HOW DOES DEVELOPMENT AID FROM OECD IMPACT AGRICULTURAL DEVELOPMENT IN SUB-SAHARAN AFRICA?

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By

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ABSTRACT

In recent years, agricultural aid has become one of the most common policy instruments used by the international community to support developing and less developed countries. It is of particular importance for promoting economic development, reducing poverty, and increasing social stability for recipient countries. Over the past three decades, productivity growth has remained slow in Sub-Saharan African (SSA) countries. The international community has strengthened measures to deal with increasing economic challenges faced by these countries. Agricultural development, with high contributions to the GDP growth, is expected to promote productivity and enhance their global competitiveness. But there have been growing concerns about aid effectiveness in recent years. These concerns motivate the question key to this study: *How does agricultural aid from OECD donor countries impact agricultural development in Sub-Saharan African countries*? This study utilizes data collected by the OECD, the World Bank, and the Food and Agriculture Organization(FAO) of the United Nations from 2002 through 2011 across 44 SSA countries. The analysis seeks to examine agricultural aid effectiveness in Sub-Saharan Africa, and in general, finds no evidence that agricultural aid and agricultural growth has a robust relationship.

The research and writing of this thesis is
dedicated to everyone who helped along the way.

Many thanks,
Yuanxin Fang

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INTRODUCTION

In recent years, there have been growing concerns about agricultural development in Sub-Saharan Africa (SSA). Agricultural development is considered one of the most critical aspects of eliminating poverty (Christiaensen, Demery & Jesper Kühl, 2006; Godoy & Dewbre, 2010; Grewal, Grunfeld & Peter Sheehan, 2012) and promoting sustainable development in these developing and less-developed countries. While governments are making many efforts to create strategic initiatives to address agricultural problems, the international community is also considering development assistance to these countries. However, there is growing skepticisms about aid effectiveness.

Over the past three decades, according to World Bank national accounts data, the net output of agricultural sector in Sub-Saharan Africa, measured by current US dollars, has more than triple from 61.96 billion in 1996 to 276.32 billion in 2016, as shown in Figure 1.

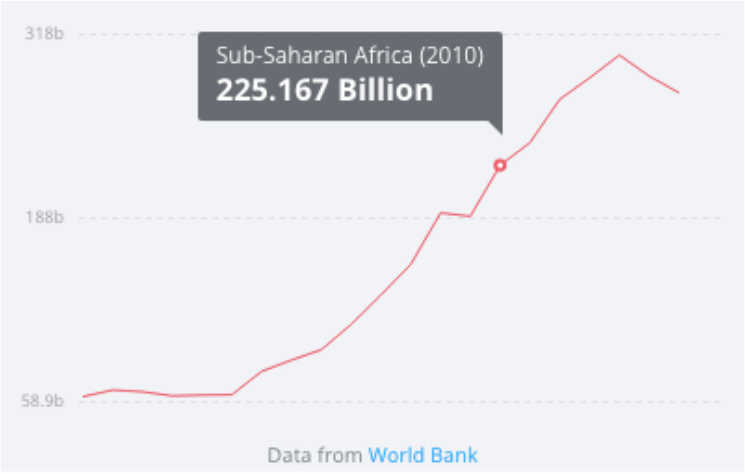


Figure 1 Agriculture, value added (current US$)

Contained within this overall trend is, however, a slow decline in agricultural net output since 2008, and the output has decreased by 25.56 billion dollars from 2014 to 2016. Alabi (2014) has argued that the decline in agricultural aid and government

expenditures on agriculture are two major contributing factors to low agricultural growth in Sub-Saharan Africa (SSA). The OECD's statistics report (2010) shows that since the mid 1980s the agricultural aid from the Development Assistance Committee (DAC) members has fallen by 43%. Dresrusse (1995) argued that this sharp decline in agricultural assistance was caused by the fact that some development theories reject the positive role of investment in agriculture in promoting economic development. The skepticism about foreign aid effectiveness is rising in recent years. For example, Deaton (2015) argued against ODA and blamed it for not producing growth but undermining local governance. Following the skepticism, there is growing concerns on whether to increase foreign aid to stimulate agricultural growth in developing countries. Donors under pressure to increase aid effectiveness would probably choose not to invest in agriculture which is risky and expensive, and may not have apparently dubious returns. (Islam, 2011) It is therefore pertinent for this paper to examine whether agricultural aid might have contributed to agricultural growth in SSA.

This paper uses country-level panel data from 2002 to 2011to study the relationship between DAC members' aid disbursement to agriculture and agricultural net output in SSA.

Although there is ample evidence in the literature that examines the impact of foreign aid on agricultural development in African countries, most studies focus their analysis on individual countries. Given that the DAC has expanded its aid to most Sub-Saharan African countries, it would be meaningful to its overall impact in these countries with

similar geographical and climate conditions. Also, many previous researchers looked at data between 1973 and 2000, which have provided a less timely estimate of the foreign aid's impact. The economic development and political environment of these countries have changed rapidly over s a long period. It is important to estimate the effect using the most recent data.

This paper is organized as follows. The second section will further introduce the background on DAC aid and other previous foreign aid to agricultural growth in 44 SSA countries. Section III reviews previous studies which discuss aid effectiveness. Section IV, V, VI, VII respectively present the hypothesis, conceptual framework, data and methods, and descriptive statistics. Finally, the results will be summarized, and their policy implications will be further discussed.

BACKGROUND

The OECD's Development Assistance Committee (DAC) serves as an international forum of 30 country funders of aid. The DAC aid disbursement for agriculture record the actual value of transfer in the form of financial resources, rural goods, and services to recipients from the 30 DAC donor countries. The aid is used for improvement in agricultural policy and management, agriculture input, agricultural environmental resources, agrarian reforms, relevant education/training/research, and other services.

Since 2008, there has been a growing concern over the need to scale up agricultural aid in developing countries. The United Nations Millennium Declaration signed in 2000 emphasizes the achievement of its goal of poverty reduction through agriculture-led economic growth. The Genoa Summit of the G8 in July 2001 reiterated the significance of agriculture in poverty reduction. According to the FAO (2009), the needs for agricultural aid increased greatly in African countries, beyond current commitments. The 2009 G8 donors pledged 20 billion dollars' commitment for agricultural development, with a large part for Sub-Saharan Africa. These initiatives have received different reviews. Some researchers claimed that there had been an increase in agricultural aid to Sub-Saharan Africa. Duncan (2014) estimated development aid to the agriculture sector in sub-Saharan Africa had more than doubled between 2003 and 2012, from US$1.1 billion in 2003 to US$2.5 billion in 2012, with an increase of 121%.

However, other institutions claimed that the supply of financial support for agriculture failed to meet the needs. The FAO (2014) reported that the share of agriculture in annual

ODA commitments for Sub-Saharan Africa fell from 25% in 1988 to only five percent in 2005, with the amount fluctuating between US$1.8 billion and US$2.1 billion. This decline in the share was "faster than its real dollar equivalent" (OECD, 2003) and the International Food Policy Research Institute estimated that Sub-Saharan Africa would require an additional annual agricultural investment of approximately US$6 billion to US$7 billion.

The increasing attention to the significance of agricultural assistance is accompanied by the debates about the foreign aid effectiveness. Some research even indicated that the foreign aid would have an adverse impact on the development of receipt countries (Boone, 1995; Lancaster, 1999; Knack, 2001). These doubts have stimulated the introduction of standards on evaluating donor performance. In 2005, at the Second High Level Forum on Aid Effectiveness, the Paris Declaration on Aid Effectiveness was endorsed, and it developed principles to evaluate donor programs. They focus on five fundamental principles: that high-quality aid should be 1) letting developing countries to decide their own plans and path"; 2) aligning behind these objectives and using local system; 3) simplifying procedures and avoiding duplication; 4) shifting focus to development results; and 5) being accountable for the development results. Based on these principles and indicators, Birdsall and Kharas (2010, 2012) developed QuODA methodology, a mechanism for ongoing, independent, annual assessments of donor performance. Then Elliott and Collins (2012) applied this QuODA methodology to compare agricultural aid programs and show the ranking of donors on different dimensions of quality of agricultural aid.

LITERATURE REVIEW

There is extensive literature testing the foreign aid effectiveness, but offering conflicting findings regarding the relationship between foreign aid and economic development in recipients. One side argues that there is a causal link between foreign aid and development. International support is believed to promote improvement on infrastructure, facilities, use of lands, and agriculture-related education, training, and research.

Supporters claim that aid can improve agricultural productivity and reduce food insecurity in rural areas (World Bank, 2010). The other side argues that foreign assistance encourages corruption and poor governance and cause moral hazard. (Boone, 1995; Lancaster, 1999)

Aid effectiveness

This section summarizes the existing empirical work in this area and describes how the present study contributes to the existing literature. Doucouliagos and Paldam (2007) said that the exsiting aid effectiveness literature contains approximately one hundred papers that see aid as an important tool for developing countries to generate development. Many of them found a positive relationship between foreign aid and economic growth. (Burnside & Dollar, 1997; Durbarry, 1998) The recent study from Bearce and Tirone (2010) used Generalized Method of Moments method to show that foreign aid from Western donors could encourage economic reform and investment, thereby promoting economic development. Loxley and Sackey (2008) argued that foreign aid has a positive impact on

growth, and it is statistically significant, but the impact of aid is diminishing, and the turning point occurs at substantial additional increases in assistance.

However, some research reaches an opposite conclusion. Boone (1995) found that the 1970s and 1980s saw a significant increase in foreign aid but zero economic growth in African countries. Lancaster (1999) found that many aid projects in Africa had suffered from poor performance, with high proportions of failed or only partially successful projects and a large number of problems generated by the projects. Additionally, Gillanders (2010) examined the effectiveness of foreign aid by comparing five Sub-Saharan African countries and concluded that the correlation between agricultural aid and crop production becomes weaker once controlling for other factors, most of which are characteristics of these countries' economic policies, political institutions, and aid dependence levels. Roger (2014) maintained that aid-giving had been facing some unresolved challenges, such as finding the best way to administer aid allocation to maximize its impact. Elliott and Collins (2012) suggested that the indicators chosen to represent dimensions including results, country ownership and alignment, harmonization, and mutual accountability that are associated with higher quality aid, which, in turn, is expected to deliver higher development impact.

The relationship between agricultural aid and agricultural development

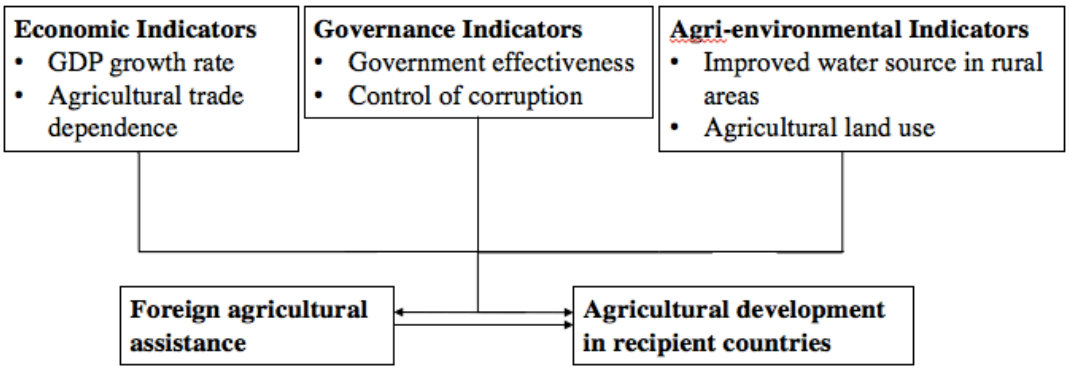
Most current literature investigates the relationship between aid and economic development in recipient countries, while only several previous studies directly examine the impact of agricultural aid on agricultural development. Adopting the Granger causality

test, generalized method of moments, and variance decomposition methodologies, in which mixed models are used for total, bilateral, and multilateral foreign agriculture aid from OECD to Sub-Saharan African countries, Alabi (2014) finds that the bilateral foreign agricultural aid has a positive effect on agricultural GDP on aid recipient countries at a significance level of 0.1. But his study indicates no significant relationship between multilateral aid and agricultural productivity. The cause for this different result, according to Alabi, might be the higher amount of the bilateral aid relative to multilateral aid. Kaya and Gunter (2013) employed country fixed effects regression models to assess the impact of agricultural aid. They randomly selected 112 recipient countries and collected annual data from 1974 through 2005. They used agriculture value added as its dependent variable, which has a positive and statistically significant correlation with foreign aid for rural development.

The present study contributes to the literature in multiple ways. First, using up-to-date data from the World Bank, it sheds new light on the previous findings of the association between agricultural development and foreign aid. In addition, taking note of the differences in the key independent variables representing agricultural aid of the two most relevant studies– Kaya and Gunter (2008) uses agricultural assistance for rural development, while Alabi (2014) uses the ODA aid disbursement for agriculture from all DAC donors– this study provides an opportunity to test whether this difference in independent variables leads to different results. Last, rather than focusing only on country-specific unobserved heterogeneity, this paper also include year fixed effects to control for characteristics that change over time but do not vary among countries.

CONCEPTUAL FRAMEWORK

Given previous research on aid effectiveness and the way in which foreign aid would influence the recipient countries' agricultural development, I hypothesize that agricultural assistance provided by the DAC member donors have a positive and strong correlation with agricultural growth in Sub-Saharan African countries. With a number of studies having emerged which explore the relationship between aid disbursement for agriculture and agriculture value added, I assume the general model in which agricultural growth is associated with economic, governance and agricultural environmental factors. And I predict that the DAC agricultural aid has had a weaker correlation with the agricultural growth if these key factors are considered. Figure 1 illustrates the relationship between key factors and agricultural development and more details will be discussed below.



Description of components

The dependent variable is the value added in agriculture as a percentage of GDP in each country. The main independent variable of interest is the gross ODA aid disbursement for agriculture.

***Economic indicators*:** As current literature reveals, economic factors are likely to be associated with agricultural output. A recent study (Oluwarotimi, Dalhatu & Opeyemi,

2017) shows economic growth is "a precondition for agricultural growth" and has a positive and significant impact on agricultural output, while Anderson (1987) argued that in a growing economy, agriculture's shares of GDP are likely to decline because of "the low domestic income elasticity of demand for food". In addition, Kaya and Gunter (2008) argued that trade dependence and GDP growth caused urban bias and industrialization impact on the aid effectiveness, and included GDP growth rate and the aggregate value of imports and exports as a percentage of GDP in their analysis. These factors are thus included as controls in my model.

***Governance indicators*:** The literature generally suggests that the aid effectiveness is higher in regions with good policy environment. (Alesina and Weder, 1999; Santiso, 2001; Alabi, 2014). Alabi's study (2014) finds governance index is positively correlated with agricultural productivity at a significance level of 0.1. Bräutigam and Knack (2015) concluded that "high levels of foreign aid are associated with declines in the quality of governance" in Sub-Saharan Africa. This paper will also include the indicators government effectiveness and control of corruption.

Agricultural-Environmental indicators: Andersen and Shimokawa (2006) find a positive and significant relationship between rural infrastructure and agricultural growth. The agriculture-related infrastructure includes storage facilities for crops, machinery and farm tools, and access to water. Alabi (2014) and Wichelns (2013) concluded that water resources and the arable land irrigated are highly associated with the agricultural productivity in SSA regions. In this paper, improved water source in rural areas is used as

a proxy for water and access in the agricultural sector. Agricultural land is used as a proxy for land area that is equipped for irrigation.

DATA AND METHODS

My empirical analyses use country-level data over a 10-year period (2002-2011) for 44 Sub-Saharan countries. The data used in this paper are drawn from the OECD, the World Bank**,** and the FAO. Data on the agriculture value added, as a percentage of GDP are obtained from World Bank national accounts data, and OECD National Accounts datasets[1]. Data on the Gross ODA aid disbursement for agriculture, DAC donors total (current US$), come from the OECD's DAC database.

This study also controls for economic indicators, agricultural environmental indicators, and governance indicators of SSA countries. Data on GDP growth rate and share of agricultural land are taken from the World Bank's World Development Indicators. Data on agricultural import and export are drawn from the FAO's African Development Indicators. Data on governance indicators including government effectiveness and control of corruption are obtained from the World Bank's Worldwide Governance Indicators. And data on improved water source for agriculture come from WHO and UNICEF Joint Monitoring Program (JMP) for Water Supply and Sanitation.

I applied several methods to fix the missing data problems. Due to missing data for Angola, Seychelles, Somalia, and South Sudan for most of my key control variables, I exclude these countries from my analysis. The key dependent variable agriculture, value added (% of GDP) had missing data: Comoros: 2002-2011; Cote d'Ivoire: 2002-2011; Equatorial Guinea: 2002-2005; Eritrea: 2010-2011; Gambia: 2002-2003; Niger: 2002-

[1] World Bank national accounts data, and OECD National Accounts data files. Data are available online at: http://databank.worldbank.org/data/reports.aspx?source=2&series=NV.AGR.TOTL.ZS&country

2005; Rwanda: 2002-2004; Sao Tome and Principe: 2002-2007. I first supplemented data from the online United Nations Database with data published in the complete World Development Indicators (WDI) publications (UN Data, 2016), which provided values for all missing data except eight country-year observations for Eritrea, Gambia, and Equatorial Guinea. The remaining eight missing values were filled in with by linear interpolation by country and year.

For indicator DAC aid disbursement to agriculture, I also used linear interpolation by country and year n to fill in two missing values (Equatorial Guinea: 2006; Mauritius: 2009). For indicators agricultural trade dependence (2011 for all countries), I used a five-year trend to estimate values for all countries in 2011 to avoid extrapolation using an interpolated value.

This study uses a fixed effects regression model, which controls for the effect of any time-invariant and country-invariant characteristics which may influence the effect of the predictors on the outcome variable. Specifically, country fixed effects control for individual country characteristics that do not vary over time, such as natural, historical, and cultural differences among the countries. Year fixed effects control for characteristics that change over time but do not vary among countries. The basic model can be specified as:

$$AVA_{it} = \beta_0 + \beta_1 DACAid_{i(t-1)} + \beta_2 GDPgrowth_{i(t-1)} + \beta_3\, agritrade_{it} + \beta_4\, govteffectiveness_{it} + \beta_5 corruption_{it} + \beta_6 water_{it} + \beta_7 agriland_{it} + a_i + \gamma_t + \mu_{it}$$

where $DAC\ Aid$ and AVA are agricultural aid from all DAC donors and agricultural value added respectively, while $DACAid_{i(t-1)}$ and $GDPgrowth_{i(t-1)}$ represent values of the variables lagged one year. Lagging the agricultural aid and GDP growth attempts to deal with the reverse causality problem. The subscript i denotes each country, the subscript t stands for each year, a_i represents country fixed effects that capture the unobserved variables, γ_t corresponds to year fixed effects and μ_{it} is the error term. The sample size for my data set is 440 observations (44 countries *10 years). Table 1 provides definitions for all variables included in the model.

Table 1: Definitions of Variables

Variables	Definitions	Sources
Dependent Variable		
Agriculture, value added	A continuous variable measuring the percentage of a country's agricultural net output in its GDP	World Development Indicators, the World Bank
Key Independent Variable		
DAC Agricultural Aid	A continuous variable measuring the amount of gross ODA aid disbursement for agriculture from DAC member donors total (current US$)	Africa Development Indicators, Development Assistance Committee of the OECD
Control Variables		
Economic Indicators		
GDP growth rate	A continuous variable measuring annual percentage growth rate of GDP at market prices based on constant 2010 U.S. dollars	World Development Indicators, the World Bank
Agricultural trade dependence	A continuous variable measuring the amount of total agricultural export plus import as a percentage of GDP	African Development Indicators, Food and Agriculture Organization
Governance Indicators		
Government Effectiveness: Percentile rank	A series of indicators representing the degree of governance quality in the country with 0 = lowest government effectiveness and 100 =highest government effectiveness.	Worldwide Governance Indicators, the World Bank
Control for corruption: Percentile rank	A series of indicators representing control of corruption in the public sector with 0 = weakest control of corruption and 100 = strongest control of corruption.	Worldwide Governance Indicators, the World Bank
Agricultural- Environmental Indicators		
Improved water source, agriculture	A continuous variable measuring the percentage of the rural population using an improved drinking water source	WHO/UNICEF Joint Monitoring Program (JMP) for Water Supply and Sanitation
Agricultural land	A continuous variable measuring the percentage of land area that is arable	World Development Indicators, the World Bank

Table 2: Descriptive Statistics

Variables	N	Mean	Standard Deviation	Min	Max
Dependent variable					
Agriculture, value added (% of GDP)	440	26.27	15.67	.89	79.04
Key Independent variable					
DAC Agricultural Aid (% of GDP)	440	.42	.45	.00	2.86
Control variables					
Economic Indicators					
GDP growth rate(%)	440	4.89	5.32	-30.15	38.00
Agricultural trade dependence (% of GDP)	440	.11	.08	.00	.52
Governance Indicators					
Government Index(0-100)	440	27.42	20.16	0.96	77.67
Control of Corruption (0-100)	440	31.71	21.36	0.48	84.85
Agricultural-environmental Indicators					
Improved Water source in rural areas (% of rural population with access)	440	57.64	17.99	22.80	99.70
Agricultural land (% of land area)	440	48.11	19.82	8.15	80.92

Table 2 provides descriptive statistics for variables of country-year level included in my model, and estimates are weighted by the average population of each country over the period of the study.

Across the country-year observations included in my analysis, the mean of agriculture, value added, as a percentage of GDP among the 44 Sub-Saharan African countries was 26.27. This number varied substantially among individual countries and years, ranging from 0.89 (Equatorial Guinea in 2008) to 79.04 (Liberia, 2002). Over the same period, the mean of Gross ODA aid disbursement for agriculture, as a percentage of GDP is 8.05, ranging from 0.00 (Equatorial Guinea in 2008) to 2.86 (Sao Tome and Principe in 2002) over the ten-year period.

The descriptive statistics for my economic control variables reveal additional variation in characteristics of sample countries. Although GDP growth hold an average of over 4.89% across the country-years in my sample, there is a wide range from -30.15% (Liberia in 2003) to 38.00% (Equatorial Guinea in 2004) over the time period covered by my analysis.

REGRESSION RESULTS

Table 3: Regression Results

Dependent Variable: Agriculture, value added (% of GDP)					
	(1)	(2)	(3)	(4)	(5)
DAC agricultural aid	796.016***				
	(158.411)				
Lagged DAC agricultural aid		647.487***	-226.698	-236.451	-230.622
		(152.232)	(162.993)	(158.132)	(162.057)
Lagged DAC agricultural aid* Above median lagged GDP growth rate				54.977	
				(76.137)	
Lagged DAC agricultural aid *Above median government effectiveness					-.476
					(1.298)
Economic Indicators					
Lagged GDP growth rate		0.465***	.128	.128	.128
		(.155)	(.152)	(.151)	(.152)
Agricultural trade dependence		53.354***	28.633**	29.238**	28.701
		(11.845)	(11.998)	(12.622)	(12.009)
Governance Indicators					
Government Effectiveness		-.164***	.048	.041	.064
		(11.844)	(.085)	(.080)	(.089)
Control for corruption		-.077	-.126**	-.128**	-.128**
		(.062)	(.048)	(.049)	(.049)
Agricultural- Environmental Indicators					
Improved water source, agriculture		-.090*	.181	.189	.180
		(.046)	(.442)	(.444)	(.441)
Agricultural land		-.051	.287	.284	.287
		(.040)	(.173)	(.173)	(.174)
Constant	24.043***	31.142***	5.529	5.365	5.483
	(0.980)	(3.267)	(21.332)	(21.414)	(21.382)
Country and Year fixed effect	No	No	Yes	Yes	Yes
observations	440	396	396	396	396
R^2	.055	.283	.001	.001	.001

Robust standard errors in parentheses
***p<0.01, **<0.05, *<0.1

To further assess the relationship agricultural value added and foreign aid, I estimate OLS regression in model 1 and 2, and use country-year fixed effects in model 3, 4 and 5. Model 1 presents the raw correlation between value added in agriculture as a share of GDP and gross ODA aid received for agriculture as a share of GDP without any control variables included. Model 2 includes two lagged independent variables (foreign aid and GDP growth rate lagged by one year) into the regression model in an attempt to address the reverse causality problem, and I regress agricultural value added on past foreign aid and

the full set of control variables, which capture both economic, governance and environmental characteristics. Model 3 builds on the previous two regressions by adding country and year fixed effects. I build upon model 4 and model 5 interacting agricultural aid and dummy version of GDP growth and government effectiveness.

Model 4 includes an interaction term between agricultural aid and higher-than-median GDP growth rate to explore whether my relationship of interest differs according to whether the country's GDP growth rate is high. And model 5 includes the interaction term between agricultural aid and higher-than-median government effectiveness to explore whether my relationship of interest differs according to whether the country's government effectiveness is above the median value. All regressions are weighted using the average population of each country. Robust standard errors are reported under each coefficient.

Model 1 shows that, without any control variables included in the regression, foreign aid has a positive relationship with agricultural value at a 10% significance level. An increase of one percent points in this measure of foreign aid is associated with a statistically significant increase of approximately 796 percent points of agricultural value added as a percentage of GDP. However, this raw correlation does not account for other factors that are likely to be associated with both agricultural aid and agricultural growth. For example, it is reasonable to assume that an increase in government effectiveness, is associated with increases in both the foreign aid commitments and the agricultural value increase of the country. Therefore, the raw correlation described above is likely upwardly biased due to the exclusion of governance indicators in the regression. Also, without lagging the key

independent variable, the reverse causality problem would be higher. Indeed, when the agricultural aid is lagged by one year and a full set of control variables is added to the regression in model 2, the coefficient on foreign aid falls at a statistically significant level.

In model 3, the inclusion of country and year fixed effected further reduces the omitted variables bias in my estimates, but it turns the coefficient on foreign aid from positive to insignificantly negative. Although the correlation coefficient in model 3 is not statistically significant, its p-value (0.141) is just slightly outside of commonly bounds and very close to 0.10. It may imply that an increase of one percentage points in foreign agricultural aid is associated with a decrease of approximately 227 percentage points of agricultural value added.

Model 4 includes interaction between lagged agricultural aid and the countries whose GDP growth rate is above the median value. The interaction term has a positive coefficient but not statistically significant, implying no evidence that aid is more effective in countries where economic growth is fast. Similarly, model 5 includes interaction between lagged agricultural aid and the countries whose government effectiveness is above the median value. The interaction term has a negative coefficient but not statistically significant, implying no evidence that aid is more effective in countries where government effectiveness is high. In model 4 and model 5, the coefficient p-values are high and show no evidence of a relationship between agricultural aid and agricultural value added.

DISCUSSIONS

This paper examines the relationship between the gross ODA disbursements for agriculture from all DAC donor countries and the agricultural growth measured by agricultural value added in 44 Sub-Saharan African countries. In the view of the current doubts about foreign aid effectiveness in the agricultural sector, the results of this research in the agricultural sector can be used to inform policy decisions on improving international aid effectiveness. The results of the study are well-timed to inform policy decisions on the promotion of aid effectiveness.

The study controls the economic, governance, and agricultural environmental factors and unobserved fixed differences among countries and time-variant characteristics that are constant across countries. From the research findings, no evidence that shows a positive relationship between DAC agricultural aid and agricultural growth in 44 Sub-Saharan African countries. However, other factors such as agricultural trade dependence and control of corruptions, have strong relationships with the agriculture growth at a statistically significant level.

Based on existing literature that directly studies the relationship between the foreign aid and agricultural productivity, this paper further examines the relationship by introducing a different indicator and regression model. As discussed earlier, Alabi 's study indicated that the foreign aid last tear has a positive relationship with agricultural productivity this year at a significance level of 0.05. Contrary to that finding, my results yield no evidence of such a robust relationship. This difference may be explained by the fact that we use

different methodologies. Alabi (2014) used generalized method of moments to examine the relationship, while I apply the country-year fixed effects models. And our measures of agricultural growth are different. Alabi used agricultural productivity index as the dependent variable, while I use agricultural value added, as a percentage of GDP as a proxy for the agricultural growth.

There are several key limitations in my paper. The first is that, despite controlling for the economic, governance, agricultural environment, and fixed country and year characteristics, my regression results may be still subject to omitted variable bias. Information on natural conditions is not included in my regression analysis. For example, the number of natural disaster events is likely to be both negatively correlated with the agricultural growth and agricultural aid. Specifically, agricultural growth would be slow if natural disasters such as earthquake and droughts happen. Also, donor countries would probably shift their focus from agricultural development aid to emergent food assistance if people in the country suffer food crises as a result of these natural disasters. In other words, my results may overestimate or underestimate the relationship between the agricultural aid and agricultural growth.

Second, I only adopt one measure of foreign agricultural aid in Sub-Saharan African countries because the data on bilateral and multilateral aid are not available for all countries. It is not perfect in defining the concept. The measure I use in the model is the gross ODA aid disbursement for agriculture from all DAC donor countries, which does not differentiate between the bilateral agricultural aid multilateral agricultural aid.

Scholars in the previous literature have pointed out that the bilateral foreign aid effectiveness is different from the multilateral aid effectiveness because the bilateral aid sometimes work at cross-purposes while multilateral aid coordinates.

The third limitation is the reverse causality problem. This paper has used the DAC aid (lagged one year;) to measure the agricultural aid. However, other reverse casualty remains unsolved. For example, the DAC aid funders would decide the amount of aid allocation to the recipient countries according to the agricultural performance of last year. The countries with higher agriculture production in the following year of the aid would be given more funds. Another problem is that past aid would probably affect current aid, and past agricultural development may affect current agricultural development. Alabi's study (2014) also indicates that a country that received aid last year will receive aid more easily this year even though all other conditions are equal.

These limitations could provide some potential directions for research in the future. In future analysis, more variation in agriculture value, added could be examined as more years of data become available. They can also figure out better measures and metrics of agricultural productivity and agricultural aid. Other agriculture-related indicators can be reported to reduce omitted variable bias. Additionally, it can be tested whether the bilateral agricultural aid effectiveness would be higher or lower that the multilateral agricultural aid effectiveness, which may provide some guidance for the aid funders.

The findings of this study suggest that the aid donors and agricultural research institutes can propose some policy remedy. In general, my results do not suggest any meaningful relationship between foreign aid and agricultural growth. However, other factors such as agricultural trade dependence and control of corruptions have significant, positive and strong relationships with the agriculture value added. This result could be helpful to policymakers when making decisions on the aid disbursement and the use of funds. Rather than offering direct financial support to promote agricultural productivity and rural development, the aid donors can support domestic policy reform efforts of recipient countries, or can impose preconditions on these countries to improve governance prior to receiving agricultural aid packages.

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