

The effects of foreign aid on income inequality in Africa and the role of corruption

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Abstract - This article examines the impact of foreign aid on income inequality (measured by the Gini coefficient) and the specific role of corruption in fragile and conflict-affected countries in Africa. Using data covering 17 countries over the period 1989–2022, we employed a fixed-effects model with Driscoll-Kraay standard errors, as well as instrumental variables, to assess the effects of foreign aid on income inequality. Two major conclusions emerge from our results. First, foreign aid, particularly development aid and aid in the health and education sectors, contributes significantly to inequality reduction. Conversely, humanitarian aid has no notable effect on income distribution. Second, a mediation analysis based on a structural equation model reveals that corruption affects the effectiveness of foreign aid: the higher the levels of corruption, the more beneficial effects of aid on inequality diminish. Seeking peaceful solutions to conflicts and establishing strong, independent institutions capable of sanctioning corrupt practices appear essential to fully ensure the impact of foreign aid on reducing inequality.

Classification JEL

C33, I3, F35, H11, O11, O55

Keywords

Corruption
Fragile states
Income inequality
Foreign aid

We thank the reviewers for their comments, which greatly contributed to improving the quality of this article. We also extend our appreciation to the Ecoresearch working group for its valuable scientific support and for providing an enabling research environment throughout the preparation of this work.

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1. INTRODUCTION

Fragile and conflict-affected countries in Africa (FCACs) are characterized by governance issues, political instability and persistent social demands. Furthermore, economic development indicators show that these countries are among the poorest. For illustration, according to the World Bank report (2023), these countries live below the poverty line, unemployment rates are high, and income inequality (inequality) is among the highest in the world with Gini index 43.1. This situation explains the social tensions and fragmentation that prevail in these countries. These vulnerabilities have made fragile countries dependent on foreign aid. For instance, the OECD reports that in 2020, \$49 billion in aid was granted to FCACs, mainly in the education and health sectors. These statistics corroborate those of UNESCO (2021), which estimates that between 2015 and 2020, 30% and 25% of aid to PFACs was spent on health and education, respectively. Significant aid was transferred to FCACs as part of humanitarian actions. This aid was mainly aimed at reducing social disparities. However, despite the significant increase in foreign aid to FCACs, the level of inequality remains high. This paradoxical situation raises questions about the effectiveness of foreign aid in reducing income inequality. The recent work of Ambassa et al. (2024) demonstrated that foreign aid reduces inequality, but that its effectiveness is considerably reduced in conflict-ridden countries. The inability of foreign aid to reduce inequalities in contexts of instability or conflict is thought to be the result of marked institutional weakness and high levels of corruption. In such contexts, foreign aid resources are diverted to predatory elites, thereby undermining the redistributive potential of foreign aid. This hypothesis is particularly relevant given that FCACs have some of the highest levels of corruption in the world. Indeed, the Transparency International report (2024) shows, for illustration, that PFACs score an average of 18 out of 100, which is lower than the score for all sub-Saharan African countries, which is 33. It is therefore essential to take corruption into account when analyzing the effect of foreign aid on inequality.

There is no consensus on the effect of foreign aid on inequality, either in theory or empirically. On a theoretical level, the debate between Rostow's modernization theory (1960), which argues that foreign aid is a catalyst, and Frank's dependency theory (1969), which states that foreign aid promotes dependency on donors and increases inequality, continues. The lack of consensus observed in the theoretical framework is also reflected in empirical literature. Two trends of thought emerge in literature. The first, more optimistic reveals that foreign aid in the context of good governance contributes significantly to reducing inequalities. The work of Berrittella (2017) and Wang et al. (2024) corroborates this hypothesis. However, the second trend of thought, which is in line with dependency theory, is more pessimistic. According to this school of thought, foreign aid does not help to reduce inequalities. These ideological differences observed in the literature highlight the complexity of assessing the impact of foreign aid on inequalities and reveal several limitations in the literature. To the best of our knowledge, there is little research on the effect of foreign aid on inequality. However, the stylized facts noted above make PFACs an important area of investigation. Assessing the impact of aid in such a context is a major challenge for the implementation of more appropriate public policies. The second limitation of literature is that it does not sufficiently address the nature of aid. To our knowledge, very few studies have explored the type of aid in analyzing the effect of foreign aid on inequality. However, the needs of vulnerable groups may vary from one context to another. This could have divergent effects on income inequality. Considering such an approach to the composition of aid types therefore

makes it possible to better assess the nature of aid likely to have the greatest impact on social disparities. The third limitation of literature is the lack of consideration given to the role of institutions, particularly corruption, which is widespread in PFACs. However, to our knowledge, there are no studies analyzing the role that corruption plays in the relationship between foreign aid and inequality in the specific case of PFACs.

Our study contributes in three ways. First, it enriches the literature by highlighting the effect of foreign aid on inequality in the specific case of PFACs. Second, it contributes conceptually by highlighting the type of foreign aid. Such an approach will make it possible to target aid according to the real needs of populations. The fundamental reason for doing so is that, on the one hand, the impact of aid can vary from one country to another, and, on the other hand, the nature of that impact can vary. Indeed, in some regions, the impact may be redistributive, while in others it is temporary or has structural effects. This study therefore aims to enrich empirical literature by focusing on the effectiveness of different types of foreign aid. Thirdly, this study analyzes corruption as the main channel through which foreign aid is transmitted in a context of fragility and conflict. Other channels, such as infrastructure deficits and access to basic social services, could be explored, but the lack of available data constrains us to focus exclusively on corruption. The importance of corruption is linked to the adverse effects it is likely to generate, and examples of this are sufficiently discussed in literature. Choosing corruption as transmission channel will provide a better understanding of the divergent effects of foreign aid, particularly in the context of institutional weakness. Also, this approach makes it possible to optimize the effects of foreign aid on income inequality by identifying the most appropriate tools for strengthening the effectiveness of aid in reducing inequality. These contributions are in line with Maruta and Banerjee (2024) who found that in countries with better institutions, foreign aid in the field of education can significantly reduce inequality.

The rest of the paper is organized as follow: Section 2 reviews the literature. Section 3 presents empirical strategy. Section 4 and 5 present and analyze results while section 6 concludes.

2. RELATED LITERATURE REVIEW

The literature on the impact of foreign aid on inequality raises major theoretical and empirical issues. There are two opposing approaches to the ability of aid to reduce inequality. The first, known as the optimistic approach, is based on the principle that foreign aid is a lever for combating inequality. The second approach, which is more pessimistic and nuanced, highlights the ambiguous effects and even the preconditions for aid to be successful in reducing inequality, particularly in countries with institutional weaknesses such as corruption. To better explore these different trends, this literature review is structured around three themes. The first highlights the debate on the effect of foreign aid as a lever for growth or a source of dependency. The second axis delineates the role played by institutions, and the third axis depicts the debate on the logic of targeting foreign aid and the imperatives of equity.

2.1. Foreign aid as a lever for growth or a source of dependency

The modernization theory developed by Rostow (1960) views foreign aid as a lever for economic takeoff, promoting better growth and, consequently, reducing

inequalities. This hypothesis is based on the idea that development is a process through which traditional societies emerge to become modern societies. This migration requires support that can contribute to modernization and industrialization. International donors have long used this approach to stimulate growth and reduce inequalities by placing aid at the heart of the economic policies of countries in the South.

Empirically, Sachs's (2005) work has shown that aid targeted at social sectors contributes significantly to reducing inequalities. Indeed, aid promotes access to essential basic services for vulnerable populations. In this optimistic vein, Berretta's (2017) work corroborates these findings. By analyzing the impact of foreign aid on economic growth in 37 developing countries, including low-income, lower-middle-income, and upper-middle-income countries, over the period 1985-2018, Azam and Feng (2022) reveal that foreign aid tends to stimulate economic growth. Similarly, by examining the causal effect of foreign aid on income distribution and drawing on the fact that, since 1987, eligibility for International Development Association aid has depended in part on a country's per capita income being below a certain threshold, which allows the use of a regression discontinuity model, Wang et al. (2024) demonstrate that countries receiving foreign aid see a significant improvement in their income distribution. In addition, they show that foreign aid reduces income inequality, probably by increasing the share of income held by the poorest 80% at the expense of the share held by the richest 20%.

There have been many reservations about the ability of foreign aid to reduce inequalities. According to Frank's dependency theory (1969), foreign aid is an instrument that favors the maintenance of hierarchical relations between rich and poor countries. Frank (1969) shows in more detail that aid fosters the emergence of a predatory elite motivated by personal interests. He also asserts that aid primarily serves the geostrategic and economic interests of the main donors. Several studies have empirically confirmed this harmful effect of aid. Easterly (2006), for instance, demonstrates that the ineffectiveness of aid is linked to poor targeting of policies whose design does not reflect local realities. Similarly, Moyo (2010) argues that aid strengthens economic dependence, thereby weakening African institutions. More recent studies have also demonstrated that aid reduces growth. Based on a sample of 157 developing countries between 1990 and 2018, Ganga (2025) shows that aid was associated with weaker economic growth. This ineffectiveness is explained by the mismatch between aid and the real needs of vulnerable populations.

2.2. The Role of Institutions in the Redistribution of Foreign Aid Resources

Significant contributions have enriched our understanding of the impact of foreign aid on economic development, particularly in contexts where institutions are fragile. These studies have proposed the hypothesis that the effectiveness of aid depends on the nature of the institutions in place in recipient countries. The framework developed by Acemoglu and Robinson (2012) is particularly illuminated in this regard, as it distinguishes between two types of institutions: inclusive and extractive. In countries characterized by inclusive institutions defined by transparency, political participation, the protection of property rights, and equitable access to resources, foreign aid tends to strengthen local capacities, improve public services, and address infrastructure deficits. In such contexts, aid plays a catalytic role in reducing socioeconomic disparities. Conversely, in countries dominated by extractive institutions often characterized by high levels of corruption or conflict

foreign aid can be ineffective or counterproductive. However, predatory elites can exploit it, exacerbating social disparities. This institutional dimension has inspired several empirical studies confirming the decisive role of institutions. For illustration, Medhora (2016) demonstrated that the effectiveness of aid depends closely on the institutional framework, the socioeconomic context, and the nature of the aid. Goldemberg et al. (2025) support the same thesis by showing that aid effectiveness varies by targeted sectors and governance challenges. Similarly, Ambassa et al. (2024) indicate that foreign aid can contribute to reducing inequalities; however, its effectiveness is considerably limited in conflict-stricken countries, where institutional fragility impedes redistribution mechanisms. Mouneer et al. (2022) also showed that although aid can reduce inequalities, the harmful effects of corruption mitigate this impact. Maruta and Banerjee (2024) argue that high-quality institutions can promote reducing inequalities if aid is targeted toward the education sector.

The institutional approach is favorably received in African countries. According to international reports such as those by Transparency International, Africa is among the most corrupt countries in the world. However, literature on the impact of foreign aid also emphasizes the importance of strategic and redistributive allocation of this aid.

2.3. Strategic and Redistributive Targeting: Foundations of Foreign Aid's Ineffectiveness in Reducing Inequality

The failure of foreign aid to effectively reduce inequality in developing countries, particularly in Africa, can partly be attributed to the targeting strategies adopted by donors. Several scholars argue that aid targeted towards geopolitical interests undermines its effectiveness. According to Bermeo (2018), aid fails to address the actual needs of recipient countries because decisions on its allocation are heavily influenced by the political, economic, and security interests of donor countries. Consequently, aid is often directed towards strategically important countries or regions rather than areas that are most in need. This can result in interventions that are poorly adapted to local realities and may exacerbate social and economic disparities. Micheletti (2024) reinforces this critique, arguing that humanitarian aid is shaped by the political and economic agendas of donor states. By analyzing aid as a public policy financed through national budgets, Micheletti demonstrates how diplomatic and security priorities can divert aid away from its intended purpose, thereby compromising its effectiveness. In contrast, redistributive targeting is based on the idea that aid can reduce inequality if it is directed towards the poorest and most vulnerable populations. Ravallion (2016) supports this view, asserting that aid effectiveness depends on targeting based on poverty indicators, accompanied by monitoring and evaluation mechanisms to ensure redistributive impact. Guillaumin and Wagner (2014) also advocate this approach, demonstrating that aid is more effective when it considers a country's vulnerability and absorption capacity. Well-targeted aid can therefore maximize its impact on reducing inequality and enhancing the resilience of recipient countries.

The current literature on the impact of foreign aid on African countries affected by fragility and conflict reveals several gaps. To date, few studies have thoroughly analyzed the impact of foreign aid on inequality in such contexts. However, given that these countries are characterized by high levels of corruption, social inequality and dependence on international aid, they are crucial case studies for understanding

development dynamics. One particularly overlooked aspect of the literature is the role of corruption in moderating the effectiveness of aid in reducing inequality. Although corruption is widespread in many fragile states, the extent to which it hinders aid's ability to redistribute resources remains under-explored. This theoretical and empirical gap hinders our understanding of the mechanisms by which aid can exacerbate inequality rather than alleviate it.

3. METHODOLOGICAL STRATEGY

3.1. Basic empirical model

The model below highlights the impact of foreign aid on inequality. It is consistent with existing literature. In simplified terms, the model is presented as follows:

$$\text{Inequality}_{it} = \alpha_0 + \beta_1 \text{ForeingAid}_{it} + \beta_2 X_{it} + \mu_i + \delta_t + \varepsilon_{it} \quad (\text{Eq. 1})$$

In this context, 'inequality' refers to income inequality as measured by the Gini coefficient. ForeingAid_{it} is the variable of interest, representing various forms of foreign aid. X_{it} is the vector of control variables consisting of: (i) GDP per capita measured by the Logarithm of GDP per capita (constant 2001 US\$). (ii) Trade openness captured by the sum of exports and imports of goods and services measured as a share of GDP (OPEN). (iii) Natural resources measured as the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents expressed as a share of GDP (NAT). (iv) Inflation captured as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly (INF). (v) Total government final consumption expenditure expressed as a percentage of GDP (TEXP). (vi) Conflicts measured as the number of conflict-related deaths relative to population (CONFL). (vii) Human capital is captured as school enrollment, secondary (% gross) (HC). μ_i and δ_t represent country-specific effects and time effects, respectively, while ε_{it} is error term.

The specification of the model to be estimated is as follows:

$$\begin{aligned} \text{Inequality}_{it} = & \alpha_0 + \beta_1 \text{ForeignAid}_{it} + \beta_2 \text{GDP}_{it} + \beta_3 \text{OPEN}_{it} + \beta_4 \text{NAT}_{it} \\ & + \beta_5 \text{INF}_{it} + \beta_6 \text{TEXP}_{it} + \beta_7 \text{CONFL}_{it} + \beta_8 \text{HC}_{it} + \omega_i + \delta_t + \varepsilon_{it} \end{aligned} \quad (\text{Eq. 2})$$

3.2. Methodology

The impact of foreign aid on inequality may be significantly affected by various sources of endogeneity, such as reverse causality, measurement error, and omitted variable bias. To address these issues, this study employs a baseline regression using the fixed-effects ordinary least squares (FE-OLS) method. The fixed-effects model is particularly well-suited to analyzing the relationship between foreign aid and inequality for several reasons. Firstly, the impact of foreign aid can vary considerably across countries due to differences in their political, social, and economic contexts. By focusing on variations within countries over time, the fixed-effects model effectively controls unobserved, time-invariant characteristics such as historical governance quality and cultural factors. This isolates the specific influence of foreign aid on inequality. This approach enhances the precision of the estimated effects and provides a clearer understanding of how aid interventions may alleviate

or exacerbate inequality. Secondly, the fixed-effects model emphasizes changes rather than levels, making it particularly appropriate for capturing the dynamic nature of foreign aid. This is important because the effects of aid are often not immediate; for example, investments in education, health or infrastructure may take time to influence income distribution. To validate the robustness of the fixed-effects estimates, a Hausman test is conducted to compare the consistency of the parameters derived from fixed and random effects models. However, we acknowledge that panel data is likely to exhibit heteroskedasticity and autocorrelation up to a certain lag, as well as cross-sectional dependence. We address these issues using appropriate estimation techniques to ensure the reliability of the results.

To address potential econometric challenges, this study uses regression analysis with Driscoll-Kraay standard errors (DKSE). There are several reasons why the DKSE method is particularly well-suited to examine the relationship between foreign aid and inequality. Firstly, foreign aid may influence inequality over time, and the DKSE method accounts for autocorrelation in error terms. This ensures that the estimated standard errors are robust to temporal dependencies. Secondly, given the heterogeneity of country contexts, cross-sectional dependence is a concern. The DKSE method provides robustness against spatial correlation, thereby enhancing the reliability of inferences drawn across diverse settings. This non-parametric approach to estimating standard errors imposes no restrictions on the asymptotic behavior of the number of panels, making it suitable for finite samples with a large cross-sectional dimension (Driscoll and Kraay, 1998). Consequently, using the DKSE method strengthens the credibility of our findings and allows for a more nuanced understanding of the complex relationship between foreign aid and inequality. Furthermore, the relationship between foreign aid and inequality is often complicated by endogeneity, which can be caused by reverse causality, measurement error or omitted variable bias. These issues can lead to biased and inconsistent estimates when using conventional estimation techniques. For instance, countries with high levels of income inequality may attract more foreign aid as international donors seek to address social disparities and promote inclusive development. Donors often prioritize aid for nations facing acute inequality, poverty, or social unrest. A country experiencing widespread deprivation may receive increased humanitarian assistance aimed at improving education, healthcare and social welfare.

However, although foreign aid is generally assumed to reduce inequality, its impact ultimately depends on how effectively it is allocated and utilized. For instance, when governance is weak or resources are misappropriated, aid can inadvertently exacerbate existing disparities.

3.3. Data

The data used in this study were obtained from several reputable sources. Information on foreign aid and control variables was primarily obtained from the World Bank (2023). Data on inequality was sourced from the World Income Inequality Database (WIID), while the corruption indicators were derived from the World Governance Indicators. The corruption variable (CORRUP) is defined as the “Control of Corruption” index, ranging from -2.5 (weak control/high corruption) to +2.5 (strong control/low corruption). Data on conflicts were provided by the Uppsala Conflict Data Program, managed by the Department of Peace and Conflict

Research. The analysis focuses on seventeen Sub-Saharan African countries classified as Fragile and Conflict-Affected Countries (FCACs) and covers the period from 1989 to 2022. Descriptive statistics for the variables are presented in Table 1, and the correlation matrix is provided in Appendix 1.

Table 1: Descriptive statistics

Variables	Obs.	Mean	Std. Dev.	Min	Max
Gini	578	42.92	5.24	32.3	54.9
Humanitarian aid	562	75.4	63.18	4.64	389.82
Development assistance	561	83.36	82.37	0.93	636.35
Health and Education aid	562	35.22	28.76	0.15	172.66
GDP per capita	578	4784.62	5813.93	628.69	35688.65
Natural resources	578	13.16	10.31	0	59.68
Inflation	538	75.58	1047.76	-13.06	23773.13
Human Capital	571	43.21	23.37127	6.19	109.44
OPEN	570	54.06	25.5	9.14	156.86
TEXP	530	14.40	7.21	0	62.13
Control of corruption	556	-1	.42	-1.94	0.52
Conflicts	560	3.37	.48	3	4

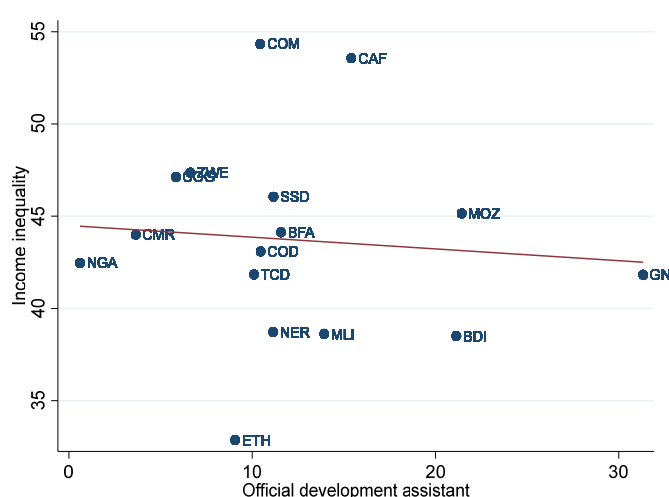
Source: Authors.

4. EMPIRICAL RESULTS

4.1. Preliminary results

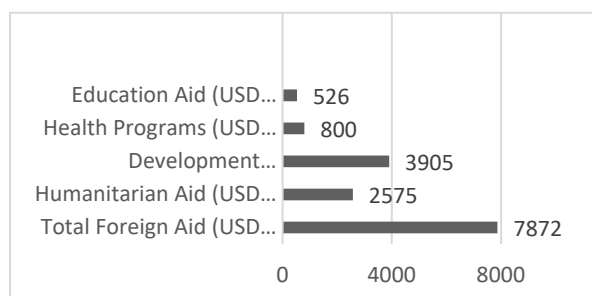
The scatter plots in Figure 1 reveal nuanced and complex patterns. Firstly, countries with high levels of inequality tend to receive substantial amounts of foreign aid. This finding highlights the important role that aid plays in meeting the needs of vulnerable populations in such situations. Secondly, countries with relatively low levels of inequality also receive significant aid inflows. This may reflect the effectiveness of foreign aid in promoting equitable access to education, healthcare and infrastructure, such as roads that facilitate agricultural marketing and income-generating activities.

Figure 1: Foreign Aid and Inequality



A third, more concerning observation is that high levels of foreign aid coexist with persistent inequality in some countries. This highlights the multifaceted nature of aid effectiveness, suggesting that its impact depends not only on volume, but also on composition and sectoral targeting. This emphasizes the importance of aligning aid with strategic priorities that directly address the structural drivers of inequality. Overall, Figure 1 shows that foreign aid significantly affects income distribution in fragile and conflict-affected countries, though its effectiveness depends on contextual factors and implementation strategies.

Figure 2: Type of Foreign Aid for Fragile and FCAC



Source: Authors with data from World Bank and OCDE.

Figure 2 provides valuable insights into the allocation of foreign aid to fragile and conflict-affected countries. Specifically, the education and health sectors receive the most consistent funding, at around 7% and 10% respectively. By contrast, development assistance and humanitarian aid account for around 50% and 32% of total aid, respectively. This distribution raises important questions regarding the strategic targeting of aid resources. Building Becker's (1964) foundational work, investment in human capital, particularly through education and healthcare, is recognized as a key means of reducing inequality by enhancing long-term productivity and economic potential. Therefore, the observed distribution of aid emphasizes the importance of prioritizing sectors that demonstrably reduce inequality. While development and humanitarian assistance play critical roles, increasing allocations to human capital development could greatly improve the effectiveness of aid in addressing inequality.

4.2. Baseline results

As indicated in Table 2, the impact of foreign aid on inequality varies significantly depending on the type of aid provided. This analysis considers three main categories: development assistance; human capital strengthening; and humanitarian aid. Our findings suggest that increases in foreign aid, particularly in the form of development assistance and investments in human capital, play a crucial role in reducing inequalities, particularly about health and education. For example, Education Cannot Wait (ECW) has introduced programmes in the Central African Republic to provide children affected by conflict with access to quality education. These initiatives include funding temporary learning spaces and distributing educational materials. In the health sector, Médecins Sans Frontières (MSF) operates in north-eastern Nigeria, providing emergency medical care, maternal and child health services, and vaccination campaigns to address the health crisis exacerbated by conflict. Similarly, the African Development Bank (AfDB) has

financed infrastructure projects in South Sudan, such as rebuilding roads to improve market access. Such projects are vital for economic development and resilience.

These forms of aid address critical infrastructure deficits, particularly in education and healthcare. By improving access to these vital services, foreign aid boosts human capital, increases household productivity, and promotes social and professional integration. This is consistent with Becker's (1964) theoretical framework, which suggests that investing in human capital can reduce inequality by improving productivity. Furthermore, our results demonstrate the effectiveness of development assistance in fragile and conflict-affected countries. This type of aid often focuses on improving infrastructure, such as building roads, providing electricity and improving the water supply in remote areas, all of which are essential investments in tackling inequality. By focusing on these sectors, aid creates opportunities for vulnerable populations and fosters economic inclusion. Quantitatively, our estimates suggest that a 1% increase in development assistance is associated with a 0.9% reduction in inequality. These findings align with those of Castells-Quintana and Larrú (2015) and support the notion that well-targeted foreign aid can effectively promote equity in fragile contexts.

Our results suggest that humanitarian aid does not have a statistically significant impact on reducing inequalities. This can be attributed to the nature of humanitarian aid, which is usually provided in response to crises or shocks, such as natural disasters or armed conflicts, and tends to be short-lived. Due to its temporary nature and focus on emergencies, the impact of humanitarian aid on inequality tends to be limited to the short term. Overall, these findings highlight the vital role of foreign aid in fragile and conflict-affected countries. Such contexts are often characterized by severe budgetary constraints, economic collapse, rapid population growth, widespread famine, and escalating climate and security challenges. In these environments, foreign aid can provide vital support to stabilize economies and address immediate humanitarian needs. However, despite the vulnerabilities of these countries, it is crucial that foreign aid is regulated strategically. This involves directing aid towards productive sectors, such as energy access, infrastructure development, healthcare, and education. Prioritizing these areas enables foreign aid to contribute to sustainable development and address the structural drivers of inequality. Moreover, the effectiveness of aid depends on overcoming implementation challenges, particularly those relating to governance and corruption. Inadequate institutional frameworks can prevent aid from reaching its intended beneficiaries, resulting in the misallocation of resources and undermining the potential impact of aid. To mitigate these risks, transparent processes must be established, and local stakeholders must be involved in designing and executing aid programmes. Such inclusive and accountable approaches can enhance the effectiveness of foreign aid, ensuring it meaningfully contributes to reducing inequalities.

Analysis of control variables revealed several key findings regarding their impact on inequality in fragile and conflict-affected African countries. Specifically, it was found that public spending, economic growth, human capital and trade openness all significantly reduce income disparities. Public spending, particularly in sectors such as education and healthcare, plays a vital role in promoting equity by providing marginalized populations with essential services. These investments enhance access to opportunities and resources, thereby fostering a more equitable distribution of income. Regarding economic growth, our findings align with

theoretical and empirical literature. Notably, Kuznets (1955) posited that inequality tends to rise in the early stages of development, when only a small proportion of the population benefits. However, as the economy matures, wealth becomes more broadly distributed, leading to a decline in inequality. Our results support this hypothesis, indicating that sustained economic growth can effectively reduce inequality.

Table 2: Effect of foreign aid on inequality: Baseline Fixed effect with Driscoll and Kray estimator

	Development assistance		Health and Education Aid		Humanitarian assistance	
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Foreign Aid (-1)	-0.090** (0.03)	-0.133*** (0.029)	-0.091** (0.039)	-0.136*** (0.031)	-0.073 (0.12)	-0.104 (0.22)
Total expenditures (-1)		-0.293*** (0.00)		-0.280*** (0.00)		-0.273** (0.04)
Natural resources (-1)		0.043 (0.32)		0.043 (0.33)		-0.043 (0.037)
Inflation (-1)		0.010 (0.13)		0.015 (0.33)		0.019 (0.027)
GDP (-1)		-0.821** (0.03)		0.824*** (0.00)		0.824*** -0.013
OPEN (-1)		-0.017* (0.07)		-0.017** (0.05)		0.13 (0.12)
Human capital		-0.017** (0.02)		-0.018* (0.07)		-0.023** (0.03)
Conflict (-1)		0.12** (0.03)		0.14** (0.05)		0.09* (0.08)
Constant	0.13*** (0.00)	0.68*** (0.00)	0.13*** (0.00)	0.17*** (0.00)	0.14*** (0.00)	0.21*** (0.00)
Observations	265	171	265	171	265	171
R ² Within	0.030	0.374	0.027	0.350	0.432	0.171
Country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes	Yes	Yes	Yes

*Note: Driscoll–Kray robust standard errors are in parenthesis. * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$. Source: Authors.*

In terms of trade openness, our findings are consistent with those of Jaumotte et al. (2013), who demonstrated that increased trade is associated with reduced income inequality. Their study, based on a sample of 31 developing and 20 developed countries from 1981 to 2003, suggests that trade liberalization enhances competition, reduces consumer prices, and generates employment opportunities, all of which contribute to narrowing income gaps. In line with Becker's (1964) theory of human capital, our results demonstrate a close link between improvements in education and skill levels and reductions in inequality. Investments in human capital enhance productivity and income potential, particularly among disadvantaged groups. Conversely, our analysis reveals that conflict exacerbates inequality. Increased conflict is associated with infrastructure destruction, market disruption and loss of livelihoods, which disproportionately affects vulnerable populations. This finding is consistent with that of Fang et al. (2020), who emphasize the

economic consequences of conflict. They note that instability deepens existing inequalities and creates new ones by hindering growth and development.

4.3. The role of corruption in the baseline model

This section examines the impact of corruption on the effectiveness of foreign aid in reducing income inequality. Incorporating a corruption variable into the baseline econometric model reveals a statistically significant negative correlation between corruption and the redistributive impact of foreign aid, regardless of its type or destination. In fragile and conflict-affected states, aid resources are often misappropriated by rent-seeking elites for unproductive purposes. This misallocation undermines the provision of essential public services, such as education, healthcare, and infrastructure, thereby preventing aid from reaching its intended beneficiaries. The resulting inefficiencies contribute to widening income disparities, weakening institutional trust and diminishing civic engagement, thereby exacerbating social exclusion. These findings emphasize the importance of anti-corruption measures as a prerequisite for enhancing the effectiveness of foreign aid in fragile contexts. Transparency and accountability in aid allocation are essential to promoting equitable access to opportunities and fostering inclusive growth. The empirical results corroborate prior research by Gupta et al. (2002), Keneck (2021) and Ambassa (2024), which documents corruption's adverse effects on income distribution and social cohesion.

Table 3: Effect of foreign aid on inequality: Adding corruption as control variable

Variables	Development assistance		Health and Education Aid		Humanitarian assistance	
	(1)	(2)	(3)	(4)	(5)	(6)
Foreign Aid (-1)	-0.090** (0.03)	-0.101** (0.01)	-0.091** (0.039)	-0.102** (0.01)	-0.073 (0.12)	-0.104 (0.21)
Total expenditures (-1)		-0.21*** (0.00)		-0.22*** (0.00)		-0.2** (0.07)
Natural resources (-1)		0.012 (0.47)		0.017 (0.35)		-0.023 (0.42)
Inflation (-1)		0.021 (0.17)		0.019 (0.21)		0.019 (0.25)
GDP (-1)		-0.711** (0.05)		0.711*** (0.00)		0.724** (0.02)
OPEN (-1)		-0.024* (0.06)		-0.023** (0.04)		0.13* (0.07)
Corruption (-1)		-0.071** (0.02)		-0.070** (0.05)		-0.061** (0.02)
Human capital		-0.015** (0.02)		-0.021** (0.04)		-0.023* (0.09)
Conflict (-1)		0.17* (0.07)		0.18** (0.05)		0.11* (0.06)
Constant	0.13*** (0.00)	0.41*** (0.00)	0.13*** (0.00)	0.15*** (0.00)	0.14*** (0.00)	0.11*** (0.00)
Observations	265	191	265	191	265	191
R ² Within	0.330	0.121	0.327	0.314	0.432	0.156
Country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes	Yes	Yes	Yes

Note: Driscoll-Kraay robust standard errors are in parenthesis. * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$. Source: Authors.

4.4. Alternative measure of inequality

To reinforce the robustness of our findings further, we used an alternative measure of inequality in this study. Specifically, we replaced the Gini coefficient used in our baseline analysis with the Palma ratio. While the Gini coefficient captures overall income distribution within a population, the Palma ratio focuses on income inequality by comparing the income share of the richest 10% with that of the poorest 40%. This makes the Palma ratio particularly relevant in contexts where income distribution is highly skewed, as it provides a clearer indication of the disparities between society's wealthiest and most vulnerable members.

Traditional measures such as the Gini coefficient can obscure significant inequalities at the extremes of the distribution. In contrast, the Palma ratio offers a more targeted view of inequality dynamics. As Beegle et al. (2016) highlights, one of the Palma ratio's key advantages is its ability to reveal substantial consumption disparities between rich and poor. The results obtained using the Palma ratio (see Table 4) are consistent with our baseline findings: foreign aid, particularly development assistance, and investments in human capital significantly contribute to reducing inequality. However, humanitarian aid continues to have no statistically significant impact on reducing inequality.

Table 4: Effect of foreign aid on inequality: Baseline with alternative measure of inequality (Palma index)

Variables	Development assistance		Health and Education Aid		Humanitarian assistance	
	(1)	(2)	(3)	(4)	(5)	(6)
Foreign Aid (-1)	-0.013* (0.07)	0.013** (0.05)	-0.017*** (0.00)	-0.016*** (0.00)	-0.022 (0.34)	-0.027 (0.17)
Control variables		Yes		Yes		Yes
Constant	0.17*** (0.00)	0.61*** (0.00)	0.15*** (0.00)	0.11*** (0.00)	0.16*** (0.00)	0.19*** (0.00)
Observations	531	531	531	531	531	531
R ² Within	0.033	0.32	0.027	0.31	0.32	0.28
Country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes	Yes	Yes	Yes

Source: Authors.

4.5. Further robustness check: Results with instrumentals variables

The results obtained from the estimates using instrumental variables are included in Table 5. These results confirm the baseline findings.

To address the potential issue of endogeneity in the relationship between foreign aid and inequality, we use an alternative instrumental variable approach proposed by Lewbel (2012). This method enables us to create valid instruments by exploiting the heteroskedasticity of the error term. This improves the reliability and credibility of our estimates. Lewbel's approach is particularly advantageous in contexts where conventional instruments are difficult to identify, providing a practical solution for empirical analysis in environments where data is limited. The results obtained using this methodology are presented in Appendix 2 and corroborate our baseline findings. They reinforce the conclusion that foreign aid, particularly when allocated to development assistance and human capital development, can significantly contribute to reducing inequalities in fragile and conflict-affected settings.

**Table 5: Effect of foreign aid on inequality:
Results with instrumental variables**

Variables	Development assistance		Health and Education Aid		Humanitarian assistance	
	(1)	(2)	(3)	(4)		
Foreign aid	-0.076** (0.03)	-0.071* (0.06)	-0.053** (0.02)	0.068*** (0.00)	-0.086 (0.16)	-0.072 (0.17)
Total expenditures		-0.32*** (0.00)		0.33*** (0.00)		-0.32*** (0.00)
Natural resources		-0.021 (0.12)		-0.022* (0.08)		-0.21 (0.42)
Inflation		0.06 (0.32)		0.04 (0.18)		0.08 (0.42)
GDP		-0.41*** (0.00)		-0.41** (0.02)		-0.41*** (0.00)
OPEN		-0.032* (0.07)		-0.031** (0.02)		-0.031 (0.14)
Corruption		-0.071** (0.01)		-0.075* (0.06)		0.071** (0.03)
Human capital		-0.14** (0.02)		-0.21** (0.02)		-0.07* (0.09)
Conflicts		0.062*** (0.00)		0.067** (0.05)		0.068** (0.04)
Constant	6.22*** (0.00)	5.12*** (0.00)	4.57*** (0.00)	4.41*** (0.00)	4.72*** (0.00)	4.61*** (0.00)
Cragg-Donald stat.	93.23	82.22	84.81	92.21	87.12	91.25
Kleibergen-Paap stat.	92.88	79.88	93.69	92.88	82.11	89.37
P-Value	0.00	0.00	0.00	0.00	0.00	0.00
Hansen J stat.	19.27	197.52	21.83	196.11	21.83	195.69
P-Value	0.508	0.37	0.920	0.31	0.920	0.29

Note: *Indicates $p < 0.1$, **indicates $p < 0.05$, and ***indicates $p < 0.01$. Source: Authors.

5. MEDIATION ANALYSIS

5.1. Estimation of the Mediator's Effect

This section examines the role of corruption as a mediating factor to determine the impact of foreign aid on inequality. The analysis uses mediation techniques within the structural equation modelling (SEM) framework, specifically the MedSEM approach. This model accommodates both observed and latent variables, as well as combinations of the two, and is estimated to use Stata's 'sem' command. MedSEM integrates two key methodologies: the Baron and Kenny (1986) approach, adapted for SEM by Iacobucci et al. (2007), and the procedure proposed by Zhao et al. (2010). The Baron and Kenny framework evaluates the relationship between three variables: the independent variable (X), the mediating variable (M) and the dependent variable (Y). The mediation hypotheses are formulated as follows:

- No mediation: If either or both coefficients for M and Y are not statistically significant.
- Some mediation: If both coefficients are significant.
- Complete mediation: If Sobel's z-test is significant while the coefficient for M is not.
- Partial mediation: If both Sobel's z-test and the coefficient for M are significant.
- Partial mediation: If Sobel's z-test is not significant but the coefficient for M is.
- No mediation: If neither the Sobel's z-test nor the coefficient for M is significant.

This approach involves estimating two equations to assess the mediating role of corruption in the relationship between foreign aid and inequality. These equations are specified as follows:

$$\text{Model 1: } \text{Corruption}_{it} = \gamma_1 + \beta_1 \text{ForeignAid}_{it} + \delta_1 X_{it} + \delta_{it} \quad (\text{Eq. 3})$$

$$\text{Model 2: } \text{Inequality}_{it} = \gamma_2 + \beta_2 \text{ForeignAid}_{it} + \beta_3 \text{TC}_{it} + \delta_2 X_{it} + \omega_{it} \quad (\text{Eq. 4})$$

where TC_{it} is the mediating variable (corruption) through foreign aid transits to affect inequality. The direct and mediating effect of foreign aid on inequality is obtained by deriving the two models as follows: direct effects (β_2); indirect effects ($\beta_1 * \beta_3$); total effects: $(\beta_1 * \beta_3) + \beta_2$.

The mediation analysis estimating the effect of corruption in the relationship between foreign aid and inequality follows a two-step procedure.

Step 1: Estimating the effect of foreign aid on corruption

We use Model 1 (Equation 3) to assess the impact of foreign aid on corruption as a potential intermediary factor. This provides a coefficient that captures the strength and statistical significance of the relationship between foreign aid and corruption. This is important because it helps us to establish whether foreign aid directly influences corruption levels in recipient countries. If foreign aid is found to have a significant effect on corruption, this suggests that corruption may act as a channel through which aid influences inequality.

Step 2: Estimating the effect on inequality

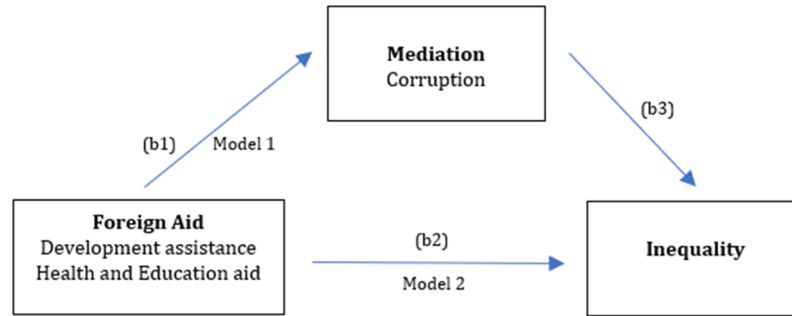
This step involves estimating Model 2 (Equation 4), which assesses the impact of foreign aid on inequality while accounting for the mediating variable of corruption. This model enables us to distinguish between the direct and indirect effects of foreign aid.

Direct effect: This is represented by a specific parameter in the model and captures the influence of foreign aid on inequality independently of corruption. It reflects the portion of the effect that is not transmitted through the mediating variable.

Indirect effect: This is calculated as the product of two parameters: (i) the effect of foreign aid on corruption (from Step 1) and (ii) the effect of corruption on inequality (from Model 2). This component quantifies the extent to which foreign aid affects inequality through its influence on corruption. Together, these two effects provide a comprehensive understanding of how foreign aid interacts with corruption to influence outcomes in terms of inequality. The significance and magnitude of each component help to establish whether corruption is a meaningful transmission channel in the relationship between aid and inequality.

Mediation mechanism

The Figure 3 illustrates the mediation mechanism linking foreign aid to inequality through corruption. This framework allows for a clearer understanding of how corruption may act as a conduit through which foreign aid influences inequality levels. In the context of analyzing the transmission channel, we do not test the effect of humanitarian aid. This choice is justified by the fact that our results indicated that the impact of humanitarian aid on inequality was not significant.

Figure 3: Mediating effect of foreign aid and inequality

Source: Authors.

5.2. Mediation analysis: Empirical results

Analysis of the mediation results (Tables 6 and 7) reveals two key insights into the relationship between foreign aid and inequality.

Firstly, corruption acts as a significant transmission channel that can undermine the effectiveness of foreign aid. Using the World Governance Indicators (WGI), corruption is categorized as high, medium or low based on scores ranging from -2.5 to 2.5. In highly corrupt environments, foreign aid is often misallocated by elites for personal or non-productive purposes, preventing resources from reaching vulnerable populations. Additionally, corruption can obstruct aid flows, with bureaucratic inefficiencies and bribery delaying or derailing project implementation. These findings emphasize the importance of good governance: reducing corruption increases the potential of aid to reduce inequality. Secondly, the results show that foreign aid is largely ineffective in reducing inequality across all levels of corruption. Even in contexts with relatively low levels of corruption, the expected redistributive impact of aid is not consistently observed. This suggests that, to be genuinely effective, foreign aid must be accompanied by comprehensive efforts to combat corruption at all levels.

6. CONCLUSION

This paper investigates the impact of foreign aid on inequality in fragile and conflict-affected African countries (FCACs). To conduct the analysis, a panel dataset covering 17 countries from 1989 to 2022 was employed, alongside a fixed effects model with Driscoll and Kraay standard errors, which were used to account for cross-sectional dependence. To address potential endogeneity concerns, the study also employs an instrumental variables approach. The findings reveal two key insights.

Firstly, foreign aid is found to have an overall positive and statistically significant effect in reducing inequality. Development assistance, particularly aid directed towards education and health, plays a crucial role in mitigating inequality in FCACs. This type of aid fosters access to learning opportunities, supports infrastructure development, and facilitates professional integration and income-generating activities. In contrast, humanitarian aid has no significant effect, likely due to its sporadic and short-term nature, which limits its sustained impact.

Table 6: Analysis of mediation effects of corruption with Development assistance

	Mediator: Corruption																																			
	(1a)		(1b)		(2a)		(2b)		(3a)		(3b)		4(a)		4(b)																					
	Low Corruption		Inequality		Medium Corruption		Inequality		High Corruption		Inequality		Corruption		Inequality																					
Development assistance	0.038*** (0.00)		-0.15** (0.02)		0.36*** (0.00)		-0.08*** (0.00)		0.41*** (0.00)		-0.037*** (0.00)		0.58*** (0.00)		-0.036** (0.02)																					
Corruption			0.022** (0.05)				0.12* (0.06)				0.32*** (0.00)				0.006** (0.02)																					
Constant	3.87*** (0.00)		4.17*** (0.00)		4.92*** (0.00)		5.62*** (0.00)		5.92*** (0.00)		5.16*** (0.00)		5.19*** (0.00)		5.17*** (0.00)																					
Observations	538		538		538		538		538		538		538		538																					
Bootstrap repl.	500		500		500		500		500		500		500		500																					
	Coef.			Sd.error			P-value			Coef.			Sd.error			P-value			Coef.			Sd.error			P-value			Coef.			Sd.error			P-value		
<i>Mediation tests</i>																																				
Delta	0.075			0.027			0.03			0.066			0.135			0.023			0.091			0.033			0.02			0.031			0.041			0.00		
Sobel	0.075			0.027			0.03			0.066			0.135			0.025			0.091			0.033			0.00			0.031			0.042			0.00		
Monte Carlo	0.075			0.027			0.03			0.066			0.135			0.026			0.091			0.033			0.00			0.031			0.042			0.00		
<i>Composition of the effect</i>																																				
Indirect effect	0.075						0.066						0.091									0.031														
Direct effect	0.22						0.107						0.066									0.069														
Total effect	0.149						0.173						0.157									0.100														
<i>% of the total effect mediated</i>	50%						38%						58%									31%														

Table 7: Analysis of mediation effects of corruption with Health and education aid

	Mediator: Corruption											
	(1a)	(1b)		(2a)	(2b)		(3a)	(3b)		4(a)		4(b)
	Low Corruption	Inequality		Medium Corruption	Inequality		High Corruption	Inequality		Corruption		Inequality
Health and education aid	0.033** (0.02)	-0.18** (0.02)		0.39** (0.05)	-0.11*** (0.00)		0.27*** (0.00)	-0.029*** (0.00)		0.57*** (0.00)		-0.028** (0.02)
Corruption		0.021** (0.03)			0.23** (0.01)			0.41** (0.04)				0.016** (0.02)
Constant	3.55*** (0.00)	3.17*** (0.00)		4.61*** (0.00)	5.12*** (0.00)		5.47*** (0.00)	4.16*** (0.00)		5.28*** (0.00)		5.17*** (0.00)
Observations	538	538		538	538		538	538		538		538
Bootstrap repl.	500	500		500	500		500	500		500		500
	Coef.	Sd. error	P-value	Coef.	Sd. error	P-value	Coef.	Sd. error	P-value	Coef.	Sd. error	P-value
<i>Mediations tests</i>												
Delta	0.044	0.022	0.06	0.087	0.102	0.011	0.072	0.018	0.021	0.028	0.038	0.00
Sobel	0.044	0.022	0.06	0.087	0.102	0.011	0.072	0.018	0.021	0.028	0.038	0.00
Monte Carlo	0.044	0.022	0.06	0.087	0.102	0.011	0.072	0.018	0.021	0.028	0.038	0.00
<i>Composition of the effect</i>												
Indirect effect	0.044			0.087			0.072			0.028		
Direct effect	0.088			0.112			0.091			0.061		
Total effect	0.132			0.199			0.163			0.089		
<i>% of the total effect mediated</i>	33%			34%			44%			31%		

For Tables 6 and 7: ***, **, *, represent the statistical significance at the level of 1%, 5% and 10%, respectively. Source: Author's estimation.

Secondly, the effectiveness of foreign aid in reducing inequality is substantially influenced by the quality of governance. Specifically, corruption is identified as a major impediment. Resources intended for vulnerable populations are often diverted, thereby exacerbating inequality and enriching predatory elites who undermine the effectiveness of aid by exploiting their influence. When corruption is categorized as weak, moderate or high, the results show that the greater the level of corruption, the weaker the impact of foreign aid on inequality.

Based on these findings, the study recommends channeling foreign aid into tangible infrastructure projects, such as construction, to reduce the risk of misappropriation associated with direct financial transfers. Aid should also be aligned with national priorities as identified by local authorities. Furthermore, the paper calls for governance frameworks, particularly anti-corruption measures, to be strengthened. Key recommendations include digitizing administrative procedures, increasing operational transparency, and ensuring unrestricted public access to information. Finally, the study emphasizes the importance of peaceful conflict resolution and of establishing robust, autonomous institutions with the power to effectively enforce anti-corruption measures.

While the study offers valuable insights, it has limitations. Notably, corruption is not the only channel through which foreign aid affects inequality. Due to data constraints, other potential mechanisms could not be explored. Future research could examine the long-term effects of governance reforms on aid effectiveness and inequality, as well as investigating alternative transmission channels.

Appendix 1 : Correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Gini	1.00											
(2) A. Development	-0.17*	1.00										
(3) Health/Educ. aid	-0.37*	-0.36*	1.00									
(4) Humanitarian A.	-0.15*	-0.13*	0.65*	1.00								
(5) GDP	-0.28*	-0.27*	0.82*	0.68*	1.00							
(6) Total expenditures	-0.21*	-0.20*	0.14*	-0.21*	0.04	1.00						
(7) Natural ressources	-0.22*	-0.20*	0.10*	-0.18*	0.07	-0.01	1.00					
(8) Inflation	0.03	0.03	-0.03	0.06	-0.02	0.08	-0.10*	1.00				
(9) OPEN	-0.15*	0.13*	-0.07	-0.30*	-0.27*	-0.30*	0.10*	0.55*	1.00			
(10) Corruption	0.19*	-0.19*	0.10	0.04	-0.12*	0.02	0.48*	-0.33*	-0.18*	1.00		
(11) Human capital	-0.17*	-0.17*	-0.28*	-0.45*	-0.25*	-0.50*	0.25*	-0.26*	-0.04	0.32*	1.00	
(12) Conflicts	0.20	0.15	-0.12	0.27*	-0.11	-0.44*	0.01	-0.07	0.13	0.39*	-0.05	1.00

Appendix 2: Instrumental variables with Lewbel (2012) approach

Variables	Assistance development	Health and Education aid	Humanitarian assistance
	(1)	(2)	
Foreign aid	-0.064*** (0.00)	-0.036** (0.00)	-0.013 (0.12)
Control variables	Yes	Yes	Yes
Constant	11.35*** (1.16)	12.89*** (1.28)	14.9*** (1.28)
Observations	531	531	531
R ²	0.127	0.125	0.125
Kleibergen-Paap rk LM(p-value)	0.00	0.00	0.00
Kleibergen-Paap rk Wald F statistic	79.93	79.93	79.93
Hansen (p)	0.242	0.284	0.284

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Huber-White robust standard errors in parentheses.

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Les effets de l'aide étrangère sur les inégalités de revenu en Afrique et le rôle de la corruption

Résumé – Cet article examine l'impact de l'aide étrangère sur les inégalités de revenu (traduites par le coefficient de Gini) et le rôle particulier de la corruption dans les pays fragiles et affectés par des conflits en Afrique. À partir de données couvrant 17 pays sur la période 1989-2022, nous avons utilisé un modèle à effets fixes avec des erreurs standard de Driscoll et Kraay, ainsi que des variables instrumentales, pour évaluer les effets de l'aide étrangère sur les inégalités de revenu. Deux conclusions majeures émergent de nos résultats. Premièrement, l'aide étrangère – notamment l'aide au développement ainsi que l'aide dans les secteurs de la santé et de l'éducation – contribue de manière significative à la réduction des inégalités. En revanche, l'aide humanitaire n'a aucun effet notable sur la distribution des revenus. Deuxièmement, une analyse de médiation fondée sur un modèle d'équations structurelles révèle que la corruption affecte l'efficacité de l'aide étrangère : plus les niveaux de corruption sont élevés, plus les effets bénéfiques de l'aide sur les inégalités de revenu s'amenuisent. La recherche de solutions pacifiques aux conflits et la mise en place d'institutions indépendantes et solides, capables de sanctionner les pratiques de corruption, apparaissent essentielles pour assurer pleinement l'impact de l'aide étrangère sur la réduction des inégalités.

Mots-clés

Corruption
États fragiles
Inégalités de revenu
Aide étrangère
