countries.*

3. Data and Research Methodology

Building on the insights provided by the literature review and the bibliometric analysis, this study examines the effect of a set of determinants on economic growth in 18 remaining least developed countries between 2000 and 2023. Previous studies have identified the number of conflict-related deaths, the share of the population under the protection of the United Nations High Commissioner for Refugees (UNHCR), Official Development Assistance (ODA) and inflation as factors that may influence economic growth. Data for these indicators were collected from the United Nations, LDC Data (UN, 2026b) and Table 1 describes the variables and their sources.

To examine the effects of these determinants on economic growth, the following specification was tested:

$$GDPG_{i,t} = \alpha_0 + \alpha_1 \text{CONFLICT_DEATHS}_{i,t} + \alpha_2 \text{UNHCR_POP}_{i,t} + \alpha_3 \text{ODA}_{i,t} + \alpha_4 \text{INFLA}_{i,t} + u_{i,t}$$

where i represents the country, t is the period (years), α_0 is constant (intercept); $\alpha_{1,2,3,4}$ are the coefficients of the estimated parameters; $u_{i,t}$ is the error term; GDPG - Growth of real GDP (%), CONFLICT_DEATHS - Conflict deaths per 100000, annual; UNHCR_POP - Population of concern to UNHCR as percentage of total population; ODA - Official Development Assistance (ODA) received as percentage of GNI; INFLA - Consumer price inflation (annual percentage change).

Prior to model estimations, several diagnostic tests were applied to verify whether the dataset satisfied the assumptions of classical regression analysis. The preliminary evaluation examined stationarity (Pesaran, 2007), cross-sectional dependence (Pesaran, 2015), normality of the residuals (Shapiro and Wilk, 1965), multicollinearity (Koengkan et al., 2019; Vatcheva et al. 2016), heteroskedasticity (Breusch & Pagan, 1979; Cameron & Trivedi, 1990; Baum, 2001) and serial correlation (Wooldridge, 2002; Drukker, 2003). Based on the results of the preliminary diagnostic tests, we began with baseline specification, a pooled Ordinary Least Squares (OLS) model, while to establish the panel structure of the data, we estimated both fixed effects and random effects models and the Hausman specification test to determine the appropriate estimator (Taraz, 2017; Wooldridge, 2020; Ateba Boyomo et al., 2025). The test results support the use of fixed effects model, indicating that unobserved country-specific effects are correlated with the explanatory variables. Accordingly, our main specification was reported using a fixed effects model with Driscoll-Kraay standard errors, controlling for heteroscedasticity, serial correlation and cross-sectional dependence (Hoechle, 2007). To assess the robustness and sensitivity of the results, we further estimated several additional static panel models. A fixed effect model with year dummies and cluster-robust standard errors at the country level was applied to control for common time-specific shocks and within-country error correlation (Baltagi, 2021). We estimated the Panel Corrected Standard Errors (PCSE) model, including year effects, to account for panel-level heteroskedasticity and contemporaneous correlation across countries (Beck and Katz, 1995). We projected the Feasible Generalized Least Squares (FGLS) method assuming panel-specific heteroskedasticity and first-order autoregressive disturbances (Baltagi, 2021).

Although the primary analysis relies on static panel estimators, a dynamic panel model is also estimated as a robustness check. The theoretical framework does not suggest that our explanatory variables are contemporaneously determined by economic growth. The explanatory variables are selected as

determinants of economic performance and panel Granger causality tests do not provide evidence of reverse causality. These tests are not reported because the results were not informative for the selection of the empirical specification. Economic growth may exhibit persistence over time, implying that current economic performance is partially determined by its past values. To account for this dynamic behavior and to mitigate potential endogeneity arising from the inclusion of the lagged dependent variable, the two-step System Generalized Method of Moments (System GMM) estimator is employed (Blundell and Bond, 1998; Arellano and Bond, 1991; Roodman, 2009). The model is estimated using orthogonal deviations and Windmeijer-corrected robust standard errors. The lagged dependent variable is treated as endogenous and instrumented using internal GMM-style instruments, while the remaining explanatory variables are included as standard instrumental variables. All econometric data were processed using STATA.

4. Results and Disussion

The preliminary analysis of the data, concentrated in Table 1, shows that the sample captures economies marked by instability and vulnerability, all variables showing both extreme values and large dispersions. In general, the largest differences do not occur between countries, but within the same country during the period analyzed. On average, economies grow by about 4.35% per year, but the variation is very large, with the standard deviation of 6.76%, with extreme situations – from a contraction of -36.4% (Central African Republic in 2013) to an enormous growth of 48.5% (Afganistan in 2002). In the case of the number of deaths in conflicts, the average is 5.76 per 100,000 inhabitants and shows a very high dispersion, up to 131.6 in the most serious cases (Ethiopia in 2022). On average, about 2.12% of the population is considered of interest to the United Nations High Commissioner for Refugees (UNHCR), referring to refugees, displaced persons and similar categories, with a maximum of 20% in the most affected cases. The phenomenon has both a structural dimension, in the sense that some states are chronically affected by humanitarian crises, but also a temporal dimension, with episodes of crisis intensifying or attenuating. Official Development Assistance (ODA) as a percentage of GNI averages 12.858% and shows significant dependence on external aid, with considerable variation from a low of 0.954% (Democratic Republic of the Congo in 2000) to a high of 92.141% (Liberia in 2007). This indicator also shows both structural and temporal dependence. Inflation is the variable with the highest volatility in the entire sample, with an average of 12.359% and which hides a huge dispersion, with a standard deviation of 36.926%, but also with accentuated episodes of deflation (-21.6% for Afganistan in 2002) or hyperinflation (513.9% for Democratic Republic of the Congo in 2000).

Table 1. Descriptive statistics of the variables

Variable	Variable Name	Level	Mean	Std. Dev.	Min.	Max.
GDPG	Growth of real GDP (%)	overall	4.350	6.760	-36.4	48.5
		between		2.378	-1.329	8.462
		within		6.351	-32.699	47.737
CONFLICT_DEATHS	Conflict deaths per 100000, annual	overall	5.760	15.625	0	131.615
		between		7.981	0	32.194
		within		13.559	-25.565	123.14
UNHCR_POP	Population of concern to UNHCR as percentage of total population	overall	2.120	3.346	0	20.019
		between		2.156	0	6.967
		within		2.607	-4.229	17.395
ODA	Official Development Assistance (ODA) received as percentage of GNI	overall	12.858	10.967	0.954	92.141
		between		7.738	3.857	30.158
		within		7.976	-13.312	76.100
INFLA	Consumer price inflation (annual percentage change)	overall	12.359	36.926	-21.6	513.9
		between		14.042	2.191	49.683
		within		34.306	-35.423	478.318

Source: authors' processing

Table 2 shows the results of the tests for stationarity, cross-sectional dependence and normality of data. The stationarity test was performed with the Pesaran CADF Second-generation cross-sectionally augmented Dickey-Fuller tests (Pesaran, 2007), a second-generation test, which considers cross-sectional dependence and where variables were estimated with an intercept only and zero augmentation lag. All the variables of the panel are stationary in level and were used as such in the econometric model, without any

transformations. Cross-sectional dependence was estimated with the Pesaran test (Pesaran, 2015) and shows that there is cross-sectional dependence, countries being interconnected and influenced by common regional or global factors. The normality of the data was studied with the Shapiro-Wilk test (Shapiro and Wilk, 1965), showing that all variables deviate significantly from normality, through asymmetry and excess courtesy.

Table 2. Stationarity and cross-sectional dependence of the variables

Variable	Stationarity			Cross-sectional dependence	Normality
	Level (CADF)	Stationarity	Order of integration		
GDPG	-9.763***	Present	I(0)	5.844***	9.825***
CONFLICT_DEATHS	-1.626*	Present	I(0)	3.123***	12.033***
UNHCR_POP	-2.036**	Present	I(0)	17.431***	10.874***
ODA	-4.740***	Present	I(0)	4.767***	10.226***
INFLA	-8.823***	Present	I(0)	7.75***	12.903***

Source: Authors' processing. Note: ***, ** and * denote significance at 1, 5 and 10 percent level respectively.

A next step in the diagnosis of the data is related to multicollinearity, the results of which are presented in Table 3. The verification of two complementary methods, the correlation matrix (Vatcheva et al., 2016) and the variant inflation factor (VIF) (Koengkan et al., 2019), both suitable for detecting intercorrelations between independent variables. The results confirm the absence of multicollinearity problems and allow the use of the dataset in further analysis.

Table 3. Correlation matrix of the variables (multicollinearity)

Variable	GDPG	CONFLICT_DEATHS	UNHCR_POP	ODA	INFLA	VIF
GDPG	1.000					1.17 mean
CONFLICT_DEATHS	-0.253	1.000				1.33
UNHCR_POP	-0.325	0.484	1.000			1.32
ODA	0.155	0.140	0.069	1.000		1.03
INFLA	-0.164	0.015	0.109	-0.058	1.000	1.02

Source: Authors' processing. VIF is the Variance Inflation Factor.

The data were tested for the existence of heteroskedasticity, which was detected with both the Breusch-Pagan test and the White test (Breusch & Pagan, 1979; Cameron & Trivedi, 1990; Baum, 2001), showing that the residues are not uniformly distributed, but change systematically with the predicted values (Table 4).

Table 4. Results of heteroskedasticity

Heteroskedasticity	Stat.	p-value
Breusch-Pagan test	41.10	0.000
White test	68.56	0.000

Source: Authors' processing.

To examine the presence of serial correlation, this study applied the Wooldridge test for panel data (Wooldridge, 2002; Drukker, 2003), whose results, as shown in Table 5, lead to reject the null hypothesis of no serial correlation, at the marginally significant level of 10%, confirming the existence of autocorrelation in the idiosyncratic error term.

Table 5. Results of serial correlation test

Serial correlation	Stat.	p-value
Wooldridge test	3.506	0.078

Source: Authors' processing.

Data analysis showed stationarity, cross-sectional dependence, non-normality of the residuals, absence of multicollinearity, heteroskedasticity and serial correlation. To efficiently manage these data characteristics, we opted for a progressive estimation strategy, starting from a basic specification (pooled OLS) and moving towards more robust estimators for the data panel. The choice between the fixed-effects and random-effects models was based on the Hausman test, which showed that the fixed-effects model is adequate,

showing the existence of a correlation between the specific unobserved effects of each country and the explanatory variables (Taraz, 2017; Wooldridge, 2020; Ateba Boyomo et al., 2025). Thus, the main specification was based on a model with fixed effects and Driscoll-Kraay errors, which simultaneously corrects for heteroscedasticity, autocorrelation and cross-sectional dependence (Hoechle, 2007). To test the robustness of the results, a model with fixed effects, year dummies and robust standard errors at the country level (Baltagi, 2021), a panel corrected standard errors model (Beck and Katz, 1995) and a feasible generalized least squares model, which assumes panel-specific heteroscedasticity and autoregressive disturbances of the first order were further estimated (Baltagi, 2021). In addition to the statistical analysis, a dynamic panel model, the System GMM, was also estimated to capture the temporal persistence of economic growth and to control the potential endogeneity problems generated by the inclusion of the delayed dependent variable (Blundell and Bond, 1998; Arellano and Bond, 1991; Roodman, 2009).

Table 6. Static panel models – the effect of macroeconomic, environmental, social and medical data on current health expenditure as a share of GDP (annual variation) across European Union countries, 2000-2022

GDPG	Pooled OLS (robust SE with year dummies)	Fixed effects regression (with year dummies)	Random effects regression (with year dummies)	Fixed effects with Driscoll-Kraay SE and year dummies	Fixed effects regression (clustered SE with year dummies)	Panel corrected standard errors (with year dummies)	Feasible generalized least squares (AR1, heteroskedastic with year dummies)	System GMM
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
GDPG _{t-1}	-	-	-	-	-	-	-	0.157** (0.071)
CONFLICT_DEATHS	-0.068* (0.038)	-0.087*** (0.024)	-0.081*** (0.023)	-0.087* (0.045)	-0.087* (0.048)	-0.068** (0.028)	-0.045* (0.024)	-0.063* (0.034)
UNHCR_POP	-0.442** (0.184)	-0.631*** (0.136)	-0.540*** (0.124)	-0.631** (0.252)	-0.631** (0.238)	-0.442** (0.130)	-0.465*** (0.119)	-0.580*** (0.132)
ODA	0.101** (0.046)	0.117*** (0.036)	0.113*** (0.032)	0.117* (0.058)	0.117** (0.050)	0.101** (0.040)	0.026 (0.030)	0.125*** (0.045)
INFLA	-0.022*** (0.005)	-0.031*** (0.008)	-0.028*** (0.008)	-0.031*** (0.004)	-0.031*** (0.005)	-0.022*** (0.005)	-0.018*** (0.005)	-0.024** (0.009)
Constant	4.384** (1.975)	5.046*** (1.451)	4.719*** (1.510)	5.046*** (0.897)	5.046** (2.199)	4.384*** (0.541)	3.011*** (1.155)	3.943*** (0.766)
R-squared	0.221	0.216	0.219	0.282	0.216	0.221	-	-

Source: Authors' processing. Note: ***, ** and * denote significance at 1, 5 and 10 percent level respectively. In model 8: AR(1) test (p-value) is 0.003; AR(2) test (p-value) is 0.669; Hansen test (p-value) is 0.71; Sargan test (p-value) is 0.827; Number of instruments is 8; Number of groups is 18.

Across all estimated methods, the model variables exhibit statistically significant coefficient that remain stable in both sign and magnitude, thereby confirming the robustness of the results relative to the characteristics identified in the panel data. The effect of ODA was concentrated in observations with high variance, which are downweighed in the model and was partly driven by the series' own inertia rather than genuine causal relationship, which causes the coefficient to shrink and become insignificant. Furthermore, postestimation tests confirm the validity of the estimated models.

The results confirm the H1 hypothesis, in line with the literature highlighting the negative effects of loss of life in conflict on economic performance, through loss of workforce, reduction of productivity, destruction of physical capital, withdrawal of investments and deterioration of human capital (Kim & Sauter, 2017; Meng et al., 2024; Jundi, 2024). In the case of the states studied, remaining LDCs, this relationship may be particularly important because these states have a low capacity to absorb the shocks generated by armed conflicts and depend on labor-intensive sectors, especially agricultural ones, which are vulnerable to disturbances generated by armed conflicts (Mueller & Techasunthornwat, 2020; Le et al., 2022; Jundi, 2024; Ogbé et al., 2024).

A higher share of the population under UNHCR protection is associated with lower economic performance, which leads to the acceptance of the H2 hypothesis. The forced displacement of the population in the face of conflicts and refugees amplifies economic vulnerability, through the loss of human capital available for work, the displacement of households, the deterioration of economic and social activities (Kim & Sauter, 2017; Hameed et al., 2022; Hassan & Saidy, 2026). In the remaining LDC states, the humanitarian burdens are accentuated by the fact that such states are often the ones that receive refugees from other countries and have their own populations displaced in other states (Le et al., 2022).

The results provide support for the acceptance of the H3 hypothesis and suggest that Official Development Assistance (ODA) may be an important mechanism to support economic growth in remaining LDCs. This result is consistent with previous studies showing the role of external financial assistance in financing investments, providing public services, strengthening governance and supporting the reconstruction of fragile economies in these countries (Hameed et al., 2022; Jundi, 2024; Abbas et al., 2024). The result should be interpreted with caution, as external financial assistance is identified in the literature as being harmful if resources are not properly allocated and managed (Kotsadam et al., 2018; Hassan & Saidy, 2026).

Higher inflation rates lead to economic instability and reduce economic growth, which confirms the expectations configured in the H4 hypothesis. The most important price increases in the analyzed countries can occur for agricultural products, seeds, fuel and transport, which especially affects the profit of farmers, who can no longer invest in new technologies that could increase their productivity (Ibey et al., 2026). Inflationary pressures generate anxiety among investors, tempted to look for other, safer markets for the development of their businesses, which leads to reduced economic growth (Ogbe, 2025). As prices rise, the population buys fewer goods and services, leading to a decrease in total demand in the economy and a decrease in GDP (Hameed et al., 2022; Ibey et al., 2026). Inflation also puts pressure on public budgets, whose purchasing power is reduced and from which fewer projects can be financed. In conflict and disadvantaged areas such as LDC states, roads, bridges and infrastructures are no longer adequately maintained, creating logistical bottlenecks that stop the movement of goods and implicitly, decreasing the contribution of productive sectors to GDP (Hameed et al., 2022; Ogbe, 2025).

Overall, the results highlight the multidimensional nature of the economic vulnerability of the remaining Least Developed Countries. Conflict-related deaths and forced displacement of the refugee population are associated with lower performance of economies, while inflation is an additional constraint by increasing macroeconomic instability and diminishing productive capacity. In contrast, Official Development Assistance is positively associated with economic growth, suggesting that external financial support can help mitigate the economic effects of fragility and humanitarian pressures.

5. Conclusions

This study analyzed the factors associated with the economic growth of 18 remaining Least Developed Countries LDCs, between 2000 and 2023, with the help of a set of static and dynamic panel techniques, chosen according to the preliminary diagnosis of the data. The focus was on the influence on economic growth of the number of deaths caused by conflict, the forcibly displaced population and refugees, under the protection of the United Nations High Commissioner for Refugees (UNHCR), the Official Development Assistance and inflation.

The results show that the number of conflict-related deaths is negative associated with economic growth. A negative relationship is also identified for the forcibly displaced population, showing an economic dimension of refugees. In contrast, external financial aid shows a positive association with economic growth, while inflation negatively influences economic growth.

From a public policy perspective, the study suggests the need for integrated interventions that combine conflict prevention and reduction with measures to protect displaced populations and maintain macroeconomic stability. The study also indicates the importance of directing external resources towards investments and activities capable of strengthening productive capacity and supporting economic growth.

The study presents limits related to the small number of economic growth determinants studied, the analyzed sample and the chosen period. Extending them could lead to potentially more reliable or different results, depending on the chosen context.

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