Development Aid: Economic Growth, Poverty and Inclusion Nexus in Africa

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Abstract

The paper aims to scrutinize the nexus between development aid, economic growth, poverty, and inclusion in Africa in the short and long run. After compiling the theoretical and empirical foundation of aid effectiveness literature, the statistical analysis is conducted in three scenarios. First, a panel data analysis was conducted from 1977 to 2018 for 34 African countries to explore the interface between Official Development Assistance (ODA) and economic growth in the long run. The second scenario presents ODA's short-term and long-term marginal effects on poverty reduction. The last scenario examines the direct effect of ODA on inclusive development. The statistical results show that aid effectiveness varies across nations. In the short-run, out of the 34 countries, only five countries have a positive marginal efficiency of ODA in terms of economic growth. However, only in one country (Nigeria) is the marginal efficiency of ODA arguably found to be positive in the long-run. The poverty elasticity of ODA is found to be negative in all countries. Finally, the random effects regression shows that ODA arguably contributes negatively to inclusion. Multiple factors may cause statistically negative relationships and should not be ignored due to the suspicion of an endogeneity problem. This is the unique selling point of this paper, as it discusses the potential causes. Statistical findings may not fully explain aid effectiveness because benefits and drawbacks may differ from national interests and project to project. Furthermore, aid may have different long- and short-term consequences. Given all the limitations, the statistical analyses in this paper show that development aid should have strategic crosscutting focus areas inter alia human development, technology, environment, demographic change, good governance, trade, and economic equity.

Keywords: Foreign Assistance, Dutch Disease, Inclusive Development, Aid Fatigue

JEL Classification: F35, F59, O20, P45

Introduction

International aid's impact on recipient nations' development has never been established, and the aid effectiveness indicators used up to this point are neither unpretentious nor dependable

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(Woldegiorgis, 2022c). The World Bank asserts, for example, that "aid can be the midwife of good policies" and that "money matters" (World Bank, 1998, pp. 14–96). In a similar vein, aid "can" promote economic growth and lessen poverty in recipient nations, according to the well-known Burnside-Dollar-Collier hypothesis (Burnside & Dollar, 2000; Collier & Dollar, 1999a, 1999b, 2002; Beynon, 2003). Proponents of the "Gap Model" contend that emerging nations have deficits in foreign exchange, savings-investment, and adaptive competence. Thus, assistance contributes to closing the gap (Fei & Paauw, 1965; Quibria, 1978; Woldegiorgis, 2022c; Chenery & Stout, 1968).

Conversely, numerous researchers, including Moyo (2009) and Easterly (2006), have strongly reasoned that aid has adversely affected, inter alia, economic and social conditions and perpetuated poverty and dependency, authoritarian regimes, a never-ending cycle of corruption, colonial institutions, weak institutionalism, and jeopardized entrepreneurship in the recipient countries (Moyo, 2009). It is also claimed that the negative correspondence between aid and democracy is customary, especially when aid flows are preceded by incautious policy advice (Kalyvitis & Vlachaki, 2012). Drometer (2018) also argues that development aid seemingly has a detrimental effect on the rule of law. Likewise, it is underscored that aid-based development may jeopardize domestic savings (Doucouliagos & Paldam, 2008, p. 1; 2009). Prokopijevi (2007, p. 29) claims that "aid is not only ineffective; it is arguably counterproductive."

On the other hand, research on 98 Official Development Assistance (ODA) recipient countries shows "there is a U-shaped relationship between foreign aid and economic growth, i.e., initially, foreign aid negatively impacts the countries' growth, then over a period of time, it positively contributes to economic growth" (Yiew & Lau, 2018, p. 21). According to statistics, there may also be no association between aid and economic growth (Doucouliagos & Paldam, 2008, p. 1). The Woldegiorgis (2022c) study provides statistical evidence that missing variables account for the unfavorable relationship between ODA and inclusive development. He argues that ODA is a statistically significant positive determinant of inclusive development and should be directed toward climate change, population pressure, and CPIA. He bases this on the instrumental variable in the two-stage linear square (2SLS) regression model.

Meanwhile, the paucity of transparency is, inter alia, a hurdle that makes aid effectiveness measurement delicate. For instance, how much of the exact amount of aid is transferred to the end beneficiaries? How many jobs are created in the recipient country due to aid? How much

aid is allotted for poverty reduction, social sector development, and private sector financing? Moreover, how impactful have bilateral and multilateral aids been? Such rudimentary queries cannot be adequately answered in the existing aid data management system.

Additionally, as institutionally affiliated literature does not tell the full story, a more prudent, pragmatic, and future-oriented study of the aid system is still of higher significance (Doucouliagos & Paldam, 2008, 2009; Moya, 2009; Easterly, 2006). Besides, most often, international development increases when countries are suffering from fiscal deficits and aggregate economic downturns. However, Easterly, for instance, condemns foreign aid for its paucity of triumph, stating that "[…] the West spent $2.3 trillion on foreign aid over the last five decades and still had not managed to get 12-cent medicines to children to prevent half of all malaria deaths. […] still had not managed to get four-dollar bed nets to poor families" (Easterly, 2006, p.1).

Meanwhile, especially since 2010, there has been a wave of political movement in Africa that kicked off in the North and then flapped towards sub-Saharan Africa, leading to more than 28 coup trials in 21 African countries (Woldegiorgis, 2019a; Woldegiorgis, 2019b). The main appeal of the protesters is "inclusive" governance and development, or "poverty reduction." Therefore, as stated above, the available literature alleging a positive, negative, or zero correlation between international development aid and economic growth reveals that the aid effectiveness thesis and antithesis are still open-ended. Obviously, the divergence in statistical findings has different root causes. In order to determine if ODA has had a substantial impact on the continent's economic growth, decrease in poverty, and inclusive development, this article will use empirical evidence.

Thus, the paper is ordered as follows: After compiling the theoretical and empirical foundations of aid effectiveness literature, the statistical analysis is presented in three scenarios. In the first setup, a panel data analysis is conducted for the years 1977–2018, covering 34 African countries, to explore the interface between Official Development Assistance (ODA) and economic growth. The second arrangement presents ODA's short-term and long-term marginal effects on poverty reduction. The last scenario examines the direct effect of ODA on inclusive development from 1990 to 2018 for the 34 African countries, given that the data for the inclusive development index is limited to 1990–2018.

Research Questions and Objectives

The following research questions are addressed: i) What are the foundational thoughts about aid effectiveness? When does ODA promote economic growth? In which countries has "aid

perpetuated poverty," if any? ii) Under which condition ODA may promote inclusive development in the research countries? iii) How have institutional bottlenecks affected aid effectiveness? In line with the research questions, the paper aims to assess the short- and long-term effects of ODA on economic growth, poverty reduction, and inclusive development.

Limitations

Development aid is heterogeneous per se. So are the aid recipients and donations. As a result, aggregating different aid projects for effectiveness appraisal may not yield consistent results. Transparency problems and time lag in aid effectiveness measurement are also other hurdles. Moreover, the generalization of aid effectiveness statistical findings at the regional level, given the missing data from some countries, might be unsound. Endogeneity issues should also be taken into consideration before any statistical inferences. Therefore, there is a need for further zoom-in and explorations, particularly research based on specific aid projects rather than aggregation.

Literature Review

Definitions and Concepts

International aid (ODA) is defined on the OECD's website as long-term loans that typically have a ten- to twenty-year repayment period for the recipient. Project aid is provided to a particular scheme, like infrastructure, and is typically in the form of a grant with no payback obligations. Technical support focuses on human and technological capital and is typically associated with project aid. The final type of grant help is commodity aid, often known as general program assistance, and it aims to boost productivity.

Theoretical Literature

According to Woldegiorgis (2023c), one of the twin gap models of Chenery and Stout (1966), which contends that developing nations have a domestic saving gap and a foreign exchange deficit that necessitates international aid, is one of the most widely accepted theoretical foundations of international aid. The "gap model" is expanded to include the "technical expertise gap," also known as the "adaptive capacity approach," which claims that developing nations initially lack the capacity to utilize financial and technological resources and thus require technical assistance. The Harrod-Domar legacy serves as the foundation for the gap model of international aid in general (Taylor, 1994).

Given the diminishing marginal returns of aid, the Burnside-Dollar-Collier models have also profoundly sparked additional discourse in the last 20 years regarding the effectiveness of aid. They have argued that international aid is necessary and can effectively address poverty reduction provided that quality policy and other institutional setups are in place (Burnside & Dollar, 2000; Collier & Dollar, 1999a, 1999b, 2002; Beynon, 2003). Aid can also ethically be used to governance institutions and family planning policies (Woldegiorgis, 2022c; Woldegiorgis, 2023a; Woldegiorgis, 2023b; Woldegiorgis, 2024).

In addition to the theoretical frameworks mentioned above, international development aid has also been the subject of various political economy perspectives that have sparked additional discussions about aid, development, and policy because various development theories shaped the policies of international aid organizations in the various Cold War era decades. For instance, the Marshall Plan in the 1950s was greatly influenced by the linear stages of the growth model (Todaro & Smith, 2012).

Due to the influence of Raul Prebisch *et al*., dependence theory entered the debate in the late 1950s. The argument holds that aid may lead to greater employment and demand for products and services in wealthy nations than in developing nations, hence prolonging poverty in the latter (Ferraro, 1996; Kabonga, 2017). The "false paradigm model" also suggests that poor guidance from assistance organizations contributes to underdevelopment (*ibid*.).

In contrast, the assistance community was more influenced by structural change ideas during the 1960s and 1970s. Aid rhetoric has also been antagonistically driven by conceptions of modernization and the international dependency revolution, particularly in the 1970s (Todaro & Smith, 2012). The neoclassical growth model proposed by Solow also heavily influences the discourse on aid. Thus, the majority of agencies provided funding for extremely big, capital-intensive projects. The "basic needs" approach, which is based on welfare economics, has encouraged aid policies to shift their priorities so that a larger portion of funding is allocated to social programs (health and education), initiatives that directly combat poverty, and initiatives that build human capital and skills (*ibid*.).

In the 1980s, neoclassical counter-revolution literature geared aid recipient countries towards liberalizing their economies through the structural adjustment program (SAP) (Mavrotas, 2009).[††]Since the late 1980s and 1990s, new institutional economics (NIE) perspectives have

[††]SAP was encouraged by the "Washington Consensus" and was operationalized under Bretton Woods institutions.

also come into play. For instance, in 1994, the World Bank argued that SAP failed because of a lack of good governance (World Bank, 1994; Collier, 2007). Following the collapse of the Soviet Union in 1991, there was a paradigm shift in the international aid system in such a way that the Millennium and Sustainable Development Goals (MDGs and SDGs) were conceived (Loewe, 2008; Beegle *et al*., 2016; Woldegiorgis, 2022c).

Empirical Literature Review

The empirical literature is clustered into four groups. Doucouliagos & Paldam (2008, 2009), as referenced in Woldegiorgis (2022c), thoroughly collated 97 empirical aid effectiveness literature (AEL) and categorized them into three groups: aid's positive, negative, and conditional effects on economic growth. They confirm that the empirical results are "significantly asymmetric," and they ascribe the discrepancy in the empirical findings to variances in the data, model specification, institutional affiliation, and publication outlet. The overwhelming body of data suggests that development aid has not been successful after 40 years. The apparent ineffectiveness of help can be explained by the Dutch sickness impact on currency rates (Doucouliagos & Paldam, 2009, p. 433).

The first group argues that there has not been enough foreign assistance. Thus, a significant increase in aid can promote inclusive development, lower poverty, and accelerate economic growth (Sachs, 2005). It appears that this reasoning supports the huge push theory. Indeed, this side is certain that the current aid system needs to be reformed in a way that promotes technological change, the growth of infrastructure and human capital, and the wider decrease of economic disparity (*ibid*.). The following is a description of one of the statistical testimonies regarding the beneficial contribution of aid.

It has raised the annual growth rate of the lowest billion by about one percentage point over the past thirty years. [...] Thus, a one percent increase has been the difference between severe cumulative decrease and stagnation. The nations in the bottom billion would have become far poorer than they are now if help had not been provided to them collectively (Collier, 2007, p.100).

Gomanee *et al*. (2005) claim that aid encourages economic growth through investment. Likewise, Loxley and Sackey (2008) discovered a positive and statistically significant effect of aid on growth using fixed-effects growth models and a sample of 40 African countries. One of the main transmission mechanisms in the assistance-growth relationship, they contend, is that aid boosts investment. Similarly, an examination of 34 years' worth of yearly aid data

shows that foreign assistance to Ghana has contributed to lower domestic borrowing, higher public spending, and improved fiscal performance (Osei *et al*., 2005). According to Adekunle *et al*. (2019), foreign aid shows a favorable correlation with economic growth, albeit this relationship is not as strong in Nigeria. By extending this, Riddella and Nio-Zarazab (2015) highlight the beneficial impact of aid on the education sector.

According to the second group, development assistance "jeopardized" inclusive growth in recipient nations by promoting poverty, reliance, corruption, manipulated local currency, stifling entrepreneurship, and stimulating inflation (Moyo, 2010; Easterly, 2006). They say humanitarian aid is important and morally acceptable, but development aid "must be removed bit by bit." International dependency theory is theoretically consistent with this line of inquiry. International help is referred to in the camp as "Dutch disease."[‡‡] In his book "Toxic Aid: Economic Collapse and Recovery in Tanzania," Edwards (2014, p. 1) asserts that *Tanzania was the darling of foreign assistance organizations for a long time. Throughout the 1970s, it received more aid per person than any other country in the world. Despite this, the economy performed horribly: there was no growth, a fall in exports, and a sharp rise in poverty.*

According to the third line of research, there is a random influence, indeterminacy, and inconclusiveness in the association between development aid and development in general (Banerjee & Duflo, 2011). Because some help programs had successful landings while others have failure stories, the hostile discourse advocating "aid perpetuates poverty" or "aid fosters economic growth" cannot be supported by utilizing aggregate data and cross-country regressions. According to Edwards (2014b), aid has a complex impact on recipients' economies, and "aid-development relations are time-dependent and two-way." This explains why certain help initiatives succeed while failing in others. Therefore, going beyond statistical methods is necessary (Bourguignon & Sundberg, 2007).

According to a time-series data analysis of aid in Uganda, projects and food aid seem to have a negative impact on public investment, while technical assistance and program aid have a favorable relationship (Mavrotas & George, 2005). Similarly, a panel data analysis spanning 42 sub-Saharan African nations from 1980 to 2007 discovered no evidence supporting either

[‡‡] This means that when aid increases, a country's currency strengthens, and exports become more expensive for other countries to purchase, while imports become less expensive, making the country's exports more affordable.

the unconditional or conditional effectiveness of aid. Effective results are not always the consequence of effective policies in bilateral and multilateral aid (Wako, 2011).

According to a study done utilizing information from the top 10 sub-Saharan African nations that received aid, aid in and of itself has no influence on economic growth. Nonetheless, it is shown that the aid-policy variable is statistically significant and positive; indicating that aid only increases the growth rate in favorable policy environments. Therefore, the effectiveness of international aid depends on a minimum norm of institutional quality (Hansen, 2001; Burnside & Dollar, 1997, 2000, 2004; Collier & Dollar, 1999a, 1999b, 2002, 2004). Aid effectiveness is particularly impacted by a number of factors, including political stability, voice and accountability, government efficacy, rule of law, quality of regulations, democracy, and control over corruption (Asongu, 2013).By using its own social innovation model, the Awra Amba community in Ethiopia has proven remarkable resilience and ensured socio-economic development in the last thirty years by rejecting foreign aid as a strategic determinant factor for development (Woldegiorgis, 2024).

Aid effectiveness is particularly impacted by a number of factors, including political stability, voice and accountability, government efficacy, rule of law, quality of regulations, democracy, and control over corruption (Asongu, 2013). Similarly, it is discovered that the impact of aid is more significant in a favorable policy environment marked by strong trade openness, low budget deficit, and relatively low inflation (Yelognisse-Alia & Kouadio-Anago, 2014).

As a cluster of studies, the conditionality of institutional quality for effectiveness still requires closer examination because, on the one hand, the World Bank (1998) asserts that aid can serve as the caregiver for "good policies." Conversely, aid is said to have sustained weak institutionalism, authoritarian regimes, and colonial institutions (Moyo, 2009; Easterly, 2006). Aid flows adversely affect economic and social conditions in recipient countries, especially when aid flows precede forced "liberalization" (Kalyvitis & Vlachaki, 2012). This was the conclusion drawn from an analysis of data covering the years 1967–2002 from 64 aid-recipient countries. Similarly, it is contended that aiding debt financing could be detrimental to economic progress.

Hypotheses

The literature review leads to two hypotheses:

Hypothesis 1: Aid effectiveness inferences may depend on the statistical method. Therefore, the statistical findings may not give a consistent full picture of aid effectiveness.

Hypothesis 2: The benefits and drawbacks may differ from nation to nation and project to project. Furthermore, aid may have different long- and short-term consequences.

There is also wide-ranging literature that claims the impact of development aid should not be seen from the recipient countries' point of view. The following model, therefore, summarizes the cost-benefit analysis from a hypothetical recipient and donor point of view. The dual country model may give additional insight into the aid effectiveness literature.

Table 1: Donor-Recipient Aid Model (DRAM)

	Country X (Aid Recipient)	**Country Y (Aid Donor)**
Virtuous Effects of Aid (short-term effects)	▪ Job creation ▪ Relief during the budget deficit ▪ Saving lives, rebuilding livelihoods during humanitarian crises, and reducing the short-term impacts of poverty ▪ Technology and the governance system spill over. ▪ institutional reform toward democratization and modernization ▪ Promotion of social sector development (education and health system, sanitation, birth control) ▪ Facilitating international openness	▪ Job Creation ▪ Deepening of the free market, competition, globalization, and regionalization ▪ Reduce demographic pressure. ▪ Market facilitation, sustainable investment, trade, finance, and information opportunity, global competitiveness ▪ Political intervention gateway, ideological alliance, conflict resolution ▪ Cultural and religious integration ▪ Sustainable supply and value chain of goods and services ▪ Facilitates international openness[§§]
Vicious Effects of Aid (long-term effects)	▪ Weak kleptocratic state, high international dependence on free cash and dysfunctional imported institutions, poor accountability of recipient country governments to their own citizens, perpetuating conflict ▪ Crowd in effect: conditional aid may jeopardize internal government systems and cause Dutch disease and "Alien Growth Models," adverse effects on domestic savings, ▪ political interference, cultural, and religious inducement ▪ Brain drains and better incentives for aid workers only, not beneficiaries ▪ Misguided policies, unfair terms of trade and balance of payment deficits, and illicit capital migration	▪ Local critics from a public finance point of view ▪ Critics from recipient country activists claim that aid is a finance for dictators. ▪ Working through hardships ▪ Opportunity costs at home ▪ Superfluous competition among donors ▪ Conditional aid increases transaction costs. ▪ Aid conditionalities are used to fail.

Source: compiled by the authors from diverse sources

[§§] Brain gain, in this context, is defined as acquiring professional people. It is the antonym of brain drain.

Method and Data Sources

The sole information used in the paper comes from secondary sources. With a little scale modification, the National Policy Institutional Assessment (CPIA) index is used as a stand-in for institutional quality (Woldegiorgis, 2022c). The CPIA is scored between 1 and 6. However, the mini-max approach was used to transform all of the 1-6 scale scores into a 1–5 rating in order to make the CPIA index uniform from 1977 to 2018. Since 1977, the index has only been reported for 34 of the 54 African countries. For this reason, we extend our investigations to the 34 African countries. Most of the data on the policy variables utilized in the panel regression came from the World Bank and Africa Development Bank's 1977–2018 data sources. Panel data are used for econometric investigations using STATA 14 software. Our study is applied to three scenarios.

Scenario 1: Economic growth development aid nexus

According to the World Economic Forum (WEF), economic growth and poverty reduction are essential conditions for inclusive development (WEF, 2017). In scenario 1, the direct and indirect interactions of aid, particularly ODA, with economic growth are analyzed by controlling for initial per capita income, institutional quality, aid elasticity, and the policy-aid interaction factor (see equation 1).

The Model

The model is adapted from the "aid-efficient" regression model used by Burnside & Dollar (1997, 2000, 2004), Collier & Dollar (1999a, 1999b, 2002, 2004), and Beynon (2003) for the research that has immensely benefited academia and the aid community. The model specification is applied based on Burnside and Dollar (1997, 2000). The specification is as follows:

$$G = c + b_1X + b_2P + b_3A + b_4\,AP + b_5\,A^2 \quad (1)$$

Where G is real per capita income growth and c is the intercept. X is the initial income multiplied by real per capita income. P is a policy proxied by CPIA (see Annex 1). Aid is proxied by ODA. AP is when aid and policy vectors are multiplied, and A2 is aid squared to see the scale effect, i.e., what would happen if aid significantly increased. Only a few control variables are systematically included because the objective is not how much variation in the model is explained by the explanatory variables but how aid, economic growth, the initial economic condition, and policy are interrelated. Statistically, even if the adjusted R square is minuscule, aid's direct and indirect effects on economic growth are well explained.

By first differencing the above model with respect to aid (A), the marginal effect of aid on economic growth (Ga) could be calculated. Accordingly, as per the logic of Burnside and Dollar (1997, 2000), the marginal impact of aid on economic growth is therefore given as follows:

$G_a = b_3 + b_4P + 2b_5A$ .....(2)

Table 2: The detailed descriptive statistics of the panel data in the scenario 1

Variable	Mean	Std. Dev.	Min	Max	Observations
ID (country)					
Overall	17.31068	9.860718	1	34	N = 1339
Between		9.958246	1	34	n = 34
Year					
Overall			1977	2018	N = 1339
Between					n = 34
rGDP					
overall	3.727341	5.464773	-50.2	35.2	N = 1335
Between		1.205659	1.119048	6.803571	n = 34
Within		5.342444	-51.6798	33.7202	T-bar = 39.2647
LogPCI					
Overall	2.685906	0.2970309	2.011139	3.516759	N = 1339
Between		0.2184626	2.285399	3.095749	n = 34
Within		0.2066901	2.134557	3.297477	T-bar = 39.3824
Aid%GDP					
Overall	11.48896	9.823713	0	94.9	N = 1323
Between		6.607513	0.5833333	33.62143	n = 34
Within		7.386611	-14.03246	88.14135	T-bar = 38.9118
Policy					
Overall	2.769651	0.6089699	0	4.7	N = 1288
Between		0.3640886	1.958974	3.32725	n = 34
Within		0.493088	-0.1693734	4.172151	T-bar = 37.8824
Aid%GDP*Policy					
Overall	32.48322	27.94486	0.0616629	220.38	N = 1268
Between		18.94724	1.010427	95.02294	n = 34
Within		20.83297	-44.6746	170.6848	T-bar = 37.2941
Aidsquare					
Overall	2.255988	5.320903	0	90.14749	N = 1339
Between		2.883731	0.0116879	15.26797	n = 34
Within		4.49804	-12.35998	87.07412	T-bar = 39.3824

Source: Generated by the authors from the STATA regression

From 1977 to 2018, on average, the countries' economies have grown approximately 3.73% with a standard deviation of 5.5%, and the countries have received, on average, 11.5% of their annual GDP with a standard deviation of 9.8%. Meanwhile, Rwanda received the maximum amount of aid (94.9% of its GDP) in 1994, during the Rwandan civil war. The aid-to-GDP ratio square is put in percentage terms, which is why [aid/GDP]2 is less than the aid/GDP ratio. Accordingly, the average CPIA score is 2.76 with a standard deviation of 0.6, which shows the institutional quality in the countries is not only minimal but also has a small variance across countries.

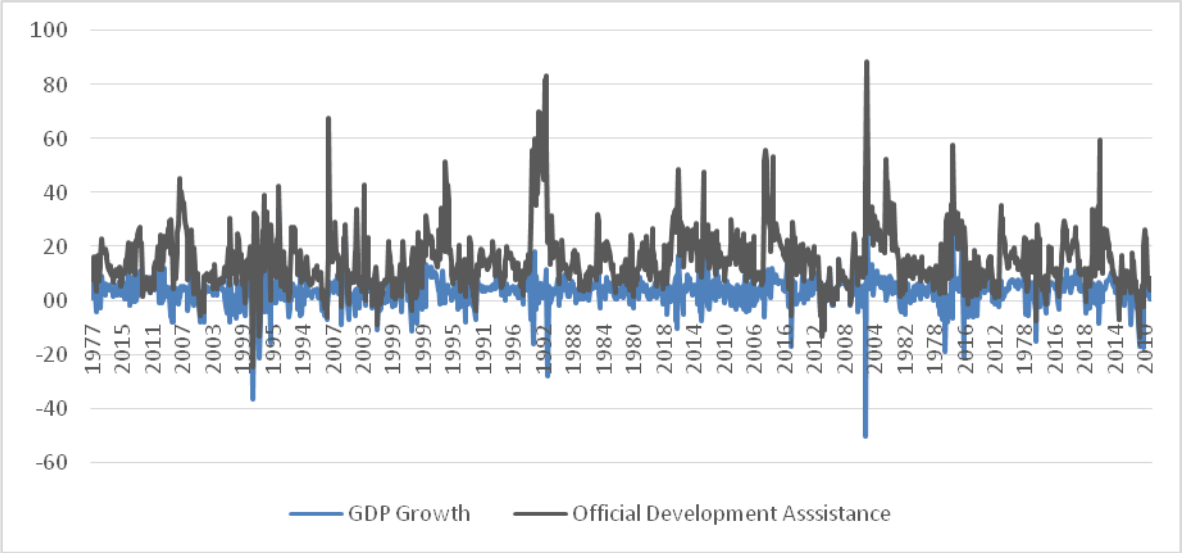

Fig 1. Economic growth rate official development assistance nexus

Source: Compiled by the authors based on data from the World Bank

As more ODA is mostly provided to countries when their macroeconomy is shrinking, the above figure shows an inverse relationship between economic growth and ODA. However, the inverse relation does not necessarily mean that aid perpetuates poor economic performance. Therefore, econometric regression is conducted to see the marginal effect of aiding in economic growth.

Table 3: Panel data regression result for scenario 1

	Model (a) *Fixed Effects*	*Model (b)* *Random Effects*	*Model (c)* *Pooled OLS Regression*
Log-Percapita income	4.695338***	2.681079***	2.061824***
	(0.8722562)	(0.674242)	(0.6147732)

Aid%GDP	0.0762874	0.0329496	0.0036943
	(0.0979159)	(0.0922556)	(0.0901829)
Policy (1-5 score)	0.5143068	0.7250106*	0.7410426**
	(0.4658801)	(0.0922556)	(0.3773848)
*Aid%GDP*policy*	0.0565622**	0.0577909**	.0608114**
	(0.0287271)	(0.0275642)	(0.0271664)
Aid-Square	-0.4155206***	-0.3716515***	-.3431252***
	(0.0735183)	(0.0680756)	(0.0658964)
Constant	-12.06332***	-6.867815***	-5.106133**
	(2.543373)	(2.132392)	(1.996703)
R-sq:			Adj R-sq= 0.0621
within	0.0760	0.0723	
between	0.0080	0.0644	
overall	0.0566	0.0652	
Prob > F	0.0000	0.0000	Prob > F= 0.0000
rho	0.06668349	0.0165656	

*** significant at α=1% ** significant at α=5% * significant at α=10%

The Hausman test (Ho: difference in coefficients is not systematic) is Prob>chi2 = 0.0049. The test shows that model (a) is consistent under Ho and Ha, but model (b) is inconsistent under Ha but efficient under Ho. Thus, model (a) qualifies the assumptions. Similarly, the Breusch and Pagan Lagrangian multiplier test is conducted to compare models (b) and (c). (Ho: Var(u) = 0); Prob > chibar2 = 0.0055. This shows that OLS should not be used. Thus, the fixed effects model is the best fit.

The policy implication is that the major explanatory variable, which is aid/GDP, is positively correlated with economic growth but not statistically significant. However, when aid is combined with policy, they have positively and significantly affected economic growth. Conversely, aid/GDP-square has negatively affected economic growth, which proves the diminishing returns of aid on economic growth and substantiates the claims of Burnside & Dollar (1997, 2000, 2004), Collier & Dollar (1999a, 1999b, 2002, 2004), and Beynon (2003). It is also called "aid fatigue."[***].

$$rGDP=-12+ 4.7logpci +0.076aid +0.51policy+0.057\ aid*policy- 0.42\ aid^2 \ldots\ldots\ldots\ldots\ldots\ldots\ldots(3)$$

[***]Aid fatigue, in this context, means that even if more aid is received, the intended development goal is hardly achieved. Then, aid loses public trust because it has been misused. The misuse might be inefficiency, ineffectiveness, looting, etc.

The statistically significant model explains nearly 5.7% of the total variation in economic growth, which appears to be small. However, the main intent is to show the direct and indirect effects of aid, growth, and policy interaction. The estimated marginal impact of aid on economic growth is presented as follows (besides seeing Equation 2).

G_a=0.076+ 2*0.056*P-0.41*A.....(4)

The Long-run marginal effect of aid on economic growth

As can be seen from the above equation, when the policy variable increases, economic growth also increases, but aid increases when economic growth decreases. Economic growth is also dependent on the amount of the intercept (in our case, 0.076). Using average data for policy (2.8) and the aid-to-growth ratio (11.5%), the overall long-run marginal impact of aid (Ga 1977–2018 = -4.38%) is calculated. The coefficient of aid without combining it with policy is 0.076. This means that aid and policy alone determine economic growth positively, but they are not statistically significant separately. However, their total marginal effect of aid declined after being combined with policy (i.e., -4.38 is less than 0.076). This leads to an important policy implication. According to the regression result, the magnitude of the aid/GDP ratio square outweighs itself due to diminishing returns to aid, which is termed aid fatigue and the Dutch disease. Moreover, it shares the arguments of development aid opponents like Easterly (2006) and Moyo (2010). To see the long-term and short-term marginal effects, Ga is calculated for the individual countries using the average of the variables.

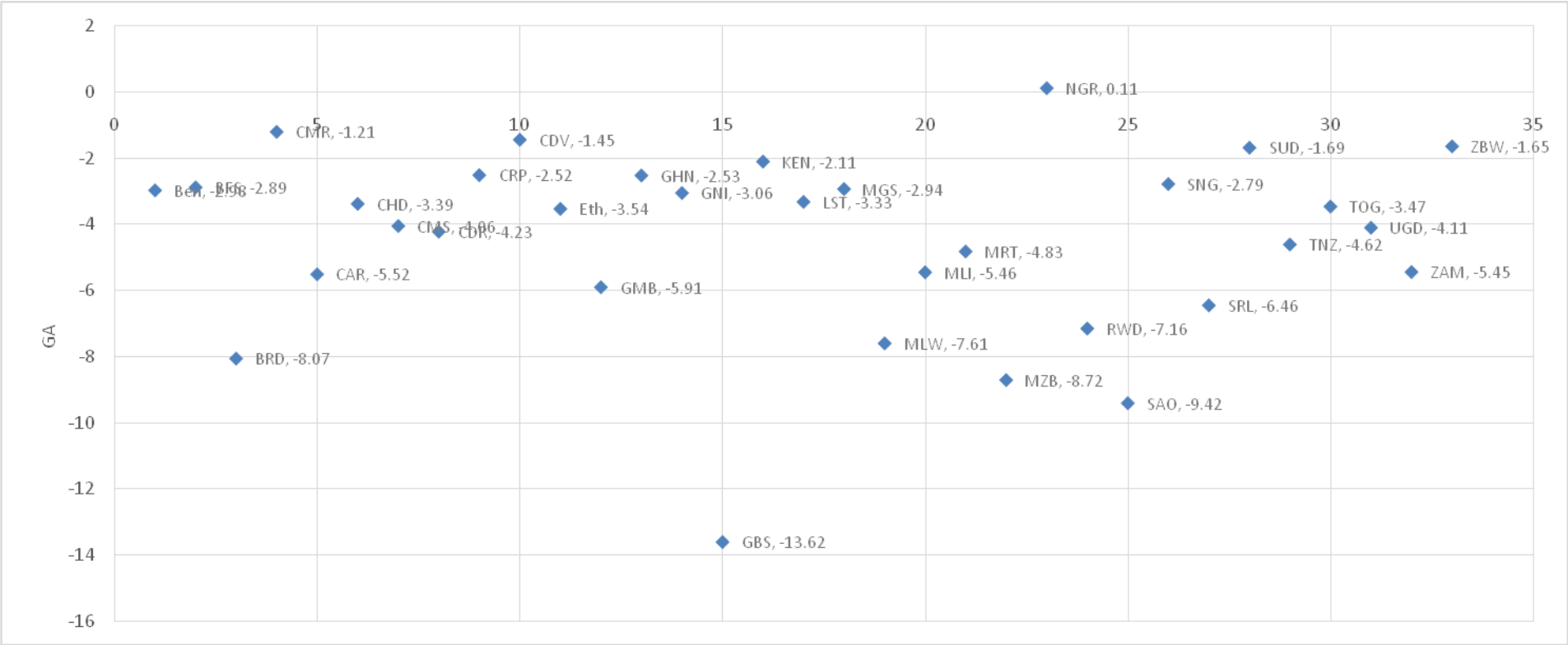

Figure 2: Marginal Economic Growth Due to Aid after Policy is induced in the Long-run (1977-2018)

Source: Calculated by the authors using Burside and Dollar (1997) Model and data from the World Bank. For the abbreviations (see Annex 2).

Accordingly, Nigeria is the only country out of the 34 in which marginal aid resulted in positive economic growth (see Figure 2).

The short-run marginal effect of aid on economic growth

Combined with the policy variable, the marginal impact of aid in the short-run is calculated from an OLS regression result using cross-sectional data for the 34 sampled countries for the year 2018. The estimated model is presented as follows:

$rGDP_{2018}$=-17.45+1.82logGDP_{2018}+0.62Aid_{2018}+5.62$Policy_{2018}$-0.14Aid*$Policy_{2018}$-.06Aid^2_{2018}..... (5)

Therefore, the marginal economic growth due to aid (after interacting with policy) can be calculated using the Burnside and Gold (1997, 2000)model.

$rGDP_{aid\ in2018}$=0.62-0.14policy-.12Aid .....(6)

The values are presented in figure (3).

Accordingly, in the short-run, ODA resulted in positive economic growth in five countries, namely the Congo Democratic Republic, the Republic of the Congo, Nigeria, Gambia, and Zimbabwe. In the other countries, the total effect of aid after interacting with policy is found to be negative (see Figure 4). The model indicates that it needs further country-specific investigation as to why aid and policy interactions ended up in the black box in the panel data regression. For instance, in 2018, the new president of Zimbabwe came up with a reform that has influenced the aid system, which may be the reason that the policy variable affected the best marginal impact of aid in the year. On the other hand, the marginal impact of aid on economic growth in Cameroon became devastating in 2018, perhaps due to the unlawful extension of incumbent president Paul Biya's regime, which resulted in political chaos. Due to the unrest, several Western countries (aid communities) issued travel warnings to their citizens. To this end, the following figure presents a comparison of the long-run and short-run marginal effects of aid on economic growth.

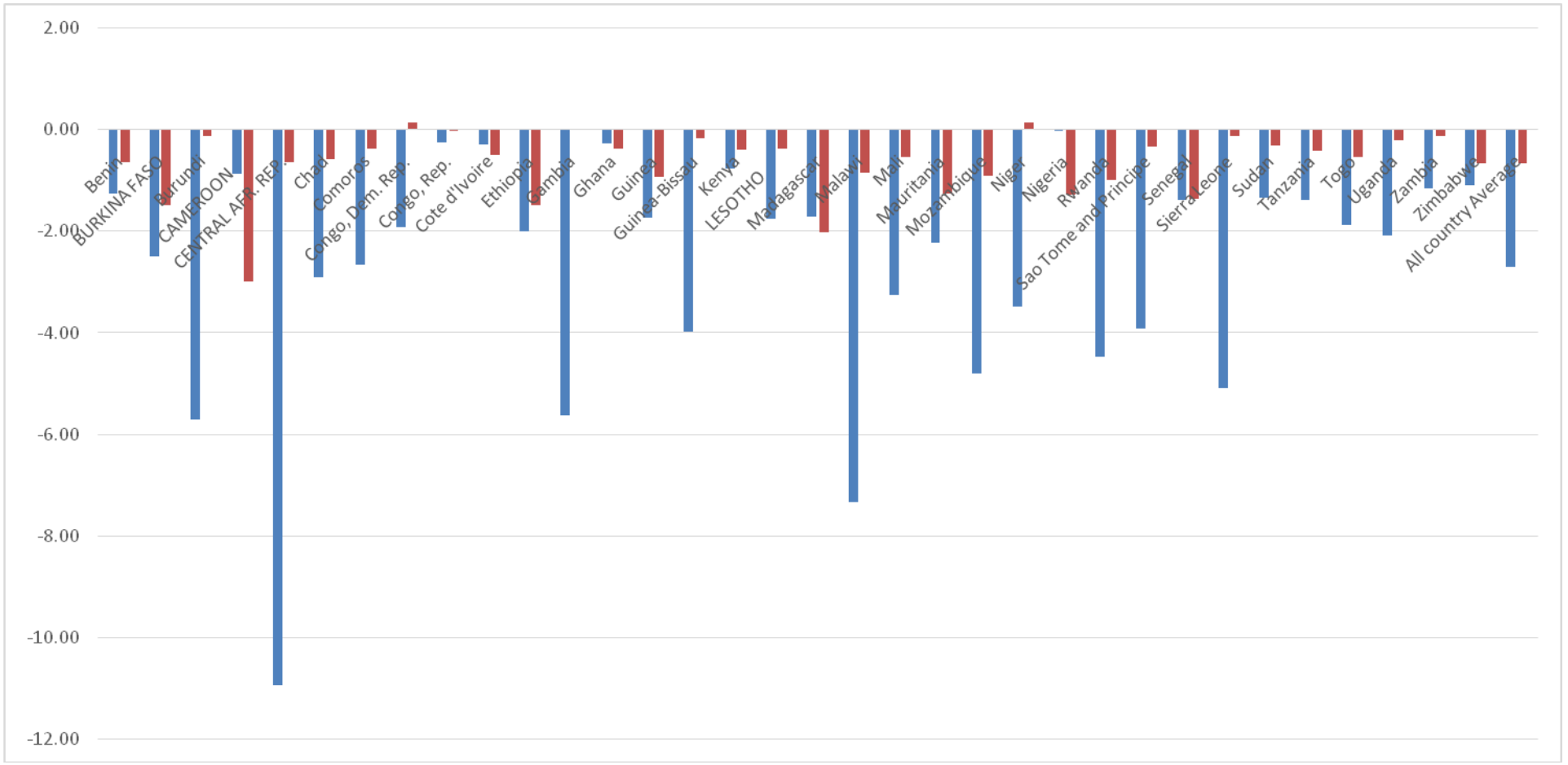

Figure 3: The short-run and long-run marginal effect of aid on economic growth

Source: Calculated by the authors using the World Bank Data

As the above figure reveals, except in a few countries, the marginal contribution of aid to economic growth is negative both in the short-run and the long-run. The implication is that the reforms in aid policy since 1977 have not had enough impact on the effectiveness of aid in its actual statistical sense. This conclusion is, however, reached by incorporating only aid, initial growth, and policy in the model and their mixes. However, in real life, aid effectiveness is affected by and affects several factors. Therefore, in scenario 2, we extend the analysis to other key variables.

Scenario 2: The effectiveness of aid in poverty reduction

Inclusive development is a pro-poor approach where "those who are left behind are reached first." Accordingly, inclusive development promotes economic growth in such a way that impoverished people are lifted out of poverty, thereby reducing income inequality (United Nations, 2016, p. 138). Likewise, the principle of "leave no one behind", as introduced by the United Nations, is primarily the fundamental principle of inclusive development, with poverty reduction as the major priority intervention area (Woldegiorgis, 2019a; United Nations, 2016; UNDP, 2018).

As shown in scenario 1, aid alone is not statistically significant, but when aid is multiplied by the vector of inclusive policies, together, they promote economic growth and, by implication, lift underprivileged people out of poverty. Bearing this in mind, we borrow the poverty-efficient aid allocation model articulated by Collier and Dollar (1999a, 1999b, 2002). The model has also been used by other researchers, such as Beynon (2003). The inner logic is linked to the inclusive development concept of the United Nations, viz., "reach those who are left behind first" and "leave no one behind." Those who are left behind are mainly those who are impoverished. Therefore, our objective function and constraint are presented as follows (*ibid*.). It is aimed at calculating the number of people lifted out of poverty and the sensitivity of the poverty response to an increase in income. Like the microeconomic theory of consumption, the objective function of the donors is presented as follows (Collier & Dollar, 1999a, 1999b, 2002; Beynon, 2003).

Maximise Poverty Reduction = G_i α_i h_i N_i……..……..……(7)

subject to Ai yi Ni = ∀, and Ai ≥ 0……..……..(8)

G is real per capita income growth (GNP, derived as a function of aid and policy), E is the elasticity of poverty reduction with respect to mean income, and h is a measure of poverty (e.g., the headcount index). N is population (so h*N = numbers of people below the poverty line), A is aid (as a percentage of GDP), y is per capita income, and ∀ is the total amount of aid available. The superscript 'i' refers to the corresponding country. The objective function stands for the number of people who are left out of poverty (i.e., the change in poverty). The first constraint is the amount of aid received. Just like the utility maximization function in microeconomic theory, the optimization concept is applied using the Lagrange function for aid optimization, as done by Beynon (2003, p. 38).

For aid to be optimally allocated, the slope of the objective function and the slope of the constraint should be equal for all countries. That is the first difference in the Lagrange function due to aid. This means Ga is used in place of Gi (see equation 2). To allocate the aid efficiently, the first difference of the objective function to aid divided by the first difference of the constraint due to aid should be a constant, that is, λ. Accordingly, the first difference in the objective function with respect to aid is Gai αi hi Ni

$$\frac{\partial(G1\ \alpha1h1\ N1)}{\partial A1}=\frac{\partial(G2\ \alpha2h2\ N2)}{\partial A2}=\frac{\partial(G3\alpha3h3\ N3)}{\partial A3}=\frac{\partial(Gn\alpha nhn\ Nn)}{\partial An}= Ga\ i\ \alpha i\ hi\ Ni \ldots\ldots\ldots(9)$$

Where i=1, 2, 3, …n

And the first difference of the constraint due to aid is hi Ni. Mathematically,

$$\frac{\partial(A1\,y1\ N1)}{\partial A1}=\frac{\partial(A2\,y2\ N2)}{\partial A2}=\frac{\partial(A3\,y3\ N3)}{\partial A3}=\frac{\partial(A1\,y1\ N1)}{\partial A1}\ldots\ldots\ldots(10)$$

The marginal cost of aid reduction across countries is equated at the points where the slope of the objective function and the budget constraint are constant (λ). Mathematically,

$$\frac{\frac{\partial(G_1\,\alpha_1h_1\ N_1)}{\partial A_1}}{\frac{\partial(A_1\,y_1\,N_1)}{\partial A_1}}=\frac{\frac{\partial(G_2\,\alpha_2h_2\ N_2)}{\partial A_2}}{\frac{\partial(A_2\,y_2\,N_2)}{\partial A_2}}=\frac{\frac{\partial(G_3\alpha_3h_3\ N_3)}{\partial A_3}}{\frac{\partial(A_3\,y_3\ N_3)}{\partial A_3}}\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\frac{\frac{\partial(Gn\alpha nhn\ Nn)}{\partial An}}{\frac{\partial(An\,yn\ Nn)}{\partial An}}=\frac{Ga\ i\ \alpha i\ hi\ Ni}{yi\ Ni}=\lambda\ldots\ldots(11)$$

From equation (7) and (8), derive

$G_ai\ \alpha i\ hi\ Ni = \lambda\ yi\ Ni$……………………………..……………………..……..……....(12)

From equation 10,

$G_a i = \frac{\lambda \, yi \, Ni}{\alpha i \, hi \, Ni}$……..…….…….……(13)

To derive the poverty-efficient level of aid (Ai) for each country, let us substitute equation 13 in equation 2 (i.e., $G_a = b3 + 2b_4A + b5P$)

$$\frac{\lambda \, yi \, Ni}{\alpha i \, hi \, Ni} = b3 + 2b4A + b5P \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (14)$$

Ai = 1/(2b4) * [-b3 - b5Pi + [(λ yi) / (αi hi)]]……(15)

Accordingly, the poverty-efficient level of aid could be calculated for each country.

Poverty elasticity

According to Baynon (2003, p. 37) and Collier-Dollar (1999, p. 13), Ravallion and Chen (1997) calculated the elasticity of headcount poverty using the following formula for a broad sample of countries: Our work does not aim to explain the statistical justification in depth.

$\alpha_{pg} = / \frac{pg-h}{pg} /$……(16)

Where pg represents the poverty gap ratio, and h represents the poverty headcount ratio. According to the World Bank database, the poverty gap (pg) at $1.90 a day (2011 PPP) is the mean shortfall in income or consumption from the poverty line at $1.90 a day (counting the non-poor as having a zero shortfall), expressed as a percentage of the poverty line. It reflects the depth of poverty. Whereas the national poverty headcount ratio (h) is the percentage of the population living below the national poverty line, Collier and Dollar (1999) adopted a constant of 2 (i.e., =2). Accordingly, the calculated results for the selected countries are presented as follows (see the results in Annex 2).

Elasticity of poverty due to aid income

Collier and Dollar (1999) comprehend the marginal efficiency of aid in each country (λi)as the number of people effectively lifted out of poverty by an extra $1m of aid.

λi = Gai αi (hi /yi) = (b3 + 2b4Ai + b5Pi) αi (hi /yi)…….. (17)

The inverse of λi is the marginal cost of poverty reduction, i.e., the cost per person lifted out of poverty (*ibid*.). A weighted average marginal efficiency (ME) can be calculated for all aid or for

each donor by taking the weighted average of these λi marginal effects (weighted by the amount of aid given in aggregate or by each donor to each country).

Scenario 3: Nexus between aid and inclusive development

This section presents the statistical relationship between aid and inclusive development. The types of variables used in the regression, the data source, and the expected sign (null hypothesis) are summarized as follows: The null hypotheses are based on the literature presented in this paper.

Table 3: Definition of regression variables and hypothesis (expected signs)

Variables	**Proxy**	**Type of Variable**	**Expected Sign**	**Data Source**
Inclusive development	Inclusive development index	Dependent		Modeled by the authors*
Aid (i.e. ODA)	Aid%GDP	Major	Positive or Negative	World Development Indicators
Policy	Policy (1-5 score) of (CPIA)	Major	Positive	World Bank and AfDB
Export	Export%GDP	Control	Positive	World Development Indicators
FDI	FDI%GDP	Control	Positive	World Development Indicators
CO_2	CO_2%GDP	Control	Negative	World Development Indicators
Change in Aid Structure	Dummy MDGs&SDGs†	Control	Positive	Modeled by the Authors
Population	LogPopulation	Control	Negative	World Development Indicators
Technology	Mobile cellular subscriptions (per 100 people)	Control	Positive	World Development Indicators

* See Woldegiorgis (2020a).

†As the Millennium Development Goals (MDGs) and Sustainable Goals (SDGs) have been implemented since 2000, dummy=1 and 0 if the time is from 1990 to 1999. The intention is to capture the effect of structure change in aid.

Gross Capital Formation	Gross Capital Formation%GDP	Control	Positive	World Development Indicators

Table 4: Self-explanatory descriptive statistics summary scenario 3

Variable	Mean	Std. Dev.	Min	Max	Observations
Id (Country)					
Overall	17.43814	9.834691	1	34	N = 970
Time (year)					
overall	2004.168	8.325524	1990	2018	N = 970
Inclusive Dev't Index (%)					
overall	37.45874	19.29082	6.355233	127.7184	N = 970
between		14.61272	16.30942	74.43446	n = 34
within		12.97188	3.491859	102.2352	T-bar = 28.5294
Aid%GDP					
overall	11.40519	9.782917	0.2399652	94.94604	N = 954
between		6.543228	0.7904772	27.44525	n = 34
within		7.390806	-7.965374	84.9434	T-bar = 28.0588
Policy (1-5 score)					
overall	2.636823	0.7809961	0	4.2	N = 970
between		0.3695201	1.674247	3.142313	n = 34
within		0.6901794	-0.5054899	4.146352	T-bar = 28.5294
Export%GDP					
overall	23.99594	13.79685	3.335026	97.82387	N = 908
between		12.44648	7.979441	72.9594	n = 33
within		6.651835	-8.271362	60.77277	T-bar = 27.5152
FDI%GDP					
overall	3.074855	5.330651	-8.70307	49.99791	N = 963
between		2.761302	0.4029451	12.07262	n = 34
within		4.673198	-15.30089	44.15789	T-bar = 28.3235
CO_2 %GDP					
overall	0.1511053	0.1348878	0.0047239	1.063928	N = 903
between		0.1246239	0.0553222	0.6696255	n = 34
within		0.0539652	-0.1500941	0.5454073	T = 26.5588
Dummy MDGs&SDGS					

overall	0.6319588	0.4825214	0	1	N = 970
between		0.0667407	0.6206897	1	n = 34
within		0.4795594	-.0880412	1.011269	T-bar = 28.5294
LogPopulation					
overall	6.989227	0.5610828	5.160634	8.291979	N = 970
between		0.5886571	5.245518	8.133367	n = 34
within		0.0968662	6.772163	7.218712	T-bar = 28.5294
Technology					
overall	31.55488	34.7552	0.0006089	139.529	N = 766
between		11.97728	11.88389	59.47923	n = 34
within		32.74433	-27.34265	124.9718	T-bar = 22.5294
Gross Capital Formation overall	10.81617	13.21197	-48.50795	64.92741	N = 909
between		11.03829	-6.135799	44.99956	n = 33
within		8.141487	-42.2149	53.32446	T-bar = 27.5455
Aid%GDP Square					
overall	221.9609	541.4118	0	9014.749	N = 970
between		262.2809	1.665109	1154.317	n = 34
within		477.1186	-867.1557	8521.908	T-bar = 28.5294

Table 5: Panel data regression table, 1990-2018

	Model 1 *Fixed Effects*	*Model 2* *Random Effects*	*Model 3* *Pooled OLS*
Aid%GDP	-0.6257476***	-0.6958439***	-.3797903*
	(0.1249211)	(0.1237265)	(0.1996282)
Policy (1-5 Score)	0.2110287	0.2961795	3.004661***
	(0.4212474)	(0.4234374)	(0.74826)
Export&GDP	0.0230917	0.0682846	.1670526***
	(0.0506663)	(0.0491072)	(.0548119)
FDI%GDP	0.0503462	0.0579338	-.0376851
	(0.0569506)	(0.0572254)	(.105716)
CO_2%GDP	-31.18179***	-24.55185***	-25.19452***
	(8.672901)	(8.099952)	(6.642421)
Dummy MDGs&SDGs	2.260575**	4.534185***	2.505263*
	(1.020386)	(0.7953772)	(1.468103)

(2000-2018)			
LogPopulation	30.60724***	-0.5233171	-7.501186***
	(9.496997)	(4.107288)	(1.26711)
Technology	0.1833256***	0.2321583***	.2894512***
	(0.0177755)	(0.0119391)	(.0196003)
Gross Capital Formation%GDP	0.1859511***	0.1988549***	.3667798***
	(0.0402922)	(0.0402533)	(.0619046)
Aid%GDP-Square	0.0104461***	0.0111438***	.0021108
	(0.0027257)	(0.0027307)	(.0050119)
Constant	-179.1538***	36.08949	72.3953***
	(65.88793)	(28.65275)	(9.54819)
R-sq:			Adj R-sq= 0.4919
within	0.6979	0.6922	
between	0.0001	0.4234	
overall	0.0538	0.4392	
Prob > chi2	0.0000	0.0000	Prob > F= 0.0000
Rho	0.934	0.813	

Post estimation tests

To contrast models 1 and 2, the Hausman test is conducted. The test shows that Model 1 is consistent under Ho and Ha, as it is obtained from the panel data regression. Whereas model 1 is inconsistent under Ha but efficient under Ho,the Hausman test for the null hypothesis (Ho: difference in coefficients not systematic) shows that Prob>chi2 = 0.2446, which means one can safely reject the null hypothesis. Therefore, the random effects model could be used to fit the regression model. To compare Models 2 and 3, the Breusch-Pagan LM Test is conducted. The null hypothesis (H0: Var(u) = 0) could be rejected (prob > chibar2 = 0.0000). Therefore, pooled OLS cannot be used; a random effects model fits best. The multicollinearity effect is also already checked.

Accordingly, the random effects model shows that the major variable, ODA as a percentage of GDP, negatively affects inclusive development. Regarding the control variables, for instance,

when the aid to GDP ratio is squared, it has a statistically significant positive effect on inclusion. This has fascinating policy implications. If aid is significantly increased, it would improve inclusive development. By the same analogy, if ODA is ineffective in providing inclusive development, it is because it is so small. In scenario 1, aid has diminishing returns on economic growth. However, inclusive development has increasing returns. This shows that economic growth should not be equated with development.

Moreover, quality policy positively affects inclusion. Similarly, FDI, exports, gross capital formation, and technology are positively correlated with inclusive development. On the contrary, carbon emissions and the total number of populations have negatively affected inclusive development. In the random effect model, the specified model explains a significant part of the overall variation (rho = 0.813).

Conclusion

The aid effectiveness thesis and antithesis are open-ended, as the available literature alleges a positive, negative, or zero correlation between international development aid and economic growth. The current paper underscores that the divergence in statistical findings has different root causes.For instance, aid effectiveness inferences may depend on ideological affiliation. Moreover, the statistical findings may not give a full picture of aid effectiveness as they are vulnerable to not only biasness but also lack transparency on the strategic appraisal variables.On the other hand, the benefits and drawbacks may also differ from national interests and project to project. Furthermore, aid may have different long- and short-term consequences. Aggregation of aid effectiveness at national and regional levels might also be misleading. This paper shows that development aid can be targeted towards human development, technology, environment, demographic change, good governance, trade, and economic equity so that the aid can effectively hit its goals.

Policy implication

Along with the prevailing institutional inefficiencies, the effect of international aid on economic growth, poverty reduction, and inclusive development has a bad track record in the long-run in most of the sampled countries. However, caution must be taken to ensure that this conclusion is reached based on the current statistical package. In a real-life situation, aid has potential virtuous

and vicious effects for donor and recipient countries (see Table 1). Assessment of the net effect of aid on inclusive development is still open-ended for further contextual study, especially at the microlevel, as putting all aid in one basket might deter the appraisal because some aid projects may have success stories but others may not. In other words, measuring effectiveness after aggregating all aid money into one basket may mislead policymakers. Moreover, good policy affects inclusion positively. Similarly, FDI, exports, gross capital formation, and technology are positively correlated with inclusive development. On the contrary, carbon emissions and the total number of populations have negatively affected inclusive development. In the random effect model, the specified model explains a significant part of the overall variation (rho = 0.813).

The current aid data may have helped with the bookkeeping and balance of payments analysis. Nevertheless, to ease aid effectiveness metrics and make an impactful intervention, the aid data management system, structures, and institutions need further reform. The aid data should transparently illustrate, inter alia, the amount of jobs created, health improved, children educated, households food secured, infrastructure built, entrepreneurs empowered, technology transferred, policies reformed, industries transformed, etc. Moreover, aid effectiveness should be gauged from both the recipient's and donor's points of view; donor interest is most often a black box. As institutions are often abstract and contextual, the CPIA and inclusive development index are worthwhile to start with in institutional reform measures. Given all the limitations the statistical analyses in this paper show that development aid should have strategic crosscutting focus areas including human development, technology, environment, demographic change, good governance, trade and economic equity.

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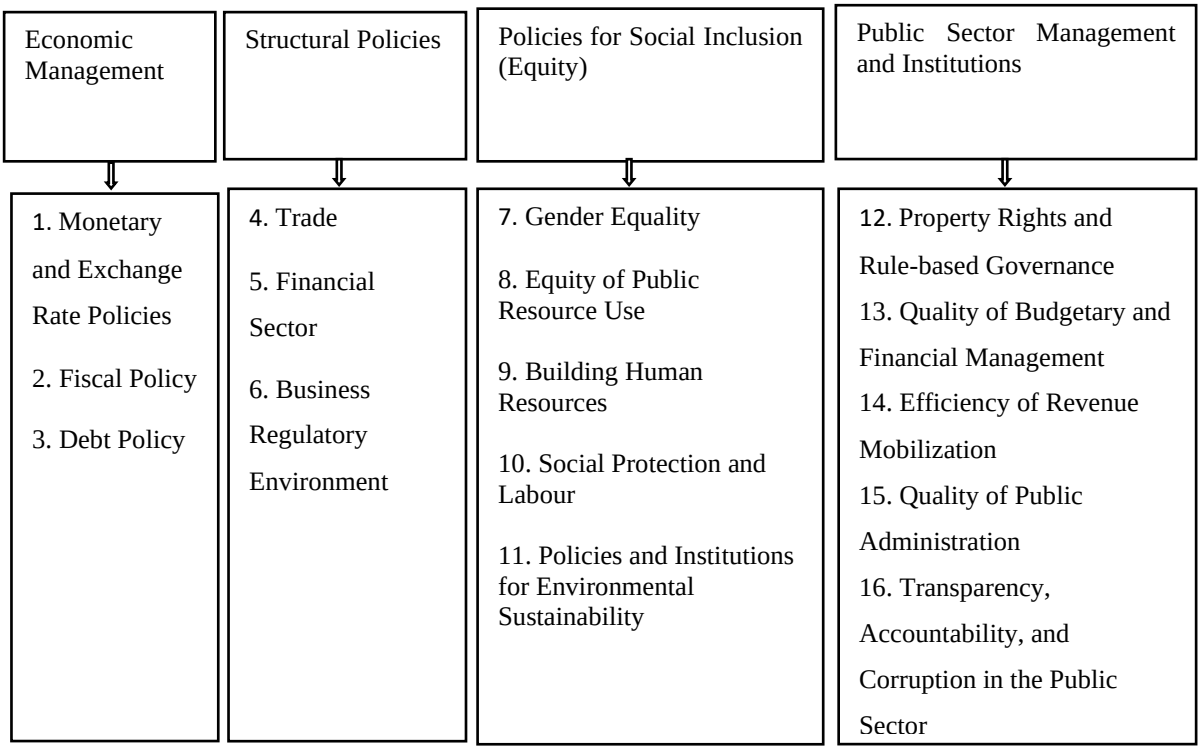
Annex 1: Country Policy and Institutional Assessment 2017 Criteria



Source: Compiled by the authorsbased on the World Bank Group (2018)

Annex 2: Poverty Elasticity /α/

Country	Abbreviation	Most recent year	Poverty Head Count Ration (% of pop)	Most recent year	Poverty gap at $1.90 a day (2011 PPP) (%)	α	Poverty Elasticity /α/
Benin	BEN	2019	38.5	2015	22.4	-0.719	0.72
Burkina Faso	BFA	2018	41.5	2014	11.2	-2.705	2.71
Burundi	BDI	2013	64.9	2013	31.1	-1.087	1.09
Cameroon	CMR	2013	37.5	2014	8.4	-3.464	3.46
Central Africa Republic	CAF	2008	62	2008	32.8	-0.890	0.89

Chad	CHD	2018	42.3	2011	15.2	-1.783	1.78
Comoros	COM	2018	42.4	2014	6.8	-5.235	5.24
Congo, Dem. Rep.	COD	2012	63.9	2012	39.3	-0.626	0.63
Congo, Rep.	COG	2011	40.9	2011	15.4	-1.656	1.66
Cote d'Ivoire	CDV	2018	39.5	2018	0.6	-64.833	64.83
Ethiopia	ETH	2015	23.5	2015	9.4	-1.500	1.50
Gambia	GMB	2015	48.6	2015	2.3	-20.130	20.13
Ghana	GHA	2016	23.4	2016	4.6	-4.087	4.09
Guinea	GIN	2018	43.7	2012	10.6	-3.123	3.12
Guinea-Bissau	GNB	2010	69.3	2010	32	-1.166	1.17
Kenya	KEN	2015	36.1	2015	11.7	-2.085	2.09
Lesotho	LSO	2017	49.7	2017	9.6	-4.177	4.18
Madagascar	MDG	2012	70.7	2012	38.7	-0.827	0.83
Malawi	MWI	2016	51.5	2016	29.8	-0.728	0.73
Mali	MAIL	2019	42.1	2009	15.8	-1.665	1.66
Mauritania	MRT	2014	31	2014	1.4	-21.143	21.14
Mozambique	MOZ	2014	46.1	2014	28.6	-0.612	0.61
Niger	NER	2018	40.8	2014	13.7	-1.978	1.98
Nigeria	NGR	2018	40.1	2018	12.5	-2.208	2.21
Rwanda	RWD	2016	38.2	2016	20.9	-0.828	0.83
Sao Tome and Principe	STP	2017	66.7	2017	13.1	-4.092	4.09
Senegal	SEN	2011	46.7	2011	13.1	-2.565	2.56
Sierra Leone	SLE	2018	56.8	2018	11.7	-3.855	3.85
Sudan	SDN	2009	46.5	2014	2.8	-15.607	15.61
Tanzania	TZA	2018	26.4	2017	15.9	-0.660	0.66
Togo	TGO	2015	55.1	2015	20.7	-1.662	1.66
Uganda	UGA	2016	21.4	2016	13.1	-0.634	0.63
Zambia	ZAM	2015	54.4	2015	30.7	-0.772	0.77
Zimbabwe	ZBW	2019	38.3	2017	9.3	-3.118	3.12

Source: α is calculated by the authors after compiling information from the World Bank Database (Accessed: 14 Oct. 2020)