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Foreign Aid Complementarites and Inclusive Human Development in Africa

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Abstract

This study complements existing literature by assessing how various types of foreign aid complement each other in boosting inclusive human development in Africa. (a) When 'aid to social infrastructure' is moderated with other aid types, 'action on debts' is substitutive whereas 'aid to the production sector', 'aid for program assistance' and humanitarian assistance are complementary. (b) 'Aid to the production sector' ('action on debt') is complementary (substitutive) to 'aid for economic infrastructure'. (c) Whereas 'action on debt' is a substitute to 'aid to the production sector', 'aid for social infrastructure' and 'aid for economic infrastructure' are complementary. (d) 'Action on debt' is a substitute for 'aid to the multi-sector'. (e) While 'aid for social infrastructure' and 'action on debt' are substitutive to 'aid for program assistance'; humanitarian assistance is complementary. (f) The following are substitutes to 'action on debt': 'aid for economic infrastructure', 'aid to the production sector', 'aid to the multi-sector' and 'programme assistance'. (g) 'Aid for social infrastructure' and 'programme assistance' are complementary to humanitarian assistance. The findings reveal various patterns that inform policy makers on the relevance of sequencing aid types to enhance inclusive development. Future research should focus on country-specific studies.

***JEL Classification*:** B20; F35; F50; O10; O55

***Keywords*:** Foreign Aid; Inclusive Development; Africa

1. Introduction

The research question motivating this study is: How do various types of foreign aid complement one another to influence inclusive human development in Africa?[1] An inquiry into the relevance of foreign aid complementarities in inclusive human development in Africa is motivated by four principal features, namely: (a) decreasing inclusive development in Africa; (b) the importance of inclusive development in Sustainable Development Goals (SDGs); (c) increasing calls in academic circles to reinvent development assistance in the light of the failure by most countries in the continent to achieve the Millennium Development Goal (MDG) extreme poverty target and (d) gaps in the available literature.

First, extreme poverty has been increasing in most African countries. The last two decades have been characterised by a resurgence in economic growth which began in the mid-1990s (Fosu, 2015; Asongu & Nwachukwu, 2017a). This experience is an indication that the fruits of economic prosperity have not been broad-based to benefit a majority of the population. This narrative is consistent with a 2015 World Bank report on MDGs which revealed that extreme poverty was being eradicated in all regions of the world except for Africa, where close to half of sub-Saharan African countries were considerably off-course from reaching the MDG extreme poverty target (World Bank, 2015). Among the multitude of scholarly responses to this extreme poverty tragedy, Kuada (2015) has proposed a paradigm shift to 'soft economics' based on human capability development. According to the author, contrary to the 'strong economics' approach based on structural adjustment policies, the soft approach provides a comprehensive understanding of the current poverty and exclusive developmental trends in Africa.

[1] Inclusive human development in the study is the inequality-adjusted human development index, which is a combination of a country's average achievements in terms of income, education and health. These achievements are adjusted for inequality so that human development also captures how the three sets of achievements are distributed among the population of the country. Accordingly, the inequality-adjusted human development index (IHDI) is the human development index (HDI) that is adjusted for inequality.

Second, this study is also relevant because of pressing policy challenges in the post-2015 SDGs agenda. Such relevance builds on the need to reverse current exclusive development trends to enhance and promote inclusive development globally. These goals of global appeal are consistent with the current policy syndrome of non-inclusive development in Africa. The outcome variable of this study is the 'inequality adjusted human development' index, which is in line with six of the seventeen SDGs, namely: end poverty in all its forms everywhere; end hunger, achieve food security and improved nutrition and promote sustainable agriculture; ensure healthy lives and promote well-being for all ages; ensure inclusive and equitable quality education and promote lifelong learning opportunities for all; promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all, and reduce inequality within and among countries[2].

Third, there have been growing calls in scholarly circles for development assistance in Africa to be reinvented to address development concerns of poverty, unemployment and exclusive development. Notable works in this area have included the reinvention of foreign aid: for inclusive development and sustainable development (Asongu, 2016), and to tackle challenging policy concerns such as unemployment and increasing poverty (Jones & Tarp, 2015; Jones, Page, Shimeles, & Tarp, 2015; Simpasa, Shimeles, & Salami, 2015).

Fourth, the focus of this inquiry bridges contemporary foreign aid literature, notably: the absence of a study that has examined how various categories of development assistance can be complemented to improve inclusive human development in Africa. Accordingly, dominant strands have included: policies pertaining to the reinvention of development assistance and debates surrounding the importance of development assistance in outcomes of development.

[2] We invite the interested reader to consult Michel (2016) for a full list of SDGs. For more information on refer to http://www.cipe.org/publications/detail/beyond-aid-integration-sustainable-development-coherent-international-agenda

As concerns the debate on the role of foreign aid in Africa's development, no consensus has yet been established. Some optimistic perspectives have been advanced on the positive effects of foreign aid when corresponding policies are well designed with appropriate transmission channels to development (Asiedu, 2014; Gyimah-Brempong & Racine, 2014; Kargbo & Sen, 2014). Conversely, there has been another evolving strand advocating the negative consequences of development assistance on African development outcomes (Banuri, 2013; Ghosh, 2013; Krause, 2013; Marglin, 2013; Monni & Spaventa, 2013; Obeng-Odoom, 2013; Titumir & Kamal, 2013; Wamboye, Adekola, & Sergi, 2013).

In relation to the bulk of quantitative and qualitative studies that have focused on reinventing development assistance, the following are worthwhile: Advanced Purchase Commitment (Kremer, 2008); new global initiatives (Radelet & Levine, 2008); more emphasis on 'searching for solutions' and less emphasis on 'planning for solutions' (Easterly, 2006); 'aid vouchers' for incentives in better/competitive delivery of aid services (Easterly, 2002, 2008); need for more rigorous evaluations (Pritchett, 2008); Randomised Control Trials (Duflo & Kremer, 2008); intensification, amputation and 'policy change'-related reforms (Pritchett & Woolcook, 2008), and the Sachs experiment of eliminating poverty and cost effectiveness schemes by the World Bank (Banerjee & He, 2008). The goal of this study is to extend the extant literature by assessing how foreign aid types complement one another to affect inclusive human development in Africa. The corresponding research question is: How do various types of foreign aid complement one another to influence inclusive human development in Africa?

The rest of the study is organised as follows. Section 2 discusses the theoretical underpinnings and contemporary literature. The data and methodology are covered in section 3, while section 4 presents and discusses the empirical results. Section 5 concludes with policy implications and future research directions.

2. Theoretical underpinnings and reinvention of foreign aid

The theoretical connection between external flows and inclusive development in less developed countries is discussed in two main categories: (a) growing poverty trends in Africa, and (b) recent literature documenting the need to reinvent foreign aid for more pro-poor growth (Asongu & Nwachukwu, 2017a).

First, Kuada (2015) observed that increasing extreme poverty levels in Africa has prompted scholars to rethink contemporary development paradigms on which the continent's march towards development is based. According to the narrative of the author, there is a development imperative to shift towards 'soft economics' based on human capability development to understand recent poverty trends in Africa. This paradigm shift steers clear of an alternative paradigm focused on strong economics or structural adjustment policies. Moreover, the proposed shift in paradigm is consistent with theoretical propositions based on foreign aid that have been proposed by Asongu and Jellal (2016). The authors have suggested that economic growth and inclusive development can be improved in Africa if development assistance is channelled through mechanisms that reduce the tax burden on private economic sector. It is also important to note that the paradigm shift suggested by Kuada (2015) for explaining the African poverty tragedy is broadly in line with recent literature devoted to reinvent foreign aid in order to increase employment and social mobility (Jones & Tarp, 2015; Jones et al., 2015; Page & Shimeles, 2015; Page & Söderbom, 2015; Simpasa et al., 2015).

Second, the imperative of reinventing foreign aid for more inclusive development has coincided with the celebrated literature of Piketty (2014): a study which has questioned the long-established Kuznets conjecture on the relationship between inclusive development and industrialisation. In a recent literature survey, Asongu (2016) has summarised 200 scientific studies on development assistance to conclude that in the post-2015 sustainable development era, it is imperative to reinvent foreign aid in the light of Piketty's findings, contrary to the conjecture of Kuznets, i.e. that industrialisation would

mitigate inequality in the long run. It is important to note that the theoretical underpinnings of Kuznets are founded on the hypothesis that the relationship between inequality and industrialisation follows an inverted U-shape. According to Asongu (2016), it is high time to abandon Kuznets' perspective that inequality will decrease with advancement in industrialisation and place more emphasis on inequality in policies of development assistance. This approach will engender better conditions for sustainable development outcomes, which include: poverty reduction; addressing issues surrounding the burgeoning population growth; fighting corruption; and training recipient governments in inclusive development.

The aim of this study is to unite the discussed points by assessing the complementarity of foreign aid types in inclusive human development. Hence, the purpose of the study is not to engage in the debate on whether development assistance positively or negatively affects development outcomes. The research focuses on how inclusive human development is affected when one type of foreign aid is complemented with another. To this end, seven types of development assistance are considered, namely: humanitarian assistance, action on debt, programme assistance, aid to the multi-sector, aid to the productive sector, aid for economic infrastructure and aid for the social infrastructure. The interacting of foreign aid variables is of policy relevance because some development assistance variables may be complementary while others may be substitutive in the process of enhancing inclusive human development.

The research question for this study is; How do various types of foreign aid complement one another to influence inclusive human development in Africa?

By positioning the research on inclusive human development, the study also departs from contemporary literature on pro-poor development which has not focused on inclusive human development, *inter alia*: strategies for eradicating extreme poverty by 2030 (Bicaba, Brixiova, & Ncube, 2017); linkages between economic growth, inequality and poverty (Ncube,

Anyanwu, & Hausken, 2014; Fosu, 2017a, 2017b); relationships between income, consumption and the wealth of less wealthy factions of the population (De Magalhães & Santaeulàlia-Llopis, 2018); the connection between inequality and corruption (Sulemana & Kpienbaareh, 2018); the relevance of technologies in pro-poor economic development (Afutu-Kotey, Gough, & Owusu, 2017; Asongu & le Roux, 2017; Abor, Amidu, & Issahaku, 2018; Asongu & Boateng, 2018; Bongomin, Ntayi, Munene, & Malinga, 2018; Efobi, Tanankem, Asongu, 2018; Gosavi, 2018; Humbani & Wiese, 2018; Isszhaku, Abu, & Nkegbe, 2018; Minkoua Nzie, Bidogeza, & Ngum, 2018; Muthinja & Chipeta, 2018); nexuses between education, finance and inequality (Mannah-Blankson, 2018; Meniago & Asongu, 2018; Tchamyou, 2019a, 2019b; Tchamyou, Erreygers & Cassimon, 2019) and linkages between inclusive development, remittances, foreign investment and external debts (Asongu, Efobi, & Beecroft, 2015; Kaulihowa & Adjasi, 2018; Asongu & Leke, 2019).

Consistent with the narratives in the introduction, this research improves the engaged literature by attempting to answer the following question in the empirical section: How do various types of foreign aid complement one another to influence inclusive human development in Africa?

"Insert Tables 1 to 2 here"

3. Data and methodology

3.1 Data

This study examines a panel of 53 countries in Africa with data from three main sources, namely, the: (a) United Nations Development Program (UNDP); (b) World Bank Development Indicators; and (c) Organisation of Economic Co-operation and Development (OECD). A 2005 to 2012 periodicity is adopted to restrict over-identification and/or limit instrument proliferation because the Generalised Method of Moments (GMM) estimation is adopted as empirical strategy. This justification of periodicity is consistent

with recent literature on the nexus between development assistance and inclusive development (Asongu & Nwachukwu, 2017a). Moreover, it is observed from a preliminary assessment that a higher value of T or number of years results in estimated coefficients that are biased in the light of the proliferation of instruments. Furthermore, when T has a maximum value of eight, the requirement for the avoidance of instrument proliferation is respected, even when instruments are collapsed. The number of cross-sections should be higher than the corresponding number of instruments in the post-estimation diagnostics.

The dependent variable is the Inequality adjusted Human Development Index (IHDI). The outcome variable adopted in recent inclusive development literature (Asongu & Nwachukwu, 2017b) is the human development index (HDI) that is adjusted for inequality. It is important to note that the HDI takes into account the national average of achievements in three principal domains, namely: (a) long life and health; (b) knowledge, and (c) decent living standards. The IHDI, however, goes a step further to accounting for the distribution of the achievements encapsulated in the HDI. The IHDI accounts for whether national benefits in education, health and income are evenly distributed across the population. This adjustment is done by discounting the mean of underlying achievements with the corresponding level of inequality.

The independent variables are development assistance dynamics. In the selection of the variables the research is consistent with recent literature in adopting a plethora of foreign aid indicators to account for heterogeneity in development assistance. There have been growing calls in scholarly and policy circles on the need to account for foreign aid heterogeneity in terms of sectors and types of development assistance (Quartey & Afful-Mensah, 2014; Asiedu & Nandwa, 2007). According to these authors, distinguishing foreign aid by sector and type enables a more comprehensive perspective on the influence of foreign aid in development outcomes. As shown in Table 1, the selected variables include: 'aid for social infrastructure', 'aid for economic infrastructure', 'aid to the production sector', 'aid to the multi-sector',

'programme assistance', 'action on debt', and humanitarian assistance. Both the HDI and IHDI are defined in Gross National Income (GNI) per capita that is adjusted for purchasing power parity (PPP US $).

Two main control variables are adopted because accounting for more control variables leads to instrument proliferation and over-identification. It is important to note that to limit over-identification; some studies in recent literature employing the GMM technique have avoided using control variables (Osabuohien & Efobi, 2013, p. 303). The two adopted control variables are GDP per capita and trade openness. The choice of GDP per capita is motivated by the fact that, from intuition, it is highly correlated with GNI per capita, which is a component of the IHDI. Globalisation in terms of trade openness has been documented to affect inclusive development (Stiglitz, 2007; Chang, 2008; Mshomba, 2011; Asongu, 2013).

The summary statistics, definitions and corresponding sources of the variables are disclosed in Table 1. It is apparent from the summary statistics that the variables are comparable in terms of mean values. It is essentially for comparison that the development assistance variables are defined in logarithms. Moreover, from the corresponding standard deviations, confidence can be built that reasonable estimated relationships can be established. The development assistance variables encompass disbursements of multilateral aid from the Development Assistance Committee (DAC) countries. The correlation matrix is presented in Table 2. Consistent with recent literature, the matrix is based on two tailed critical values that are significant (Asongu, Nwachukwu, & Pyke, 2018).

It is also important to note that, the selected variables are from secondary data that are available in the referenced sources. While some relevant insights into the measurements of the variables are disclosed in Table 1, more information on the collection and measurement of the variables is available in the referenced sources. The study focuses on Africa and 53 of the 54 African countries are selected because South Sudan gained

independence in 2011. Hence, South Sudan is not included because of data availability constraints.

3.2 Methodology

3.2.1 Generalised Method of Moments

Five principal motives underline the choice of the GMM estimation technique. The first two are essential requirements for the use of the technique whereas the last three are corresponding advantages (Asongu & Nwachukwu, 2016a). First, the GMM technique requires that the dependent variable should be persistent, and this persistence is apparent in the IHDI because its correlation with its first lag value is 0.9876, which is higher the rule of thumb threshold of 0.800 needed to confirm the presence of persistence. Second, the number of cross-sections is substantially higher than the number of years in every cross-section. This implies N is higher than T, given that the research has 53 countries and a periodicity from 2005 to 2012. Third, the approach to estimation enables the inquiry to control for potential endogeneity by using: (a) time-invariant variables to control for the unobserved heterogeneity, and (b) instrumented variables to address concerns of simultaneity or reverse causality in the explanatory variables. Fourth, cross-country differences are taken into account in the regressions because the GMM technique by definition and construction is consistent with a panel data structure. Fifth, in accordance with Bond et al. (2001), the *system* GMM estimator (Arellano & Bover, 1995; Blundell & Bond, 1998) accounts for small sample biases related to the *difference* estimator (Arellano & Bond, 1991).

In this inquiry, the Roodman (2009a, 2009b) extension of Arellano and Bover (1995) is adopted because it employs forward orthogonal differences as opposed to first variations. This extension has been established to restrict over-identification and limit the proliferation of instruments (Love & Zicchino, 2006; Baltagi, 2008; Asongu & Nwachukwu, 2016b; Boateng, Asongu, Akamavi, & Tchamyou, 2018). In the specification process, a *two-step* instead

of *one-step* procedure is adopted because it accounts for heteroscedasticity. It is important to note that the *one-step* procedure is consistent with homoscedasticity.

The following equations in levels (1) and first difference (2) summarize the standard *system* GMM estimation procedure.

$$IHD_{i,t} = \sigma_0 + \sigma_1 IHD_{i,t-\tau} + \sigma_2 A_{i,t} + \sigma_3 AA_{i,t} + \sum_{h=1}^{k} \delta_h W_{h,i,t-\tau} + \eta_i + \xi_t + \varepsilon_{i,t}$$

(1)

$$IHD_{i,t} - IHD_{i,t-\tau} = \sigma_1 (IHD_{i,t-\tau} - IHD_{i,t-2\tau}) + \sigma_2 (A_{i,t} - A_{i,t-\tau}) + \sigma_3 (AA_{i,t} - AA_{i,t-\tau}) + \sum_{h=1}^{k} \delta_h (W_{h,i,t-\tau} - W_{h,i,t-2\tau}) + (\xi_t - \xi_{t-\tau}) + (\varepsilon_{i,t} - \varepsilon_{i,t-\tau})$$

(2)

where, $IHD_{i,t}$ is inclusive human development in country i in period t; $IHD_{i,t-1}$ is inclusive human development in country i in period $t-1$; $A_{i,t}$ is foreign aid (which includes 'aid for social infrastructure', 'aid for economic infrastructure', 'aid to the production sector', 'aid to the multi-sector', 'programme assistance', 'action on debt' and humanitarian assistance) of country i in period t; σ_0 is a constant; τ represents the coefficient of auto-regression; W is the vector of control variables , η_i is the country-specific effect, ξ_t is the time-specific constant and $\varepsilon_{i,t}$ the error term.

3.2.2 Identification, simultaneity and exclusion restrictions

Space is devoted to issues related to identification, simultaneity and exclusion restrictions. Engaging such issues is important for a sound specification of the GMM estimation approach. The research considers all explanatory variables to be suspected endogenous or predetermined while time-invariant variables or years are acknowledged to exhibit strict exogeneity. A similar process of identification has been employed in recent literature employing the GMM estimation strategy (Dewan & Ramaprasad,

2014; Asongu & Nwachukwu, 2016c; Tchamyou & Asongu, 2017). The intuition for the identification also builds on the fact that it is not feasible for time-invariant variables or years to become endogenous after first difference (Roodman, 2009b). Hence, the approach for treating time-invariant omitted variables is (or *ivstyle*) is 'iv (years, eq(diff))' while the *gmmstyle* is used for the predetermined or suspected endogenous variables.

The concerns related to simultaneity are addressed with lagged regressors which are employed as instruments for forward differenced variables. The research employs Helmet transformations to remove fixed effects that are potentially linked to error terms. Such linkages could potentially bias the investigated relationships (Arellano & Bover, 1995; Love & Zicchino, 2006). The underlying transformations encompass the employment of forward mean-differences of indicators. This is different from the process of reducing past observations from future observations (Roodman, 2009b, p.104). Accordingly, the mean of the future observation is deducted from previous observations. This process of transformation enables orthogonal or parallel conditions between lagged values and forward-differenced indicators. Irrespective of lag numbers, the research prevents the loss of data by computing the underlying transformations for all observations with the exception of the last observation for each country: "*And because lagged observations do not enter the formula, they are valid as instruments*" (Roodman, 2009b, p. 104).

In the light of the above clarification, the outcome variable (or the inequality adjusted human development index) influences time-invariant variables exclusively via the suspected endogenous or predetermined indicators. Moreover, the statistical validity of the exclusion restriction is investigated with the Difference in Hansen Test (DHT) for the validity of instruments. The outcome variable to be influenced by the time-invariant variables exclusively through the suspected endogenous variables, the null hypothesis of the test should not be rejected. It is relevant to note that, when using an instrumental variable (IV) estimation strategy, rejecting the null

hypothesis of the Sargan Overidentifying Restrictions (OIR) test implies that the instruments do not explain the dependent variable exclusively through the suspected endogenous or predetermined variables (Beck, Demirgüç-Kunt, & Levine, 2003; Asongu & Nwachukwu, 2016d). However, with the GMM approach that is based on forward orthogonal deviations, the information criterion that is used to assess if the time-invariant omitted variable is exhibiting strict exogeneity is the DHT. Therefore, in the light of the above clarifications, the hypothesis of exclusion restriction is validated if the null hypothesis corresponding to the DHT related to IV (year, eq(diff)) is not rejected.

4. Empirical results

Tables 4-10 present empirical results. Table 4, Table 5, Table 6, Table 7, Table 8, Table 9 and Table 10 show findings respectively corresponding to: 'aid for social infrastructure', 'aid for economic infrastructure', 'aid to the production sector', 'aid to the multi-sector', 'aid for programme assistance', 'action on debt' and humanitarian assistance. Four information criteria are used to assess the validity of the GMM model with forward orthogonal deviations[3]. In the light of these attendant criteria, the estimated models are overwhelmingly valid. Our objective is to assess whether the interacted foreign aid variables are complementary or substitutive in their influence on inclusive development.

The criterion for assessing whether pairs of development assistance variables are complementary or substitutive is from Osabuohien and Efobi (2013, p. 299). According to the narrative, if the unconditional effect of remittances is positive while the unconditional effect based on the interactive estimated coefficient is negative, it implies that the moderating variable has a

[3] "*First, the null hypothesis of the second-order Arellano and Bond autocorrelation test (AR(2)) in difference for the absence of autocorrelation in the residuals should not be rejected. Second the Sargan and Hansen overidentification restrictions (OIR) tests should not be significant because their null hypotheses are the positions that instruments are valid or not correlated with the error terms. In essence, while the Sargan OIR test is not robust but not weakened by instruments, the Hansen OIR is robust but weakened by instruments. In order to restrict identification or limit the proliferation of instruments, we have ensured that instruments are lower than the number of cross-sections in most specifications. Third, the Difference in Hansen Test (DHT) for exogeneity of instruments is also employed to assess the validity of results from the Hansen OIR test. Fourth, a Fischer test for the joint validity of estimated coefficients is also provided*" (Asongu & De Moor, 2017, p.200).

substitutive influence on the outcome variable. Conversely, if the unconditional impact of remittances is positive while the unconditional impact based on the interactive estimated is positive, it implies that the moderating variable has a complementary influence on the outcome variable. It follows that opposing signs between the conditional and unconditional effects are very likely to reflect substitution whereas effects with the same signs reflect complementarity. The research takes a minimalist approach by concluding on a complementary effect if the conditional effect from the estimated interaction term is significant while the corresponding unconditional effect is not significant. This is essentially because the purpose of foreign aid is to enhance development outcomes, which could also build on the logic that one form of aid may complement another form of aid when effects on development outcomes from the latter form of aid are insignificant. It follows that in scenarios where one type of aid does not significantly influence inclusive development, another type of aid may have a significant effect on inclusive development, contingent on the presence of the former type of aid. The scenarios are plausible when one type of aid is not enough to induce significant effects on inclusive development.

"Insert Tables 3 to 10 here"

The findings of Tables 4-10 based on the criteria discussed are summarized in Table 3. (a) When 'aid to social infrastructure' is moderated with other aid types, 'action on debts' is substitutive whereas 'aid to the production sector', 'aid for program assistance' and humanitarian assistance are complementary. (b) 'Aid to the production sector' ('action on debt') is complementary (substitutive) to 'aid for economic infrastructure'. (c) Whereas 'action on debt' is a substitute to 'aid to the production sector', 'aid for social infrastructure' and 'aid for economic infrastructure' are complementary. (d) 'Action on debt' is a substitute for 'aid to the multi-sector'. (e) While 'aid for social infrastructure' and 'action on debt' are

substitutive to 'aid for program assistance'; humanitarian assistance is complementary. (f) The following are substitutes to 'action on debt': 'aid for economic infrastructure', 'aid to the production sector', 'aid to the multi-sector' and 'programme assistance'. (g) 'Aid for social infrastructure' and 'programme assistance' are complementary to humanitarian assistance.

As for the control variables, whereas trade openness has the expected sign, GDP per capital growth does not. A reason for the negative impact of GDP per capita on the dependent variable could be traceable to two main facts. On the one hand, GDP per capita growth is not adjusted for inequality as in the inclusive human development variable. On the other hand, the effect of GDP could also be traceable to recent extreme poverty trends in Africa. Accordingly, in spite of more than two decades of growth resurgence in Africa (Fosu, 2015a), both the number of poor (World Bank, 2015) and inequality (Blas, 2014) have been increasing in the continent.

While previous literature on the relevance of foreign aid has focused on direct nexuses between foreign aid and development outcomes, the findings of this research have complemented the attendant literature by establishing that the inconclusive debate on the relevance of foreign aid in the economic development of poor countries is also contingent on the how foreign aid types interact with one another. Accordingly, even when an assessment is made on how foreign aid types complement one another to influence a development outcome within the framework of inclusive human development, both positive and negative effects on inclusive development are apparent. Such positive and negative outcomes are broadly consistent with the two dominant strands of the literature, notably, the: positive effects of foreign aid on economic development (Asiedu, 2014; Gyimah-Brempong & Racine, 2014; Kargbo & Sen, 2014) and negative relevance of development assistance in economic development (Banuri, 2013; Ghosh, 2013; Krause, 2013; Marglin, 2013; Monni & Spaventa, 2013; Obeng-Odoom, 2013; Titumir & Kamal, 2013; Wamboye et al., 2013). Unfortunately, the findings of this study cannot be directly compared with the attendant literature because to the

best of our knowledge, this is the first study to assess how foreign aid types complement one another to influence a development outcome such as inclusive human development.

Irrespective of positions in the debate pertaining to positive or negative effects of foreign aid on inclusive human development, what the findings clearly show is that, the sequencing of foreign aid types is fundamental in driving inclusive development in Africa, and by extension developing countries. Accordingly, the results of the study support the position that when foreign aid types are substitutive, they should not be allocated at the same time to target inclusive development while when foreign aid types are complementary, they can be allocated simultaneously for the purpose of enhancing the human development outcome.

5. Concluding implications and future research directions

This study has complemented existing literature by assessing how various types of foreign aid complement each other in boosting inclusive human development in 53 African countries for the period of 2005-2012. The adopted foreign aid variables are: 'humanitarian assistance', 'action on debt', 'aid for social infrastructure', 'aid to the production sector', 'aid to the multi-sector', 'aid for economic infrastructure', and 'programme assistance'. The empirical evidence is based on the Generalised Method of Moments. The following main findings have been established. (a) When 'aid to social infrastructure' is moderated with other aid types, 'action on debts' is substitutive whereas 'aid to the production sector', 'aid for program assistance' and humanitarian assistance are complementary. (b) 'Aid to the production sector' ('action on debt') is complementary (substitutive) to 'aid for economic infrastructure'. (c) Whereas 'action on debt' is a substitute to 'aid to the production sector', 'aid for social infrastructure' and 'aid for economic infrastructure' are complementary. (d) 'Action on debt' is a substitute for 'aid to the multi-sector'. (e) While 'aid for social infrastructure' and 'action on debt' are substitutive to 'aid for program assistance'; humanitarian assistance is

complementary. (f) The following are substitutes to 'action on debt': 'aid for economic infrastructure', 'aid to the production sector', 'aid to the multi-sector' and 'programme assistance'. (g) 'Aid for social infrastructure' and 'programme assistance' are complementary to humanitarian assistance.

The findings reveal various patterns that inform policy on the relevance of sequencing aid types to enhance inclusive development. Hence, policy makers who have been viewing their challenges exclusively from the perspective of increasing foreign aid to enhance inclusive development may be getting the dynamics wrong because some aid types are complementary while others are substitutive, when specific modes of sequencing are considered. As main policy implication, in the post-2015 sustainable development era, in order to boost inclusive development in Africa, understanding the sequencing and interaction of foreign aid types are essential.

From a broad perspective, the complementary effects are consistent with an optimistic strand of literature (Asiedu, 2014; Brempong & Racine, 2014; Kargbo & Sen, 2014), while the substitutive impacts are in accordance with the contending strand or pessimistic literature (Marglin, 2013; Monni & Spaventa, 2013; Titumir & Kamal, 2013; Wamboye et al., 2013). These results are within a broader narrative question overly pessimistic perspectives with provocative titles such as '*foreign aid follies*' (Rogoff, 2014), as well as sceptical conclusions from surveys on the development impacts of foreign aid (Doucouliagos & Paldam, 2008, 2009).

The above narrative clearly articulates the open debate surrounding the development outcomes of development assistance to developing countries. Unfortunately, the research does not engage the debate further for three fundamental reasons. First and foremost, foreign aid should be considered as policy with an outcome contingent on various factors: domestic and foreign. Therefore, it would be premature to consider development assistance as a good or bad omen for poorer nations. Conversely, it is the purpose of research by means of applied econometrics to

assess and inform policy on how measures surrounding foreign aid can be tailored to achieve optimal development outcomes. Understanding how aid types are substitutive and complementary to one another (as has been established) is a step in this direction. Second, development assistance is crucial in the post-2015 development agenda because more-developed countries are expected to help their less-developed counterparts in achieving the seventeen universal objectives. Third, whereas foreign aid has been motivated by some strategic ambitions of the Donor community, it is also the responsibility of governments in recipient nations to assist in the sequencing processes so that in the event of a negative outcome, the burden of responsibility does not rest exclusively on Donor countries.

Given that not all types of aid are disbursed simultaneously, this study has shown that understanding how various types of aid should be complemented with one another is important in tailoring such external flows for inclusive development outcomes. Hence, sequencing of aid types in the light of their substitutive or complementary characteristics is relevant in limiting the waste of foreign aid resources because some aid types broadly have similar inclusive development outcomes while others do not. However, such sequencing should be informed by empirical studies prior to their implementation in view of achieving the posited practical implications.

The main strength of the study in the light of extant literature is that to the best of our knowledge, it is the first study to assess how foreign aid types complement one another to affect inclusive human development. Other strengths of the study are linked to the methodology, notably, the empirical strategy accounts for endogeneity by: (i) controlling for time invariant omitted variables or the unobservered heterogeneity and (ii) accounting for simultaneity or reverse causality through an instrumentation process.

The principal weakness of the research is that country-specific effects are eliminated from the study because country-specific effects are by theory and application not consistent with the GMM approach. This is essentially because the lagged outcome variable is correlated with country-specific

effects and hence biases estimated coefficients. Therefore, it is relevant to eliminate country-specific effects by first differencing. Future research can improve the extant literature by investigating whether the established findings withstand empirical scrutiny when the relationships are assessed within the framework of country-specific data. Such country-specific empirical settings are essential for more targeted or country-specific policy implications.

Table 1. Definitions of variables, sources and summary statistics.

	Definitions/ Sources	Mean	S.D	Min	Max	Obs
Inclusive development	Inequality Adjusted Human Development Index UNDP, World Bank WDI.	0.486	0.130	0.129	0.809	351
Aid to Social Infrastructure	Foreign aid directed at human development purposes such as education, water supply and sanitation (log)/OECD.	2.012	0.622	0.113	3.077	424
Aid to Economic Infrastructure	Foreign aid directed at infrastructures like transport, communication and energy (log)/OECD.	0.812	1.201	-2.000	3.067	415
Aid to Productive sector	Foreign aid directed at the productive sector like agriculture, industry, mining, construction, trade and tourism(log)/OECD.	1.017	0.830	-1.699	2.741	424
Aid to Multi-Sector	Foreign aid directed at other sectorial development like rural development (log)/OECD.	1.023	0.682	-1.699	2.541	424
Programme Assistance	Foreign aid directed towards program related assistance like food aid, disaster and war (log)/OECD.	1.116	0.924	-2.000	3.103	350
Action on debt	Aid directed towards debt relief (log)/OECD.	0.535	1.310	-2.000	4.045	321
Humanitarian Assistance	Aid allocated for Humanitarian Assistance (log)/OECD	0.894	1.004	-2.000	3.038	400
GDP per capita	Gross Domestic Product Per Capita (Log)/WBDI	2.949	0.501	2.157	4.142	416
Trade	Imports plus Exports as a percentage of GDP (Log)/WBDI.	4.298	0.413	3.111	5.368	396

S.D: Standard Deviation. Min: Minimum. Max: Maximum. Obs: Observations. Log: logarithm. OECD : Organisation for Economic Co-operation & Development. UNDP: United Nations Development Program. WDI: World Bank Development Indicators.

Table 2. Correlation matrix.

SocInfra	EcoInfra	ProdSect	MultiSec	Prog. Assis	Action Debt	Human Assis	GDPpc	Trade	IHDI	
1.000	0.756	0.760	0.784	0.284	0.111	0.419	-0.108	-0.211	-0.184	SocioInfra
	1.000	0.675	0.693	0.203	0.155	0.150	0.086	-0.107	0.029	EcoInfra
		1.000	0.733	0.304	0.112	0.262	-0.149	-0.289	-0.139	ProdSec
			1.000	0.297	0.067	0.349	-0.072	-0.196	-0.189	MultiSec
				1.000	-0.022	0.351	-0.418	-0.216	-0.359	Prog. Assis
					1.000	0.006	0.063	0.021	-0.007	ActionDebt
						1.000	-0.399	-0.278	-0.553	HumaAssis
							1.000	0.366	0.740	GDPpc
								1.000	0.184	Trade
									1.000	IHDI

SocInfra: Aid to Social Infrastructure & Services. EcoInfra: Aid to Economic Infrastructure and Services. ProdSect: Aid to Production Services. MultiSect: Aid to Multi Sector Development. Prog. Assis: Programme Assistance. ActionDebt: Aid for debt relief. HumanAssis: Aid for Humanitarian Assistance. GDPpc: GDP per capita. Trade: Trade Openness. IHDI: Inequality adjusted Human Development Index. Two tailed critical values are significant for the entire correlation matrix.

Table 3. Summary of results.

	SocInfra	EconInfra	ProdSect	MultiSect	ProgAssis	ActionDebt	HumanAssis
	Panel A (from Table 4): Complementing Aid for Social Infrastructure (SocInfra)						
Unconditional effect	---	Positive	Insignificant	Positive	Insignificant	Positive	Insignificant
Conditional effect	---	Insignificant	Positive	Insignificant	Positive	Negative	Positive
Assessment of effect	---	Undefined	Complement	Undefined	Complement	Substitute	Complement
	SocInfra	EconInfra	ProdSect	MultiSect	ProgAssis	ActionDebt	HumanAssis
	Panel B (from Table 5): Complementing Aid for Economic Infrastructure (EconInfra)						
Unconditional effect	Insignificant	---	Insignificant	Insignificant	Insignificant	Positive	Insignificant
Conditional effect	Insignificant	---	Positive	Insignificant	Insignificant	Negative	Insignificant
Assessment of effect	Undefined	---	Complement	Undefined	Undefined	Substitute	Undefined
	SocInfra	EconInfra	ProdSect	MultiSect	ProgAssis	ActionDebt	HumanAssis
	Panel C (from Table 6): Complementing Aid to the Production Sector (ProdSect)						
Unconditional effect	Negative	Insignificant	---	Insignificant	Insignificant	Insignificant	Insignificant
Conditional effect	Positive	Positive	---	Insignificant	Insignificant	Negative	Insignificant
Assessment of effect	Complement	Complement	---	Undefined	Undefined	Substitute	Undefined
	SocInfra	EconInfra	ProdSect	MultiSect	ProgAssis	ActionDebt	HumanAssis
	Panel D (from Table 7): Complementing Aid to the Multi-Sector (MultiSect)						
Unconditional effect	Insignificant	Insignificant	Insignificant	---	Insignificant	Insignificant	Insignificant
Conditional effect	Insignificant	Insignificant	Insignificant	---	Insignificant	Negative	Insignificant
Assessment of effect	Undefined	Undefined	Undefined	---	Undefined	Substitute	Undefined
	SocInfra	EconInfra	ProdSect	MultiSect	ProgAssis	ActionDebt	HumanAssis
	Panel E (from Table 8): Complementing Aid for Program Assistance (ProgAss)						
Unconditional effect	Negative	Insignificant	Insignificant	Insignificant	---	Positive	Insignificant
Conditional effect	Positive	Insignificant	Insignificant	Insignificant	---	Negative	Positive
Assessment of effect	Substitute	Undefined	Undefined	Undefined	---	Substitute	Complement
	SocInfra	EconInfra	ProdSect	MultiSect	ProgAssis	ActionDebt	HumanAssis
	Panel F (from Table 9): Complementing Action on Debts (ActionDebt)						
Unconditional effect	Positive	Positive	Positive	Positive	Positive	---	Insignificant
Conditional effect	Insignificant	Negative	Negative	Negative	Negative	---	Insignificant
Assessment of effect	Undefined	Substitute	Substitute	Substitute	Substitute	---	Undefined
	SocInfra	EconInfra	ProdSect	MultiSect	ProgAssis	ActionDebt	HumanAssis
	Panel G (from Table 10): Complementing Aid for Humanitarian Assistance (HumanAssis)						
Unconditional effect	Negative	Insignificant	Insignificant	Insignificant	Insignificant	Positive	---
Conditional effect	Positive	Insignificant	Insignificant	Insignificant	Positive	Insignificant	---
Assessment of effect	Complement	Undefined	Undefined	Undefined	Complement	Undefined	---

SocInfra: Aid to Social Infrastructure & Services. EcoInfra: Aid to Economic Infrastructure and Services. ProdSect: Aid to Production Services. MultiSect: Aid to Multi Sector Development. Prog. Assis: Programme Assistance. ActionDebt: Aid for debt relief. HumanAssis: Aid for Humanitarian Assistance.

Table 4. Complementarities to aid for Social Infrastructure.

	Dependent Variable: Inequality Adjusted Inclusive Human Development						
	SocInfra	EconInfra	ProdSect	MultiSect	ProgAssis	ActionDebt	HumanAssis
IHDI (-1)	**1.131*** (0.000)**	**1.070*** (0.000)**	**1.001*** (0.000)**	**1.134*** (0.000)**	**1.070*** (0.000)**	**0.991*** (0.000)**	**1.071*** (0.000)**
Constant	0.008 (0.830)	-0.017 (0.506)	-0.050 (0.192)	0.025 (0.311)	-0.041 (0.581)	-0.051 (0.172)	**-0.049* (0.077)**
SocInfra(Ln)	**0.009** (0.012)**	**0.007*** (0.007)**	0.003 (0.202)	**0.006** (0.047)**	0.007 (0.137)	**0.014*** (0.000)**	0.004 (0.137)
EconInfra(Ln)	---	-0.003 (0.334)	---	---	---	---	---
ProdSect(Ln)	---	---	**-0.011** (0.040)**	---	---	---	---
MultiSect(Ln)	---	---	---	-0.003 (0.622)	---	---	---
ProgAssis(Ln)	---	---	---	---	**-0.011* (0.055)**	---	---
ActionDebt(Ln)	---	---	---	---	---	**0.010*** (0.003)**	---
HumanAssis(Ln)	---	---	---	---	---	---	**-0.012** (0.012)**
EconInfra(Ln) × SocInfra(Ln)	---	0.002 (0.250)	---	---	---	---	---
ProdSect(Ln) ×SocInfra(Ln)	---	---	**0.006** (0.027)**	---	---	---	---
MultiSect(Ln) × SocInfra(Ln)	---	---	---	0.0005 (0.841)	---	---	---
ProgAssis(Ln) × SocInfra(Ln)	---	---	---	---	**0.005** (0.029)**	---	---
ActionDebt(Ln) × SocInfra(Ln)	---	---	---	---	---	**-0.003*** (0.005)**	---
HumanAssis(Ln) ×SocInfra(Ln)	---	---	---	---	---	---	**0.005*** (0.008)**
GDP per capita (Ln)	**-0.038*** (0.001)**	**-0.021*** (0.006)**	-0.0005 (0.956)	**-0.042*** (0.000)**	-0.010 (0.550)	**0.020*** (0.004)**	**-0.021** (0.024)**
Trade(Ln)	0.004 (0.334)	**0.007* (0.088)**	**0.009* (0.069)**	0.005 (0.202)	0.006 (0.401)	-0.006 (0.305)	**0.016*** (0.001)**
AR(1)	**(0.233)**	**(0.231)**	**(0.219)**	**(0.231)**	**(0.229)**	**(0.123)**	**(0.248)**
AR(2)	**(0.312)**	**(0.314)**	**(0.297)**	**(0.310)**	**(0.301)**	**(0.059)**	**(0.309)**
Sargan OIR	(0.001)	(0.009)	(0.001)	(0.004)	(0.011)	(0.000)	(0.010)
Hansen OIR	**(0.547)**	**(0.935)**	**(0.437)**	**(0.572)**	**(0.896)**	**(0.720)**	**(0.314)**
DHT for instruments							
(a)Instruments in levels							
H excluding group	**(0.616)**	**(0.805)**	**(0.820)**	**(0.778)**	**(0.834)**	**(0.756)**	**(0.342)**
Dif(null, H=exogenous)	**(0.423)**	**(0.864)**	**(0.231)**	**(0.374)**	**(0.774)**	**(0.556)**	**(0.325)**
(b) IV (years, eq (diff))							
H excluding group	**(0.715)**	**(0.943)**	**(0.520)**	**(0.861)**	**(0.791)**	**(0.592)**	**(0.282)**
Dif(null, H=exogenous)	**(0.346)**	**(0.630)**	**(0.311)**	**(0.178)**	**(0.794)**	**(0.680)**	**(0.409)**
Fisher	**580.94***	**886.15***	**962.96***	**1293.05***	**720.30***	**798.50***	**1112.70***
Instruments	21	29	29	29	29	29	29
Countries	51	50	51	51	46	40	50
Observations	251	250	251	251	215	196	242

***,**,*: significance levels at 1%, 5% and 10% respectively. Econ: Economic. Prog: Programme. Hum: Humanitarian. DHT: Difference in Hansen Test for Exogeneity of Instruments Subsets. Dif: Difference. OIR: Over-identifying Restrictions Test. The significance of bold values is twofold. 1) The significance of estimated coefficients and the Wald statistics. 2) The failure to reject the null hypotheses of: a) no autocorrelation in the AR(1) & AR(2) tests and; b) the validity of the instruments in the Sargan and Hansen OIR tests. SocInfra: Social Infrastructure. EconInfra: Economic Infrastructure. ProdSect: Productive Sector. MultiSect: Multi Sector. ProgAssis: Program Assistance. ActionDebt: Action on Debt. HumanAssis: Humanitarian Assistance.

Table 5. Complementarities to aid for Economic Infrastructure.

	Dependent Variable: Inequality Adjusted Inclusive Human Development						
	EconInfra	SocInfra	ProdSect	MultiSect	ProgAssis	ActionDebt	HumanAssis
IHDI (-1)	**1.160*** (0.000)**	**1.070*** (0.000)**	**1.054*** (0.000)**	**1.177*** (0.000)**	**1.068*** (0.000)**	**1.029*** (0.000)**	**1.145*** (0.000)**
Constant	0.045 (0.233)	-0.017 (0.506)	0.012 (0.597)	**0.053** (0.041)**	**0.077** (0.032)**	-0.00004 (0.998)	0.016 (0.544)
EconInfra(Ln)	0.002 (0.150)	-0.003 (0.334)	0.001 (0.446)	0.001 (0.320)	0.002 (0.260)	**0.002** (0.015)**	0.0005 (0.742)
SocInfra(Ln)	---	**0.007*** (0.007)**	---	---	---	---	---
ProdSect(Ln)	---	---	0.0003 (0.812)	---	---	---	---
MultiSect(Ln)	---	---	---	-0.0005 (0.818)	---	---	---
ProgAssis(Ln)	---	---	---	---	0.0007 (0.760)	---	---
ActionDebt(Ln)	---	---	---	---	---	**0.002** (0.010)**	---
HumanAssis(Ln)	---	---	---	---	---	---	0.0008 (0.713)
SocInfra(Ln) ×EconInfra(Ln)	---	0.002 (0.250)	---	---	---	---	---
ProdSect(Ln) × EconInfra(Ln)	---	---	**0.001** (0.029)**	---	---	---	---
MultiSect(Ln) × EconInfra(Ln)	---	---	---	0.0004 (0.613)	---	---	---
ProgAssis(Ln) × EconInfra(Ln)	---	---	---	---	-0.0002 (0.885)	---	---
ActionDebt(Ln) × EconInfra(Ln)	---	---	---	---	---	**-0.001** (0.018)**	---
HumanAssis(Ln) × EconInfra(Ln)	---	---	---	---	---	---	0.0009 (0.242)
GDP per capita (Ln)	**-0.048*** (0.000)**	**-0.021*** (0.006)**	**-0.018*** (0.003)**	**-0.052*** (0.000)**	**-0.038*** (0.000)**	-0.003 (0.531)	**-0.038*** (0.000)**
Trade(Ln)	0.005 (0.417)	**0.007* (0.088)**	0.004 (0.225)	0.003 (0.513)	-0.0002 (0.946)	-0.00005 (0.987)	0.006 (0.280)
AR(1)	**(0.235)**	**(0.231)**	**(0.226)**	**(0.231)**	**(0.234)**	(0.076)	**(0.250)**
AR(2)	**(0.313)**	**(0.314)**	**(0.312)**	**(0.312)**	**(0.307)**	**(0.195)**	**(0.319)**
Sargan OIR	(0.001)	(0.009)	(0.002)	(0.005)	**(0.898)**	(0.000)	(0.009)
Hansen OIR	**(0.741)**	**(0.935)**	**(0.802)**	**(0.937)**	**(0.910)**	**(0.598)**	**(0.951)**
DHT for instruments							
(a)Instruments in levels							
H excluding group	**(0.636)**	**(0.805)**	**(0.693)**	**(0.662)**	**(0.558)**	**(0.358)**	**(0.574)**
Dif(null, H=exogenous)	**(0.645)**	**(0.864)**	**(0.706)**	**(0.925)**	**(0.910)**	**(0.667)**	**(0.967)**
(b) IV (years, eq (diff))							
H excluding group	**(0.623)**	**(0.943)**	**(0.751)**	**(0.912)**	**(0.894)**	**(0.676)**	**(0.841)**
Dif(null, H=exogenous)	**(0.648)**	**(0.630)**	**(0.623)**	**(0.716)**	**(0.623)**	**(0.370)**	**(0.895)**
Fisher	**505.51***	**886.15***	**948.87***	**986.70***	**1452.28***	**2108.77***	**484.81***
Instruments	21	29	29	29	29	29	29
Countries	50	50	50	50	45	40	49
Observations	250	250	250	250	214	196	241

***,**,*: significance levels at 1%, 5% and 10% respectively. Econ: Economic. Prog: Programme. Hum: Humanitarian. DHT: Difference in Hansen Test for Exogeneity of Instruments Subsets. Dif: Difference. OIR: Over-identifying Restrictions Test. The significance of bold values is twofold. 1) The significance of estimated coefficients and the Wald statistics. 2) The failure to reject the null hypotheses of: a) no autocorrelation in the AR(1) & AR(2) tests and; b) the validity of the instruments in the Sargan and Hansen OIR tests. SocInfra: Social Infrastructure. EconInfra: Economic Infrastructure. ProdSect: Productive Sector. MultiSect: Multi-Sector. ProgAssis: Program Assistance. ActionDebt: Action on Debt. HumanAssis: Humanitarian Assistance.

Table 6. Complementarities to aid the Production Sector.

	Dependent Variable: Inequality Adjusted Inclusive Human Development						
	ProdSect	EconInfra	SocInfra	MultiSect	ProgAssis	ActionDebt	HumanAssis
IHDI (-1)	**1.146*** (0.000)**	**1.054*** (0.000)**	**1.001*** (0.000)**	**1.136*** (0.000)**	**1.088*** (0.000)**	**1.023*** (0.000)**	**1.148*** (0.000)**
Constant	0.057 (0.386)	0.012 (0.597)	-0.050 (0.192)	**0.063** (0.036)**	0.022 (0.684)	-0.013 (0.705)	0.011 (0.716)
ProdSect(Ln)	0.003 (0.186)	0.0003 (0.812)	**-0.011** (0.040)**	0.0004 (0.883)	0.002 (0.237)	**0.005** (0.021)**	0.002 (0.412)
EconInfra(Ln)	---	0.001 (0.446)	---	---	---	---	---
SocInfra(Ln)	---	---	0.003 (0.202)	---	---	---	---
MultiSect(Ln)	---	---	---	-0.001 (0.556)	---	---	---
ProgAssis(Ln)	---	---	---	---	0.0002 (0.927)	---	---
ActionDebt(Ln)	---	---	---	---	---	**0.004*** (0.001)**	---
HumanAssis(Ln)	---	---	---	---	---	---	-0.001 (0.612)
EconInfra(Ln) × ProdSect(Ln)	---	**0.001** (0.029)**	---	---	---	---	---
SocInfra(Ln) × ProdSect(Ln)	---	---	**0.006** (0.027)**	---	---	---	---
MultiSect(Ln) × ProdSect(Ln)	---	---	---	0.0006 (0.726)	---	---	---
ProgAssis(Ln) × ProdSect(Ln)	---	---	---	---	0.0001 (0.930)	---	---
ActionDebt(Ln) × ProdSect(Ln)	---	---	---	---	---	**-0.002*** (0.004)**	---
HumanAssis(Ln) × ProdSect(Ln)	---	---	---	---	---	---	0.001 (0.467)
GDP per capita (Ln)	**-0.045*** (0.005)**	**-0.018*** (0.003)**	**-0.0005 (0.956)**	**-0.040*** (0.000)**	**-0.027** (0.010)**	-0.0005 (0.696)	**-0.037*** (0.000)**
Trade(Ln)	0.0008 (0.928)	0.004 (0.225)	**0.009* (0.069)**	-0.001 (0.830)	0.003 (0.651)	0.0003 (0.952)	0.006 (0.248)
AR(1)	**(0.239)**	**(0.226)**	**(0.219)**	**(0.229)**	**(0.231)**	(0.081)	**(0.244)**
AR(2)	**(0.321)**	**(0.312)**	**(0.297)**	**(0.317)**	**(0.309)**	**(0.175)**	**(0.312)**
Sargan OIR	(0.000)	(0.002)	(0.001)	(0.004)	(0.011)	(0.000)	(0.011)
Hansen OIR	**(0.517)**	**(0.802)**	**(0.437)**	**(0.781)**	**(0.905)**	**(0.737)**	**(0.569)**
DHT for instruments							
(a)Instruments in levels							
H excluding group	**(0.483)**	**(0.693)**	**(0.820)**	**(0.578)**	**(0.619)**	**(0.615)**	**(0.394)**
Dif(null, H=exogenous)	**(0.455)**	**(0.706)**	**(0.231)**	**(0.745)**	**(0.895)**	**(0.663)**	**(0.602)**
(b) IV (years, eq (diff))							
H excluding group	**(0.309)**	**(0.751)**	**(0.520)**	**(0.845)**	**(0.719)**	**(0.504)**	**(0.812)**
Dif(null, H=exogenous)	**(0.566)**	**(0.623)**	**(0.311)**	**(0.445)**	**(0.907)**	**(0.834)**	**(0.213)**
Fisher	**561.91***	**948.87***	**962.96***	**841.23***	**1637.88***	**733.07***	**526.03***
Instruments	19	19	29	29	29	29	29
Countries	51	50	51	51	46	40	50
Observations	251	250	251	251	215	196	242

***,**,*: significance levels at 1%, 5% and 10% respectively. Econ: Economic. Prog: Programme. Hum: Humanitarian. DHT: Difference in Hansen Test for Exogeneity of Instruments Subsets. Dif: Difference. OIR: Over-identifying Restrictions Test. The significance of bold values is twofold. 1) The significance of estimated coefficients and the Wald statistics. 2) The failure to reject the null hypotheses of: a) no autocorrelation in the AR(1) & AR(2) tests and; b) the validity of the instruments in the Sargan and Hansen OIR tests. SocInfra: Social Infrastructure. EconInfra: Economic Infrastructure. ProdSect: Productive Sector. MultiSect: Multi-Sector. ProgAssis: Program Assistance. ActionDebt: Action on Debt. HumanAssis: Humanitarian Assistance.

Table 7. Complementarities to aid to the Multi-sector.

	Dependent Variable: Inequality Adjusted Inclusive Human Development						
	MultiSect	EconInfra	ProdSect	SocInfra	ProgAssis	ActionDebt	HumanAssis
IHDI (-1)	**1.191*** **	**1.177*** **	**1.136*** **	**1.134*** **	**1.122*** **	**1.024*** **	**1.134*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Constant	**0.073** **	**0.053** **	**0.063** **	0.025	**0.090*** **	0.019	0.027
	(0.018)	**(0.041)**	**(0.036)**	(0.311)	**(0.002)**	(0.520)	(0.417)
MultiSect(Ln)	-0.0007	-0.0005	-0.001	-0.003	-0.003	0.002	-0.0007
	(0.783)	(0.818)	(0.556)	(0.622)	(0.217)	(0.225)	(0.774)
EconInfra(Ln)	---	0.001	---	---	---	---	---
		(0.320)					
ProdSect(Ln)	---	---	0.0004	---	---	---	---
			(0.883)				
SocInfra(Ln)	---	---	---	**0.006** **	---	---	---
				(0.047)			
ProgAssis(Ln)	---	---	---	---	-0.003	---	---
					(0.211)		
ActionDebt(Ln)	---	---	---	---	---	**0.006*** **	---
						(0.002)	
HumanAssis(Ln)	---	---	---	---	---	---	0.001
							(0.392)
EconInfra(Ln) × MultiSect(Ln)	---	0.0004	---	---	---	---	---
		(0.613)					
ProdSect(Ln) × MultiSect(Ln)	---	---	0.0006	---	---	---	---
			(0.726)				
SocInfra(Ln) × MultiSect(Ln)	---	---	---	0.0005	---	---	---
				(0.841)			
ProgAssis(Ln) × MultiSect(Ln)	---	---	---	---	0.002	---	---
					(0.145)		
ActionDebt(Ln) × MultiSect(Ln)	---	---	---	---	---	**-0.003*** **	---
						(0.008)	
HumanAssis(Ln) × MultiSect(Ln)	---	---	---	---	---	---	0.0006
							(0.653)
GDP per capita (Ln)	**-0.056*** **	**-0.052*** **	**-0.040*** **	**-0.042*** **	**-0.045*** **	-0.003	**-0.037*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	(0.580)	**(0.000)**
Trade(Ln)	0.0008	0.003	-0.001	0.005	-0.002	-0.004	0.004
	(0.897)	(0.513)	(0.830)	(0.202)	(0.549)	(0.367)	(0.464)
AR(1)	**(0.233)**	**(0.231)**	**(0.229)**	**(0.231)**	**(0.234)**	**(0.103)**	**(0.244)**
AR(2)	**(0.316)**	**(0.312)**	**(0.317)**	**(0.310)**	**(0.309)**	**(0.049)**	**(0.318)**
Sargan OIR	(0.001)	(0.005)	(0.004)	(0.004)	(0.011)	(0.000)	(0.005)
Hansen OIR	**(0.580)**	**(0.937)**	**(0.781)**	**(0.572)**	**(0.960)**	**(0.121)**	**(0.897)**
DHT for instruments							
(a)Instruments in levels							
H excluding group	**(0.655)**	**(0.662)**	**(0.578)**	**(0.778)**	**(0.844)**	**(0.878)**	**(0.537)**
Dif(null, H=exogenous)	**(0.441)**	**(0.925)**	**(0.745)**	**(0.374)**	**(0.900)**	**(0.034)**	**(0.917)**
(b) IV (years, eq (diff))							
H excluding group	**(0.495)**	**(0.912)**	**(0.845)**	**(0.861)**	**(0.822)**	**(0.144)**	**(0.674)**
Dif(null, H=exogenous)	**(0.530)**	**(0.716)**	**(0.445)**	**(0.178)**	**(0.946)**	**(0.235)**	**(0.934)**
Fisher	**577.55*** **	**986.70*** **	**841.23*** **	**1293.05*** **	**952.93*** **	**1067.01*** **	**691.54*** **
Instruments	21	29	29	29	29	29	29
Countries	51	50	51	51	46	40	50
Observations	251	250	251	251	215	196	242

***,**,*: significance levels at 1%, 5% and 10% respectively. Econ: Economic. Prog: Programme. Hum: Humanitarian. DHT: Difference in Hansen Test for Exogeneity of Instruments Subsets. Dif: Difference. OIR: Over-identifying Restrictions Test. The significance of bold values is twofold. 1) The significance of estimated coefficients and the Wald statistics. 2) The failure to reject the null hypotheses of: a) no autocorrelation in the AR(1) & AR(2) tests and; b) the validity of the instruments in the Sargan and Hansen OIR tests. SocInfra: Social Infrastructure. EconInfra: Economic Infrastructure. ProdSect: Productive Sector. MultiSect: Multi-Sector. ProgAssis: Program Assistance. ActionDebt: Action on Debt. HumanAssis: Humanitarian Assistance.

Table 8. Complementarities to aid for Programme Assistance.

	Dependent Variable: Inequality Adjusted Inclusive Human Development						
	ProgAssis	EconInfra	ProdSect	MultiSect	SocInfra	ActionDebt	HumanAssis
IHDI (-1)	**1.150*** **	**1.068*** **	**1.088*** **	**1.22*** **	**1.070*** **	**1.022*** **	**1.097*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Constant	0.082	**0.077** **	0.022	**0.090*** **	-0.041	0.021	0.010
	(0.232)	**(0.032)**	(0.684)	**(0.002)**	(0.581)	(0.129)	(0.785)
ProgAssis(Ln)	0.001	0.0007	0.0002	-0.003	**-0.011***	**0.003** **	-0.0009
	(0.392)	(0.760)	(0.927)	(0.211)	**(0.055)**	**(0.024)**	(0.309)
EconInfra(Ln)	---	0.002	---	---	---	---	---
		(0.260)					
ProdSect(Ln)	---	---	0.002	---	---	---	---
			(0.237)				
MultiSect(Ln)	---	---	---	-0.003	---	---	---
				(0.217)			
SocInfra(Ln)	---	---	---	---	0.007	---	---
					(0.137)		
ActionDebt(Ln)	---	---	---	---	---	**0.003*** **	---
						(0.001)	
HumanAssis(Ln)	---	---	---	---	---	---	-0.003
							(0.173)
EconInfra(Ln) × ProgAssis(Ln)	---	-0.0002	---	---	---	---	---
		(0.885)					
ProdSect(Ln) × ProgAssis(Ln)	---	---	0.0001	---	---	---	---
			(0.930)				
MultiSect(Ln) × ProgAssis(Ln)	---	---	---	0.002	---	---	---
				(0.145)			
SocInfra(Ln) × ProgAssis(Ln)	---	---	---	---	**0.005** **	---	---
					(0.029)		
ActionDebt(Ln) × ProgAssis(Ln)	---	---	---	---	---	**-0.001*** **	---
						(0.006)	
HumanAssis(Ln) × ProgAssis(Ln)	---	---	---	---	---	---	**0.004*** **
							(0.001)
GDP per capita (Ln)	**-0.049*** **	**-0.038*** **	**-0.027** **	**-0.045*** **	-0.010	-0.004	**-0.022** **
	(0.002)	**(0.000)**	**(0.010)**	**(0.000)**	(0.550)	(0.424)	**(0.019)**
Trade(Ln)	-0.002	-0.0002	0.003	-0.002	0.006	-0.004	0.003
	(0.767)	(0.946)	(0.651)	(0.549)	(0.401)	(0.111)	(0.116)
AR(1)	**(0.233)**	**(0.234)**	**(0.231)**	**(0.234)**	**(0.229)**	**(0.095)**	**(0.245)**
AR(2)	**(0.312)**	**(0.307)**	**(0.309)**	**(0.309)**	**(0.301)**	**(0.650)**	**(0.305)**
Sargan OIR	(0.001)	(0.003)	(0.011)	(0.011)	(0.011)	(0.000)	(0.014)
Hansen OIR	**(0.796)**	**(0.898)**	**(0.905)**	**(0.960)**	**(0.896)**	**(0.296)**	**(0.775)**
DHT for instruments							
(a)Instruments in levels							
H excluding group	**(0.611)**	**(0.558)**	**(0.619)**	**(0.844)**	**(0.834)**	**(0.106)**	**(0.583)**
Dif(null, H=exogenous)	**(0.732)**	**(0.910)**	**(0.895)**	**(0.900)**	**(0.774)**	**(0.584)**	**(0.733)**
(b) IV (years, eq (diff))							
H excluding group	**(0.421)**	**(0.894)**	**(0.719)**	**(0.822)**	**(0.791)**	**(0.326)**	**(0.681)**
Dif(null, H=exogenous)	**(0.887)**	**(0.623)**	**(0.907)**	**(0.946)**	**(0.794)**	**(0.314)**	**(0.666)**
Fisher	**609.12*** **	**1452.28*** **	**1637.88**	**952.93*** **	**720.30*** **	**4401.25*** **	**1625.90*** **
Instruments	21	29	29	29	29	29	29
Countries	46	45	46	46	46	37	45
Observations	215	214	215	215	215	177	211

***,**,*: significance levels at 1%, 5% and 10% respectively. Econ: Economic. Prog: Programme. Hum: Humanitarian. DHT: Difference in Hansen Test for Exogeneity of Instruments Subsets. Dif: Difference. OIR: Over-identifying Restrictions Test. The significance of bold values is twofold. 1) The significance of estimated coefficients and the Wald statistics. 2) The failure to reject the null hypotheses of: a) no autocorrelation in the AR(1) & AR(2) tests and; b) the validity of the instruments in the Sargan and Hansen OIR tests. SocInfra: Social Infrastructure. EconInfra: Economic Infrastructure. ProdSect: Productive Sector. MultiSect: Multi-Sector. ProgAssis: Program Assistance. ActionDebt: Action on Debt. HumanAssis: Humanitarian Assistance.

Table 9. Complementarities to Action on Debt.

	Dependent Variable: Inequality Adjusted Inclusive Human Development						
	ActionDebt	EconInfra	ProdSect	MultiSect	ProgAssis	SocInfra	HumanAssis
IHDI (-1)	**1.068*** (0.000)**	**1.029*** (0.000)**	**1.023*** (0.000)**	**1.024*** (0.000)**	**1.022*** (0.000)**	**0.991*** (0.000)**	**1.082*** (0.000)**
Constant	0.021 (0.364)	-0.00004 (0.998)	-0.013 (0.705)	0.019 (0.520)	0.021 (0.129)	-0.051 (0.172)	-0.025 (0.101)
ActionDebt(Ln)	0.0002 (0.764)	**0.002** (0.010)**	**0.004*** (0.001)**	**0.006*** (0.002)**	**0.003*** (0.001)**	**0.010*** (0.003)**	0.0005 (0.435)
EconInfra(Ln)	---	**-0.001** (0.018)**	---	---	---	---	---
ProdSect(Ln)	---	---	**0.005** (0.021)**	---	---	---	---
MultiSect(Ln)	---	---	---	0.002 (0.225)	---	---	---
ProgAssis(Ln)	---	---	---	---	**0.003** (0.024)**	---	---
SocInfra(Ln)	---	---	---	---	---	**0.014*** (0.000)**	---
HumanAssis(Ln)	---	---	---	---	---	---	**0.004*** (0.000)**
EconInfra(Ln) × ActionDebt(Ln)	---	-0.003 (0.531)	---	---	---	---	---
ProdSect(Ln) × ActionDebt(Ln)	---	---	**-0.002*** (0.004)**	---	---	---	---
MultiSect(Ln) × ActionDebt(Ln)	---	---	---	**-0.003*** (0.008)**	---	---	---
ProgAssis(Ln) × ActionDebt(Ln)	---	---	---	---	**-0.001*** (0.006)**	---	---
SocInfra(Ln)× ActionDebt(Ln)	---	---	---	---	---	**-0.003*** (0.005)**	---
HumanAssis(Ln) × ActionDebt(Ln)	---	---	---	---	---	---	0.0001 (0.632)
GDP per capita (Ln)	**-0.019** (0.013)**	-0.00005 (0.901)	-0.0005 (0.969)	-0.003 (0.580)	-0.004 (0.424)	**0.020*** (0.004)**	**-0.012* (0.069)**
Trade(Ln)	0.001 (0.733)	0.0002 (0.901)	0.0003 (0.952)	-0.004 (0.367)	-0.004 (0.111)	-0.006 (0.305)	**0.005* (0.099)**
AR(1)	**(0.115)**	**(0.076)**	**(0.081)**	**(0.103)**	**(0.095)**	**(0.123)**	**(0.120)**
AR(2)	**(0.209)**	**(0.195)**	**(0.175)**	(0.049)	**(0.650)**	(0.059)	**(0.103)**
Sargan OIR	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hansen OIR	**(0.440)**	**(0.598)**	**(0.737)**	**(0.121)**	**(0.296)**	**(0.720)**	**(0.736)**
DHT for instruments							
(a)Instruments in levels							
H excluding group	**(0.101)**	**(0.358)**	**(0.615)**	**(0.878)**	**(0.106)**	**(0.756)**	**(0.428)**
Dif(null, H=exogenous)	**(0.805)**	**(0.667)**	**(0.663)**	(0.034)	**(0.584)**	**(0.556)**	**(0.782)**
(b) IV (years, eq (diff))							
H excluding group	**(0.233)**	**(0.676)**	**(0.504)**	**(0.144)**	**(0.326)**	**(0.592)**	**(0.795)**
Dif(null, H=exogenous)	**(0.619)**	**(0.370)**	**(0.834)**	**(0.235)**	**(0.314)**	**(0.680)**	**(0.437)**
Fisher	**834.50***	**2108.77***	**733.07***	**1067.01***	**4401.25***	**798.50***	**2931.08***
Instruments	21	29	29	29	29	29	29
Countries	40	40	40	40	37	40	39
Observations	196	196	196	196	177	196	192

***,**,*: significance levels at 1%, 5% and 10% respectively. Econ: Economic. Prog: Programme. Hum: Humanitarian. DHT: Difference in Hansen Test for Exogeneity of Instruments Subsets. Dif: Difference. OIR: Over-identifying Restrictions Test. The significance of bold values is twofold. 1) The significance of estimated coefficients and the Wald statistics. 2) The failure to reject the null hypotheses of: a) no autocorrelation in the AR(1) & AR(2) tests and; b) the validity of the instruments in the Sargan and Hansen OIR tests. SocInfra: Social Infrastructure. EconInfra: Economic Infrastructure. ProdSect: Productive Sector. MultiSect: Multi-Sector. ProgAssis: Program Assistance. ActionDebt: Action on Debt. HumanAssis: Humanitarian Assistance.

Table 10. Complementarities to aid for Humanitarian Assistance.

	Dependent Variable: Inequality Adjusted Inclusive Human Development						
	HumanAssis	EconInfra	ProdSect	MultiSect	ProgAssis	ActionDebt	SocInfra
IHDI (-1)	**1.178*** (0.000)**	**1.145*** (0.000)**	**1.148*** (0.000)**	**1.134*** (0.000)**	**1.097*** (0.000)**	**1.082*** (0.000)**	**1.071*** (0.000)**
Constant	0.001 (0.971)	0.016 (0.544)	0.011 (0.716)	0.027 (0.417)	0.010 (0.785)	-0.025 (0.101)	**-0.049* (0.077)**
HumanAssis(Ln)	0.002 (0.264)	0.0008 (0.713)	-0.001 (0.612)	0.001 (0.392)	-0.003 (0.173)	**0.004*** (0.000)**	**-0.012** (0.012)**
EconInfra(Ln)	---	0.0005 (0.742)	---	---	---	---	---
ProdSect(Ln)	---	---	0.002 (0.412)	---	---	---	---
MultiSect(Ln)	---	---	---	-0.0007 (0.774)	---	---	---
ProgAssis(Ln)	---	---	---	---	-0.0009 (0.309)	---	---
ActionDebt(Ln)	---	---	---	---	---	0.0005 (0.435)	---
SocInfra(Ln)	---	---	---	---	---	---	0.004 (0.137)
EconInfra(Ln) × HumanAssis(Ln)	---	0.0009 (0.242)	---	---	---	---	---
ProdSect(Ln) × HumanAssis(Ln)	---	---	0.001 (0.467)	---	---	---	---
MultiSect(Ln) × HumanAssis(Ln)	---	---	---	0.0006 (0.653)	---	---	---
ProgAssis(Ln) × HumanAssis(Ln)	---	---	---	---	**0.004*** (0.001)**	---	---
ActionDebt(Ln) × HumanAssis(Ln)	---	---	---	---	---	0.0001 (0.632)	---
SocInfra(Ln)× HumanAssis(Ln)	---	---	---	---	---	---	**0.005*** (0.008)**
GDP per capita (Ln)	**-0.046*** (0.000)**	**-0.038*** (0.000)**	**-0.037*** (0.000)**	**-0.037*** (0.000)**	**-0.022** (0.019)**	**-0.012* (0.069)**	**-0.021** (0.024)**
Trade(Ln)	**0.011** (0.049)**	0.006 (0.280)	0.006 (0.248)	0.004 (0.464)	0.002 (0.634)	**0.005* (0.099)**	**0.016*** (0.001)**
AR(1)	**(0.240)**	**(0.250)**	**(0.244)**	**(0.244)**	**(0.245)**	**(0.120)**	**(0.248)**
AR(2)	**(0.313)**	**(0.319)**	**(0.312)**	**(0.318)**	**(0.305)**	**(0.103)**	**(0.309)**
Sargan OIR	(0.004)	(0.009)	(0.011)	(0.005)	(0.014)	(0.000)	(0.010)
Hansen OIR	**(0.924)**	**(0.951)**	**(0.569)**	**(0.897)**	**(0.775)**	**(0.736)**	**(0.314)**
DHT for instruments							
(a)Instruments in levels							
H excluding group	**(0.708)**	**(0.574)**	**(0.394)**	**(0.537)**	**(0.583)**	**(0.428)**	**(0.342)**
Dif(null, H=exogenous)	**(0.889)**	**(0.967)**	**(0.602)**	**(0.917)**	**(0.733)**	**(0.782)**	**(0.325)**
(b) IV (years, eq (diff))							
H excluding group	**(0.730)**	**(0.841)**	**(0.812)**	**(0.674)**	**(0.681)**	**(0.795)**	**(0.282)**
Dif(null, H=exogenous)	**(0.918)**	**(0.895)**	**(0.213)**	**(0.934)**	**(0.666)**	**(0.437)**	**(0.409)**
Fisher	**578.05*** **	**484.81*** **	**526.03*** **	**691.54*** **	**1625.90*** **	**2931.08*** **	**1112.70*** **
Instruments	25	29	29	29	29	29	29
Countries	50	49	50	50	45	39	50
Observations	242	241	242	242	211	192	242

***,**,*: significance levels at 1%, 5% and 10% respectively. Econ: Economic. Prog: Programme. Hum: Humanitarian. DHT: Difference in Hansen Test for Exogeneity of Instruments Subsets. Dif: Difference. OIR: Over-identifying Restrictions Test. The significance of bold values is twofold. 1) The significance of estimated coefficients and the Wald statistics. 2) The failure to reject the null hypotheses of: a) no autocorrelation in the AR(1) & AR(2) tests and; b) the validity of the instruments in the Sargan and Hansen OIR tests. SocInfra: Social Infrastructure. EconInfra: Economic Infrastructure. ProdSect: Productive Sector. MultiSect: Multi-Sector. ProgAssis: Program Assistance. ActionDebt: Action on Debt. HumanAssis: Humanitarian Assistance.

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