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The Effect of Official Development Assistance on Inclusive Development: Evidence for Sub-Sahara Africa

Mesfin Mulugeta Woldegiorgis[1]

ABSTRACT

The effect of international aid on the economic development of recipient countries has not been conclusive, nor is aid effectiveness metrics simple and robust. This paper scrutinizes the nexus of official development assistance (ODA) and inclusive development. The data covers 34 African countries for the period 1991 to 2018. The simple OLS regression shows a negative association between ODA and inclusive development. Numerous researchers have claimed the same thing about the relationship between foreign aid and economic growth. However, paper statistically proves that the negative association between ODA and inclusive development is due to an omitted variable. Accordingly, this paper's unique addition is that it uses the instrumental variable in the two-stage linear square (2SLS) regression model and claims that ODA is a statistically significant positive determinant of inclusive development and ODA should be channelled to climate change, demographic pressure, and CPIA.

Keywords: Impact of foreign assistance, Dutch disease, Inclusiveness, Aid fatigue
JEL Classification: F35, F59, O20, P45

1. Introduction

The effect of official development aid (ODA) on the development of recipient countries is cynical because the existing empirical literature has come up with inconclusive inferences. Basically, charity in the sense of altruism have been considered to be sacred action in different religions. For example, "Zakat/Zakah/" is an Islamic charity which is considered to be obligatory as a "third pillar of Islam." The aim is to help the needy and self-purification by promoting "tranquillity, security, and harmony" (Al-Faizin et al. 2018, p.117). Hassan et al. (2022, p.101) empirically proves that Islamic finance which forgoes interest and adheres to the Islamic law or Sharia has a strong positive relationship with economic growth. Similarly, the World Bank claims that "money matters" and "aid can be the mid-wife of good policies" (World Bank, 1998, pp.14–96). Freytag and Heckelman (2012) are also in accordance with the World Bank's conclusion, by empirically showing that ODA can improve the quality of governance institutions. Correspondingly, a strand of the literature argues that foreign aid "can" foster economic growth and reduce poverty in recipient countries. For example, the "Gap Model" proponents underscore that developing countries have saving-investment, foreign exchange, and adaptive capability "gaps". Thus, aid helps narrow the gap (Chenery & Stout, 1966; Fei & Paauw, 1965; Quibria, 1988).

There is dearth of empirical literature in the area of inclusive development and development aid nexus because the available empirical literature often iterates the relationship between development aid and economic growth. Inclusive development basically deals with how to promote economic equity, social justice and enhance capability of poor people (Sen 1981, 1999;

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Woldegiorgis, 2022a). Furthermore, hitherto statistical inferences have been relied on the direct effect of aid on economic growth. However, the indirect effect of aid on inclusive development is extremely important because development aid has often been offered when recipient countries' macroeconomies are at risk. Thus, aid can statistically show a negative correlation with the economic growth rate. Unless the indirect effect and time lag of aid are analysed, such a statistical inference might be misleading because it does not really mean that aid affects growth negatively. This motivates the current research.

The aim of this paper is to find the indirect effect of aid on inclusive development. Accordingly, it answers the questions: How does ODA affects inclusive development?" What should be the priority areas of development aid in Africa? The instrumental variable in two-stage linear square (2SLS) regression helps find the instruments thereby the indirect effect of ODA. Thus, after strategically organizing the available literature, the paper answers two timely research questions based on empirical analysis. Once the instruments are identified and statistically proven, the aid community can have a clear picture of the aid-inclusiveness nexus in African countries and identify the priority areas. This makes the research enormously significant in adding value to the existing knowledge.

To this end, the remainder of the paper is organized as follows: After presenting a review of the theoretical and empirical aid effectiveness literature, the core hypotheses were drawn. Then, the data source and method of analyses are introduced before the presentation of empirical results. Finally, conclusions round off the paper.

2. Literature Review

One of the most common theoretical underpinnings of international aid is the dual gap model of Chenery and Stout (1966), which argues that developing countries have both a domestic saving gap and a foreign exchange gap. Therefore, the nations require international aid. A domestic saving gap exists when a government is spending more than what is saved domestically. Likewise, the foreign exchange gap prevails when countries are facing a hard currency scarcity because of the shallowness of exports compared to import demand. Later, the "gap model" has also been extended to include the technical expertise gap, which is also called the "adaptive capacity approach." It claims that initially developing countries have a deficiency of capacity to make use of technological and capital resources. Thus, they need technical aid. The gap model is based on the Harrod-Domar tradition (Taylor, 1994). Likewise, there are authors who underscore that given the diminishing marginal returns of aid, international aid is imperative and can effectively address poverty reduction if good governance institutions are in place (Burnside & Dollar, 2000; Dollar & Collier, 1999; Beynon, 2003).

Doucouliagos & Paldam (2008, 2009) comprehensively compiled a survey of "aid effectiveness literature (AEL)" and clustered them into three groups: claiming positive, negative, and conditional effects of aid on economic growth. They corroborate that the empirical results are "significantly asymmetric" and the disparity between the empirical findings is attributed to the publication outlet, institutional affiliation, data, and model specification differences. However, their final inference states that ODA, on average, has been ineffective.

However, the surveys conducted by Doucouliagos & Paldam cover only the researches that are conducted until the year 2004/2005. Therefore, in the current paper, to avoid duplication of effort, the empirical literature review predominantly focuses on the post-2005 literature and the African context. Accordingly, in this paper the empirical literature is clustered into four factions. The first group of literature claims a positive correlation between ODA and economic growth. In this faction, proponents claim that international aid has been too small. Thus, a large

increase in aid, is supposed to foster economic growth, reduce poverty and augment development (Sachs 2005). This argument favours the big push theory. In fact, the researches endorse that the current aid structure needs reform in such a way that it enhances a technical transformation, human capital, infrastructure, and reduction of income inequality on a larger scale (ibid.; Collier and Hoeffler, 2007, p.100; Gomanee et al., 2005; Osei et al., 2005; Adekunle et al., 2019; Riddell and Nio-Zaraza, 2015).

Conversely, other researchers claim that development aid perpetuates poverty, creates dependency, fosters corruption, manipulates local currency, undermines rule of law and democracy, impairs entrepreneurship, and encourages inflation (e.g., Easterly, 2006, Moyo, 2009; Drometer, 2018; Kalyvitis & Vlachaki, 2012; Doucouliagos & Paldam, 2008). Similarly, Prokopijevi (2007, p.29) claims that "aid is not only ineffective; it is arguably counterproductive." They also claim ODA causes "Dutch disease."[2] According to these arguments, only humanitarian aid is relevant and ethically justified, whereas regular development aid should be phased out through time.

Third group claims aid and economic growth might have a zero-correlation coefficient (Doucouliagos & Paldam, 2008, p.1) or a complex and random effect (Edwards, 2014b; Banerjee & Duflo 2011). The proponents underscore that the antagonistic discourse favouring "aid perpetuates poverty" or "aid fosters economic growth" cannot be justified by using aggregate data and cross-country regressions for the fact that some aid programmes have failure stories and others have success. For example, a time series data analysis of aid in Uganda indicates that project and food aid reduce public investment, whereas programme aid and technical assistance increase public investment on infrastructure (Mavrotas, 2005). Likewise, in the study of 98 ODA recipient countries, Yiew & Lau (2018, p.21) found a U-shaped relationship between foreign aid and economic growth. There are more complexities. For example, a panel data analysis of 42 Sub-Saharan African countries for the years 1980–2007 finds that there is no substantiation for the (conditional or unconditional) effectiveness of aid. Accordingly, both bilateral and multilateral aid, even with good policies, does not consistently result in good outcomes (Wako, 2011).

The last group of literature claims that minimal standard of institutional quality is necessary for international aid to be effective (Hansen and Tarp, 2001; Burnside & Dollar, 1997, 2000; Dollar & Collier, 1999; Tang and Bundhoo, 2017; Asongu, 2013). Lan et al. (2022) also claim that without quality institution, foreign aid has controversial relationship with growth promoting activities, such as foreign direct investment (FDI). Regarding the institutions, most of the studies refer to the World Bank indicators, namely rule of law, regulation quality, government effectiveness, democracy, voice and accountability, control of corruption, and political stability, which inter alia significantly affect aid effectiveness. Freytag and Heckelman (2012) underscore that aid has significantly contributed to certain components of the democracy score, namely civil society, the electoral process, the judicial framework, and media independence. Similarly, it is also claimed that under a good policy environment characterized by relatively low inflation, high trade openness, and a low budget deficit, development aid can be effective (Alia & Anago, 2014).

However, even the third strand of literature is not critics free. For example, the empirical analysis of data covering the years between 1967 and 2002 from 64 aid-recipient countries finds that aid flows reduce the likelihood of observing a democratic regime in a recipient country by

[2] Rajan and Subramanian (2011) explain that an increase in aid increases the stock of foreign exchange and thereby leads to a nation's currency appreciating, resulting in the nation's exports becoming more expensive for other countries to buy but imports becoming cheaper, making the sectors less competitive (Rajan and Subramanian, 2011).

adversely affecting economic and social conditions. The authors claim that the ineffectiveness is worse when aid flows are conditional on the implementation of liberalization of trade, finance, and investment, as recommended by donors during structural adjustment programs (Kalyvitis & Vlachaki, 2012), Likewise, it is argued that if aid is used for debt financing, it may have an extremely adverse effect on economic growth (Quartey, 2005). The above controversial literature inspires the current paper. Before extending the above discourse into inclusive development and development aid nexus, it is imperative to understand inclusive development.

According to Rauniyar and Kanbur (2009, p.3), "there is no universally agreed definition of inclusive development." The concept, however, is understood to refer to growth coupled with equal opportunities. According to the entitlement theory of Amartya Sen (1981, 1999), inclusive development can be understood as a concept in which a basic necessity is the right of all human beings. Likewise, according to the notion of inclusive economic and political institutions by Acemoglu and Robinson (2012) and open-access orders of North et al. (2009), an inclusive development approach is a holistic approach in which all people have free access and opportunity to exercise their freedom, use their capability, and own wealth without being subjugated. It is a human-centred and alue-based development approach in which those who are left behind are reached first (UN, 2016; UNDP, 2018; Woldegiorgis, 2020a; Dörffel & Schumann, 2020). Woldegiorgis (2022a and 2022b) underscores the theoretical significance of social justice theory in the discourse of inclusive development.

However, there is only a very limited literature that investigates the empirical evidence for drivers of inclusiveness. Dörffel et al. (2020) as well as Dörffel and Schuhmann (2022) analyse the drivers of inclusiveness and come to the conclusion that inflation affects inclusiveness negatively, whereas trade openness is a positive driver. Woldegiorgis (2022a) proves that social protection and income inequality drive inclusive development positively and negatively, respectively and Woldegiorgis, 2022b proves that hierarchical social structures restrain inclusiveness development.

To this end, given the controversies, the majority of literature has highlighted that institutional quality is crucial to aid effectiveness. One potential reason for the negative ODA-GDP nexus proponents might be ignoring the indirect effect of ODA on inclusive development. However, in both cases a statistical proof is crucial, especially, for the case of inclusive development. That is why the following hypotheses are drawn.

Thus, the first hypothesis is:

H1: *The effect of ODA on inclusive development is dependent on the institutional setting in the recipient country.*

The second hypothesis is:

H2: *The negative correlation of ODA on inclusive development is due to omitted variables.*

3. Data and Methodology

3.1. Data Source

Multidimensional inclusive development has no single indicator. It is often expressed as a composite index (WEF, 2017; Woldegiorgis, 2020a; Dörffel & Schuhmann 2022). The WEF has been producing an inclusive development index since 2017. However, the forum does not offer time series data for period of 1990 to 2018. Therefore, by following the WEF (2017), Dörffel & Schuhmann (2022) came up with a multi-dimensional index (MDI) of inclusive development, which is used as a dependent variable in the panel data regression of this paper.

Likewise, there is no single estimator of governance institution and inclusive policy. Thus, with minor customization of scaling, the Country Policy and Institutional Assessment (CPIA) index is used as a proxy for institutional quality and policy. Since 1977, the index has been reported by the World Bank, in fact, by incorporating only 34 African countries. Therefore, the analyses in the current paper is confined to the 34 countries. For the period of 1990 to 2018, the panel data on policy variables is drawn from the World Bank and African Development Bank databases. Apart from the above variables, the econometric analysis encompasses the following variables: Total population size, net inflows of FDI (% of GDP), CO2 emissions (kg per PPP $ of GDP), technology adoption rate as proxied by mobile cellular subscriptions (per 100 people), government spending (% of GDP), urbanization rate (% of total population), and industrial employment rate (% of total employment). The data is extracted from the world development indicators.

3.2. Method of Analysis

In the empirical analyses section both descriptive statistics and econometrics are conducted. Particularly, instrumental variable in two-stage linear square (2SLS) regression model was used. In the regression, the dummy variable was used to find out the effect of aid policy structural break for millennium and sustainable development goals (1990-1999 = 0; 2000-2018 = 1). Finally, to control for time lag and stationarity, every four-year clustered data was used (e.g., 1990, 1994, 1998,…, 2018). The descriptive and econometric analyses of the four-year clustered dataset were conducted by using STATA 14 software. Temple (2010) underscores that to test if there are diminishing returns to aid, the dependent variable, MDI in this case, should be modelled as a quadratic function of ODA relative to gross national income.[3] Accordingly, the instrumented ODA relative to GNI was squared in model 4 (see table 6).

[3] Diminishing returns to aid hypothesis or aid fatigue hypothesis claims that as more and more aid is given to a recipient, it becomes difficult to manage the aid and achieve positive outcome. For example, Temple (2010) claims that because of the diminishing returns to aid, the effect of aid on economic growth is nonlinear in the sense that when aid is initially offered, it is promotes economic growth but after more and more aid is offered economic growth starts to diminish.

Table 1: Description of Variables that are Incorporated in the Model Specifications

Variable	Proxy	Acronym	Obs	Mean	Std. Dev.	Min	Max
Country	Country ID		34			1	34
Time	Year (1990-2018)		29			1990	2018
Inclusive development	Multidimensional inclusive development index	MDI	268	27.13529	14.52671	4.897427	91.22741
Foreign assistance for development	Official Development Assistance (ODA) as a percentage of gross national income (GNI)	ODA%GNIhat	264	11.85316	10.95762	0.3354861	94.94604
Cumulative foreign aid	Every four years cumulative ODA % GNI	4yrsCumODAhat	229	44.70216	34.41282	1.112532	220.5959
Interaction variable 1: foreign aid square	Official Development Assistance (ODA) % [i.e. $(ODA\%GNI)^2$]	logaidhatsqu	264	260.1119	749.0214	0.1125509	9014.749
Interaction variable 2: foreign aid and policy/institutions/	Interaction Variable ODA%GNI multiplied by CPIA [i.e. (ODA%GNI) * (Policy & institution)]	ODAhat*policy	262	32.73187	28.72039	0.7478544	220.38
Policy/institutions/	Country Policy and Institutional Assessment (CPIA) index	CPIA	266	55.1023	10.63762	20	84
Foreign direct investment	Foreign direct investment, net inflows (% of GDP)	FDI%GDP	265	3.009349	5.350724	-8.70307	46.4937
Environmental pollution	CO2 emissions (kg per PPP $ of GDP)	CO2perGDP	234	0.1547232	0.1422453	0.0312058	1.063928
Technology adoption	Mobile cellular subscriptions (per 100 people)	technology	201	34.44467	36.16831	0.0011582	139.529
Government expense	Government expenditure as a % GDP	GovtExp%GDP	69	16.60185	7.636286	6.773109	42.54159
Urbanization	Urban population (% of total population)	urbanpop	268	32.58867	13.35295	5.416	72.803
Industrialization	Employment rate in industry sector (% of total employment)	emplinductry	237	10.50911	5.548635	1.89	31.55
Social class inclusion	Gender parity index (GPI) in secondary school	genderparity	216	0.8659748	0.1456859	0.44243	1.20956

4. Empirical Results

4.1. Discussion of Empirical Results

By using the instrumental variable in 2SLS approach, the paper challenges the literature which claims that ODA perpetuated underdevelopment in the recipient countries.

According to the World Economic Forum (2017), economic growth is an important pillar of inclusive development. Thus, the current paper extends the aid-growth nexus discourse into inclusive development. Accordingly, this section statistically justifies the limitation of simple OLS regression in addressing the positive impact of ODA on MDI. First of all, it must be clear that the scatter plot in figure 2 and the correlation matrix show that ODA and MDI show a negative association. Moreover, without considering the omitted variable in the generic simple OLS regression, the coefficient of ODA%GNI is negative and statistically significant (see table 2). Indeed, it is not uncommon to come across such contentious inferences (Easterly, 2006; Moyo, 2009; Doucouliagos & Paldam, 2008, 2009; Kalyvitis & Vlachaki, 2012; Drometer, 2018; Prokopijevi, 2007).

Table 2: Generic Simple OLS Regression Before Considering the Omitted Variable

MDI in %	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
ODA%GDP	-0.4352619***	0.0761376	-5.72	0.000	-0.5851893	-0.2853344
Policy	0.2633318***	0.0788428	3.34	0.001	0.1080773	0.4185863
_cons	17.73422***	4.497715	3.94	0.000	8.877474	26.59097

***. Significant at $\alpha = 1\%$

Similar to the literature explained above, table 2 justifies that in the 34 African countries, the ODA had negative impact on MDI in the last three decades (1990–2018). However, the current paper strongly argues that the negative coefficient of ODA%GNI is biased because of an omitted variable. Thus, a policy advice based on such statistical figures may delude policymakers.

On the one hand, ODA is frequently a form of concessional aid in which donors seek to improve the quality of macroeconomic policy and the living conditions of the poor in recipient countries. Therefore, by improving the quality of governance institutions and socioeconomic policies, ODA may improve economic growth (Freytag and Heckelman, 2012; World Bank, 1998). On the other hand, ODA has been provided to the recipients while they have been in a macroeconomic crisis. As a result, the impact of ODA may not appear to be immediate, at least in statistical terms. Moreover, as ODA affects and is affected by different variables, due to the omitted variables the nexus of the ODA and MDI may face endogeneity problems. Obviously, if countries become more inclusively developed, ODA will decline. Therefore, there might be reverse causality. Consequently, simple OLS regression may not offer a consistent statistical result. This demands an instrumental variable two-stage linear regression to incorporate the effect of the omitted variable (s). The following section statistically shows the effect of omitted variables and throws light on instruments. Particularly, it justifies why population size, country's policy and institutional assessment (CPIA) index, and CO2 emission are good instruments for ODA. The section also shows how and why the instrumental variable approach yields a consistent positive coefficient of ODA in the 2SLS regression.

One premise is that population size is often taken into account during ODA disbursement (World Bank, 1998). The other premise is, according to Aigner-Walder and Döring (2012), age structure has significant effect on the private consumption thereby economic growth. Citrus paribus, as total population grows faster, per capita income declines. Thus, the structural function is presented as follows:

$MDI_{ij} = \alpha_0 + \alpha_1 X1_{ij} + \alpha_2 ODA1_{ij} + \varepsilon 1_{ij}$----------(1)

Where $X1_{ij}$ represents exogenous control variables. Theoretically, simple OLS regression yields an inconsistent coefficient if there is an endogenous explanatory variable. To be specific, if ODA_{ij} is correlated with the error term ε_{ij}, that is, Corr (ODA_{ij}, ε_{ij}) $\neq 0$, then coefficient ODA (i.e., α_2) will be biased or inconsistent. This may happen when there are unobserved factors influencing both the explanatory variable and the outcome variable (viz. ODA and MDI, respectively). In that case, one can claim that ODA is endogenous. On this occasion, using the instrumental variable 2SLS regression is prudent because it enables to solve the endogeneity problem which is caused by the omitted variable (s). Bearing this in mind, the following two stage equations are specified and checked for endogeneity problems in the generic regression.

Stage 1: Specify a model for ODA_{ij}

$ODA_{ij} = \beta_0 + \beta_1 X2_{ij} + \beta_2 logPop_{ij} + \varepsilon 2_{ij}$----------(2)

$X2_{ij}$ represents control variables in equation 2 and logPop, CPIA and CO_2 represents instruments.

If population (logPop) is an instrument for ODA, it should meet certain criteria. These are: i) logpop should be a significant driver of ODAij; ii) logpop should not be strongly correlated with MDI; and iii) logpop should be unaffected by other factors. It means logpop has to be an exogenous variable. To prove the three criteria, first stage regression is run and checked for the statistical significance of the instrument. Then, the residual is predicted from the first stage OLS regression and checked. Accordingly, it is checked if there is endogeneity in the original generic regression in which ODA shows a negative association with MDI. The first stage regression is presented as follows.

Table 3: First-Stage OLS Regression in the Generic Model

ODAGNI	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
logPop	-4.742325	1.206615	-3.93	0.000	-7.122249	-2.362402
freedomscore	0.0007318	0.0413212	0.02	0.986	-0.08077	0.0822337
_cons	44.53903	8.29013	5.37	0.000	28.18761	60.89045

***, Significant at α = 1%

From table 3, one can claim that logpop is a good instrument for ODA.

In the first stage regression table, logPop is a statistically significant driver of ODA (α = 1%). Now, the residual should be predicted from the first stage regression. Then, one can check the statistical significance of the residual in the model.

Table 4: The Generic OLS Regression with Residual (E)

MDI	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
ODA%GNI	0.9215763***	0.2617622	3.52	0.001	0.4052254	1.437927
CPIA	0.4991209***	0.0821805	6.07	0.000	0.3370121	0.6612298
e (i.e. residual)	-1.505093***	0.2792328	-5.39	0.000	-2.055907	-0.95428
_cons	-11.65945**	5.871176	-1.99	0.048	-23.2409	-0.0779943

***. Significant at α = 1%, **. Significant at α = 5%

The endogeneity test is simply the statistical significance of the residual. From the table 4, one can be 99% confident that there was an endogeneity problem in the original regression model

in which ODA had a negative coefficient. That means the original regression result was inconsistent because it rules out the basic assumption of exogeneity. In other words, the omitted variable represented by the residual significantly affected the dependent variable. Now, one can safely come to the conclusion that i) ODA is an endogenous variable; ii) due to the endogeneity problem, no policy inference should rely on the original simple OLS regression. In table 3, population size is a good instrument for ODA. Anjum (2015) and Magesan (2016) also used total population as an instrument for ODA in different contexts. Thus, one can safely run the second stage regression with the predicted ODA using ivregress 2SLS command in STATA. The predicted ODA (i.e. $ODA_{ij}^{*)}$ is generated using the following equation:

$$ODA_{ij}^{*} = \beta_0 + \beta_1 freedom_{ij} + \beta_1 logPop_{ij} + \beta_2 CPIA_{ij} + \beta_3 co2pergdpij \text{----------} (3)$$

ODA_{ij}^{*} represents the instrumented or predicted ODA and it is not influenced by the error term, $\varepsilon 2_{ij}$. That means it is not affected by the unobserved variable that are the source of the endogeneity. Accordingly, one can substitute the predicted ODA (i.e., ODA_{ij}^{*}) *in* the following equation (of stage 2)

Stage 2: Specify a model for MDI_{ij} by using ODA_{ij}^{*} and other control variables

The next statistical step is to substitute ODA_{ij} by its predicted value ODA^{*}_{ij} in the main equation (1) (i.e. substitute equation 3 in equation 1).

$$MDI_{ij} = \alpha_0 + \alpha_1 X1_{ij} + \alpha_2 ODA_{ij}^{*} + \varepsilon 1_{ij} \text{----------} (1^{*})$$

Accordingly, one can estimate the modified equation (1*) using OLS and draw inference accordingly. The estimated parameter α_2^{*} will be a consistent estimate of ODA. STATA has the command ivreg2 which implements 2SLS with corrected standard errors in the second stage.

Table 5: Second Stage Instrumental Variable 2SLS Regression in The Generic Model

MDI	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
ODA%GNIhat	0.6682904*	0.3927887	1.7	0.089	-0.1015612	1.438142
CPIA	0.3407243***	0.1158397	2.94	0.003	0.1136826	0.567766
_cons	-0.1443267	7.03794	-0.02	0.984	-13.93844	13.64978

Note: ***, **, * significant at α = 1%, 5% and 10% significance level, respectively. ODA%GNIhat is predicted ODA%GDP from the first stage OLS regression. Prob > F = 0.0011; centred $R^2 = 0.4438$

The second stage instrumental variable 2SLS regression result shows that ODA is a consistent positive and statistically significant determinant of MDI. From the chi-square test, one can be 99% confident that the probability of the coefficient of ODA and CPIA cannot be zero. However, the above analysis is a rudimentary one. In real life, ODA is not affected by only two variables. The same is true for MDI. Therefore, in the following regression, one can include more instruments in the first stage and second stage regressions to explain a significant part of the variation in the dependent variable. Additionally, one can include CO2 per GDP and CPIA as instruments in the first stage. The result is shown in Table 6.

Table 6: First Stage Regression with More Instruments

ODA%GNI	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
CPIA	0.1474355**	0.0731449	2.02	0.045	0.0031453	0.2917257
LogPop	-6.167871***	1.278026	-4.83	0.000	-8.688985	-3.646756
Freedomscore	0.0315428	0.0448974	0.7	0.483	-0.0570247	0.1201103
Co2perGDP	-14.02492***	5.20368	-2.7	0.008	-24.29003	-3.759816
_cons	46.73559***	8.961793	5.21	0.000	29.057	64.41419

Note: ***, **, * significant at α = 1%, 5% and 10% significance level, respectively

From the first stage regression (table 6), population, carbon dioxide emission, and CPIA are good instruments of ODA as they have theoretical and empirical support. Obviously, the instrumental variables in 2SLS capture the effect of the omitted variables. Table 7, presents the 2SLS regression result as generated by the ivreg2 command.[4]

[4] The difference between ivregress 2SLS and ivreg2 is that if the latter command is used in advanced STATA versions, the post estimation results appear together with the regression results.

Table 7: Instrumental Variable (2SLS) Estimation

MDI	Model 1	Model 2	Model 3	Model 4	Model 5
Initial MDI	0.0267245 (8.527386)				
ODA%GNIhat	1.727425* (1.072675)	1.77705* (1.072069)			
Every four years cummulative			0.0019817* (0.0872756)		
Log(ODA%GNIhat*policy)				2.529802** (2.149624)	
Log(ODA%GNIhat-square)					0.0058409** (0.0325272)
CPIA	0.1236117 (0.258476)	0.1188355 (0.2579386)	0.2976783 (0.2025492)	0.3969526* (0.2198335)	0.225858 (0.1894925)
FDI%GDP	0.1426011 (0.8922812)	0.1143257 (0.8947401)	1.155954** (0.5618234)	1.308718** (0.5231816)	1.172173** (0.5294423)
CO2perGDP	-48.07394*** (16.66765)	-47.89793*** (16.8367)	-54.33262*** (13.82334)	-48.53813*** (13.52503)	-50.65143*** (14.94969)
Technology	0.2376486*** (0.0853316)	0.2404208*** (0.0839887)	0.1416133** (0.0571252)	0.1164264** (0.0534431)	0.1473855*** (0.0485699)
Govt Exp %GDP	0.8593587*** (0.3353017)	0.8606089** (0.3369239)	0.8189311*** (0.2796617)	1.017832*** (0.2708476)	0.8902058*** (0.2776053)
Urbanpop	0.4741806** (0.2126431)	0.4784064** (0.2126964)	0.3216613** (0.1588755)	0.4962677*** (0.1389744)	0.4124525*** (0.1260647)
Employment in industry % total employment	0.8226319 (0.6248591)	0.8279413* (0.6204007)	0.6462084 (0.5196834)	0.1357486 (0.2602867)	0.1354906 (0.2680983)
Genderparity	43.23957** (20.31752)	43.58379** (20.3865)	30.88107** (15.78818)	17.86145 (16.46111)	25.70536* (15.27033)
_cons	-68.28364*** (24.39858)	-68.96567*** (24.35947)	-44.68818*** (16.21095)	-27.46693* (16.89283)	-36.22554** (15.35711)
Centered R2	0.6013	0.5933		0.7130	0.7129
Uncentered R2	0.9257	0.9242		0.9476	0.9476
Prob > F	0.0000	0.0000		0.0000	0.0000

Note: ***, **, * significant at α = 1%, 5% and 10% significance level, respectively. ODA%GNIhat is the instrumented ODA%GNI from the stage 1 regression Log(Odagnihat*policy) is the interaction variable of ODA and policy. Policy is proxied by CPIA. Robust standard errors are in the parentheses.

Figure 1) Scatterplot of MDI and ODA nexus (before instrumenting)

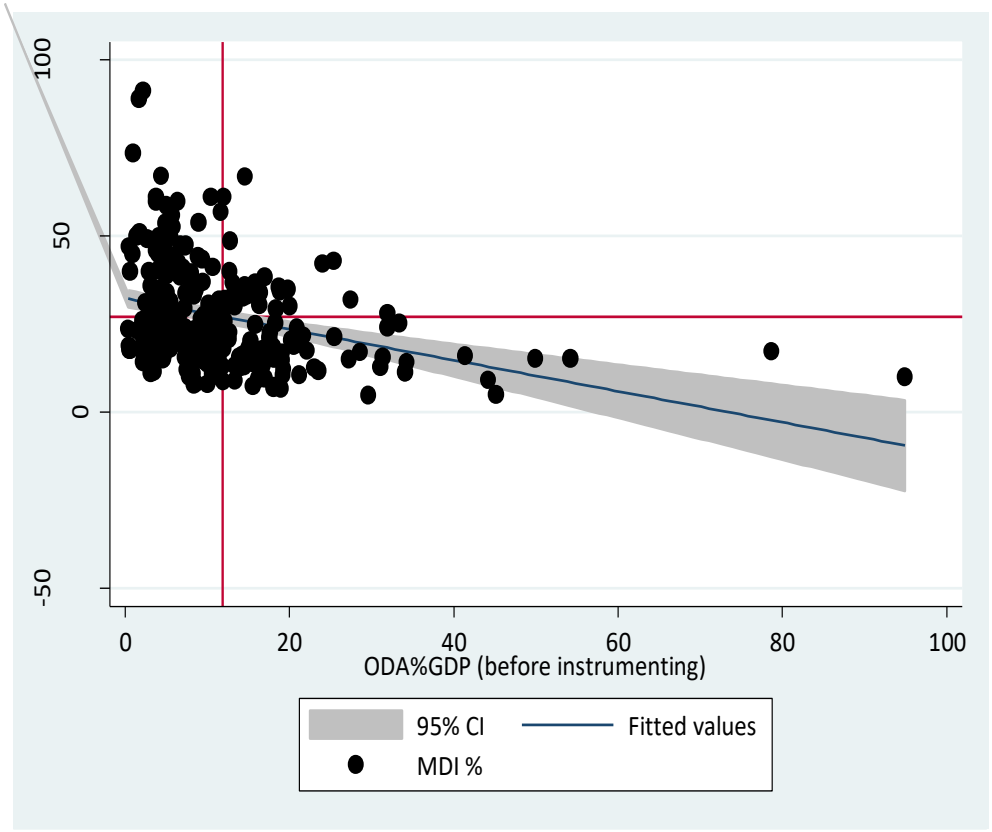
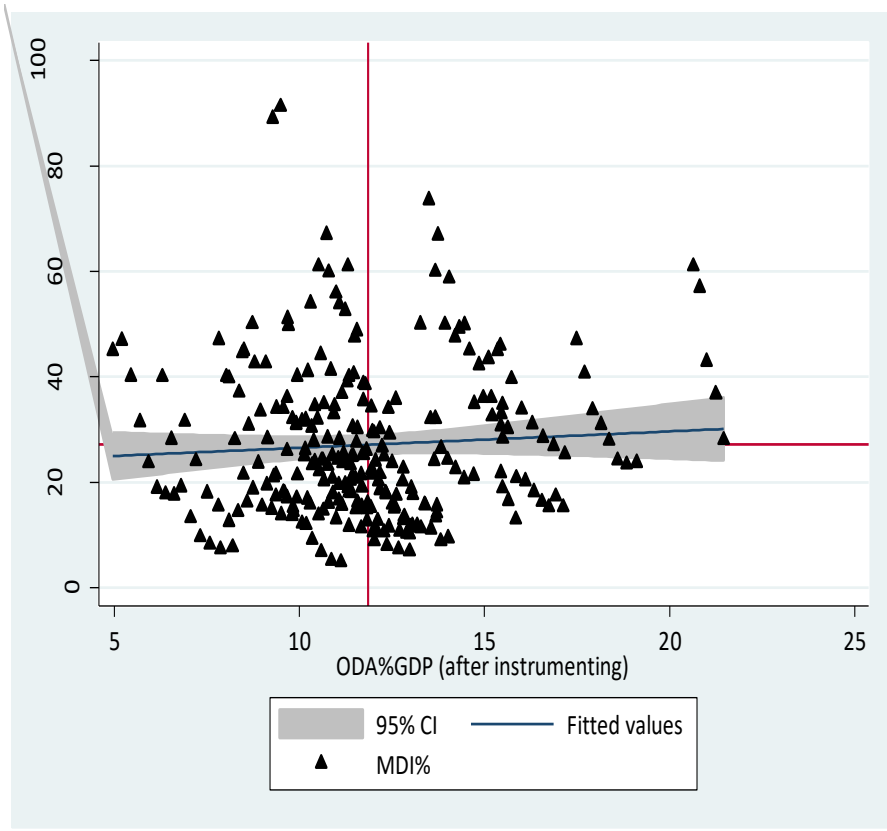


Figure 2) Scatterplot of MDI and ODA nexus (after instrumenting)



In Figure 1, ODA%GNI is negatively associated with MDI. This baseline association is in line with most of the existing literature. However, as explained above, the association is not consistent and dependable because the indirect effect of ODA on MDI, through omitted variables, is undermined. The positive association after the instrumenting of the ODA corrects the bias because through the instrument the effect of the omitted variable is captured and the endogeneity problem is solved (see figure 2).

Figure 3) Scatterplot of MDI and Log (ODA%GDP)^2 nexus before instrumenting

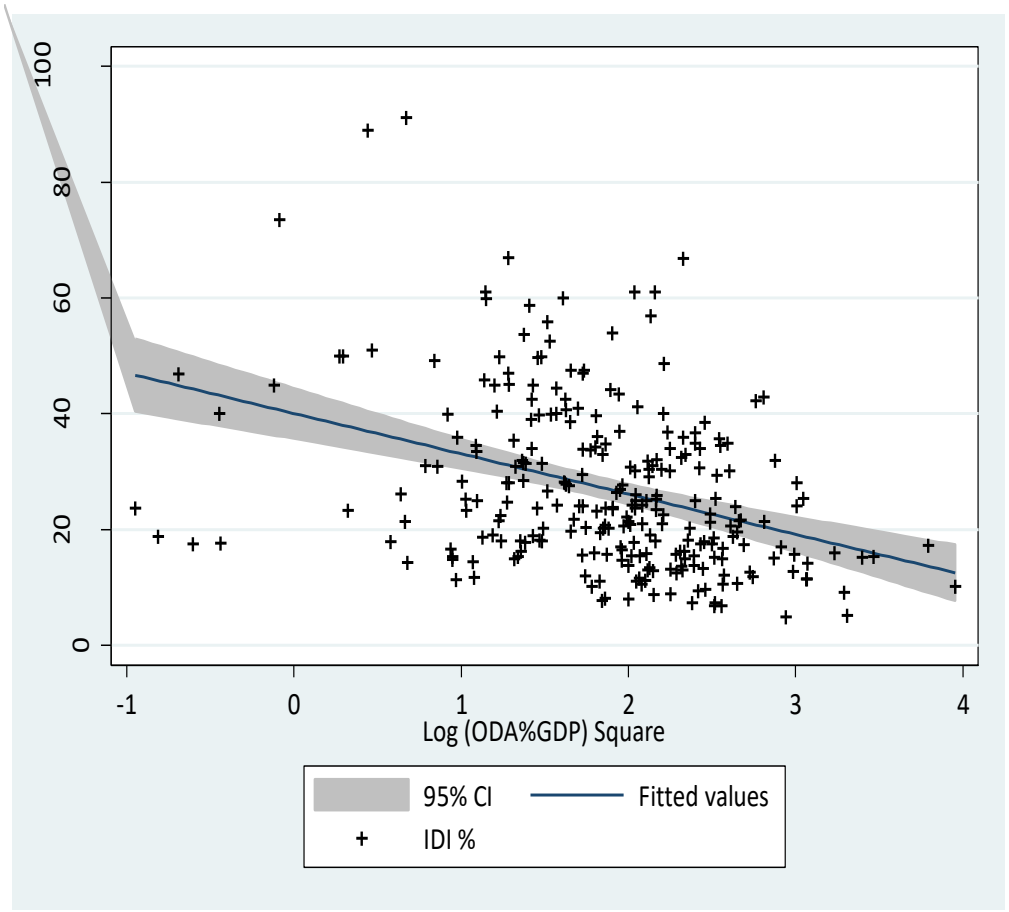


Figure 4) Scatterplot of MDI (i.e. IDI) and Log (ODA%GDP)^2 nexus after instrumenting

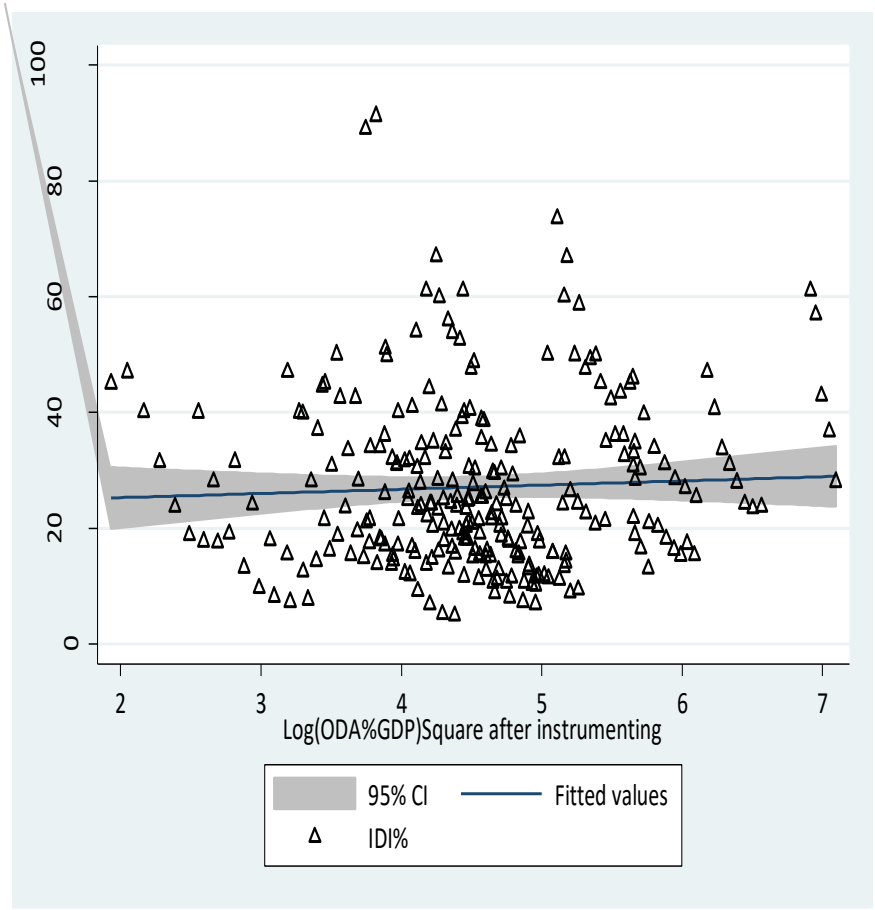


Figure 3 shows the negative association of MDI and Log (ODA%GDP) before instrumenting ODA, which shows diminishing returns to ODA. Whereas figure 4 shows the positive association of MDI and Log (ODA%GDP)^2 after instrumenting ODA, which shows increasing returns to ODA.

The model 1 in table 6 shows that the MDI in the initial year (i.e., 1990) has a positive effect on the overall MDI, but it is not statistically significant. The instrumented ODA%GNI and the cumulative ODA%GNI have a statistically significant positive effect on MDI in models 2 and 3. Model 5 disproves the diminishing returns to aid hypothesis because when ODA%GNI-squared, it still shows a statistically significant positive relationship with MDI. In plain words, the positive associations of cumulative ODA and the ODA-square with MDI illustrate that if more and more official development assistance is offered to African countries, it can positively contribute to inclusive development as long as good institutions and policies are in place. The interaction variable of ODA%GNI with policy, i.e., CPIA, shows a statistically significant positive coefficient (see model 4).

Moreover, in comparison to figures 2 and 4, the scatterplots in figures 3 and 5 also clearly show how using the instrumental variable in the 2SLS model changes the narrative about the effectiveness of ODA, at least in the 34 countries of Africa. To be sure, before considering the omitted variable, the association between ODA and MDI was negative. However, after instrumenting, ODA and ODA-square associate themselves positively with MDI.

Besides, to quickly shed light on the strategically selected control variables, macroeconomic policies and governance institutions (which are proxied by CPIA) are statically significant positive drivers of inclusive development in model 4. Similarly, government spending is a statically significant positive driver of inclusive development in all the models. The creation of jobs in industry sector is another positive driver of inclusive development in model 2. In models 1, 2, 3 and 5, gender parity (in secondary school enrolment) is a positive driver of inclusive development. Climate change, which is proxied by CO2 per GDP, is a negative driver of inclusive development in all the models. Technology and urbanization are positive drivers of inclusive development in all the models. In models 3, 4 and 5, FDI is a positive driver of inclusive development.

4.2. Postestimation

The following post-estimation tests are conducted to test whether the tests are robust. *Multicollinearity?* The interaction variables with ODA, show multicollinearity. To be specific, ODA, cumulative ODA, ODA*Policy, and logODA-square show a strong correlation. As a solution, separate models are generated for the correlated variables. Within a specific model, the Pearson's correlation matrix shows that there is no strong multicollinearity among the specified variables.

Heteroscedasticity? Using the command "ivhettest, all", the instrumental heteroscedasticity test was conducted. The null hypothesis is that "disturbance is homoscedastic". All chi-square tests, namely, the Pagan-Hall general test statistic and the Pagan-Hall test assumed normality. The White/Koenker nR2 test statistic, and the Breusch-Pagan/Godfrey/Cook-Weisberg show that there was heteroscedasticity. Therefore, the remedial measure was taken by adding ". robust" command in the instrumental variable regression so that the robust standard errors were generated and presented in parenthesis.

Endogeneity? Theoretically, endogeneity refers to the bias in regression estimates that is caused by omitted variables, reverse causality, and/or measurement errors. Initially, endogeneity problem was identified in the simple OLS baseline regression. Thus, the negative correlation between ODA%GNI and MDI was not robust. Therefore, endogeneity issue was addressed by using the instrumental variables approach in two-stage linear square (2SLS) regression.

The command "ivreg2" generates the instrumental variable's 2SLS regression results and post-estimation results. Accordingly, the under-identification, weak identification, and

overidentification test results show that the regression models are not vulnerable to the prospective problems. To be specific, the chi-square test shows one can reject the null hypothesis, which claims there is an under-specification problem in the models because the p-value in all the models shows less than 5% in the Kleibergen-Paap rk LM statistic. The overidentification test of all instruments in the Hansen J statistic is the same. Regarding weak identification, the Cragg-Donald Wald F statistic is greater than the Stock-Yogo weak ID test critical values. That means the instruments can sufficiently explain the endogenous variables.

5 Conclusion

African countries are the largest ODA recipients in the world. Despite the continuous economic growth in the last two decades, Africa still lags behind with respect to inclusive development. Thus, the effectiveness of ODA in promoting economic growth is widely questioned. Views range from those that are highly sceptical which claim that aid perpetuates poverty and authoritarianism to those arguments that emphasize that aid plays a significant role in promoting economic growth and institutional quality. Both camps present strong arguments. Although the arguments fundamentally rely on ideological affiliations, methods of statistical analysis also contribute to the polarized antagonistic arguments. Thus, the current paper addresses the endogeneity problem which has been one of the causes of difference in statistical inference.

Accordingly, the current paper deviates from the mainstream aid effectiveness literature in four ways: i) the available literature appraises aid effectiveness mostly from an economic growth point of view, whereas the current paper's focus is multidimensional inclusive development; ii) as the effect of aid is not supposed to be immediate, the current paper challenges the existing literature by calculating the effect of "cumulative aid" by grouping the longitudinal data into seven clusters, each cluster constituting four years: iii) rather than relying on simple OLS, fixed effects, and random effects regression models, the current paper captures the effect of the omitted variable which caused the negative relation between ODA and MDI by using an instrumental variables in two-stage least square (2SLS) approach. Accordingly, one can claim that if ODA is channelled to improve *climate change, demographic pressure, and macroeconomic policy* and governance institutions, it can significantly improve inclusive development in the recipient countries; iv) Diminishing marginal returns to aid hypothesis is disproved statistically by controlling for ODA-square.

Besides, the empirics tries to capture the effect of interaction variables, lagged variables, and policy and institutional variables. From the statistical significance of interaction variables between ODA and policy, one can underscore the cruciality of quality macroeconomic policy and institutions.

Likewise, ODA should be channelled to minimize demographic pressure, promote technological advancement; reduce carbon dioxide emissions; improve gender inclusion; job creation in industry sector; government spending on social sector development, basic infrastructure, and governance quality improvement.

Finally, as ODA is often allotted for diverse sectors, cross-country comparative empirical analyses might not always show the whole picture regarding the impact of ODA. The other source of complexity stems from transparency problem and the lack of impact assessment measures by the aid community. Therefore, participatory impact assessment should also be conducted at a project, program, and country level so that tax payers in the donor countries can clearly see where their donation goes and its impact. Recipient countries can also see if the aid community is contributing positively. The national interests of both recipient and donor countries should also be transparently defined and milestones should be set.

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