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Abstract

Over the past decade, a growing number of studies have examined the role of agricultural export in economic growth in Africa. The literature, however, provides conflicting results about the agricultural export-led growth hypothesis. In this study, we aim to examine the impact of agricultural export on economic growth by performing a meta-analysis. Our meta-analysis finds significant presence of negative publication bias in the literature. Using mixed-effect multilevel meta-regression, we find that after correction for publication bias, the average agricultural export elasticity to economic growth is 0.763 for the poor in Africa. Interestingly, agricultural export is growth for the rich in Africa, although the elasticity of GDP is 0.043. These results are consistent with the agricultural export-led growth hypothesis. The implication is that export promotion should be targeted at agricultural output in low-income and lower middle-income countries whereas upper middle-income countries in Africa may focus on non-agricultural export.

Keywords – Africa; export-led growth; agricultural export; meta-analysis

JEL Classification– C10; C40; I30; N50; O55

1. Introduction

There has been an intense debate in the literature over whether export leads to growth for the poor. One stance of the literature argues in favor of the export-led growth hypothesis (Dorosh & Mellor, 2013; Foster, 2006; Fosu, 1990; Sanjuán-López & Dawson, 2010). Another stance of the literature reject export-led growth hypothesis for the poor because of the deleterious effect of export instability (Abu-Qarn & Abu-Bader, 2004; Dreger & Herzer, 2013; Furuoka, 2018). Thus, the literature provides conflicting results of the growth effect of export for the poor. We contribute to this debate in the literature by exploring whether agricultural export is growth for the poor in Africa. The African context is important because economic growth has implications for improvements in living standards due to the high incidence of poverty (Dollar, Kleineberg, & Kraay, 2016; Seok & Moon, 2021; Tchamyou, Asongu, & Odhiambo, 2019; Tchamyou, Erreygers, & Cassimon, 2019). At the same time, recent studies and policy documents appear to downplay the potency of agricultural export to increases in wealth per capita in Africa. For example, UNCTAD (2005) bemoaned the heavy reliance on primary commodity export, suggesting that many economies would fail to generate the required externalities for sustained growth from agricultural export. Yet, for most African economies, the agricultural sector still contributes a relatively large share of GDP (Awokuse & Xie, 2015; Fosu, 1990; Ssozi, Asongu, & Amavilah, 2019). Thus, making the agricultural path of development and growth very paramount and represents optimal resource allocation (Dawson, 2005).

Moreover, to the best of our knowledge, Mookerjee (2006) is the only meta-analysis study in the extant literature that specifies the export-growth effect on Africa in the perspective of manufactured exports, oil exports and total exports, excluding agricultural exports and found that after correcting for publication bias, exports do not spur growth in Africa on average.[1,2]However, African countries have a relatively high reliance on agricultural exports than other developing countries (Fosu, 1990). Thus, whether agricultural export is growth for the poor in Africa is still an open empirical question. Consequently, we seek to quantitatively examine: (1) whether there is publication bias in the agricultural export-growth literature, (2) what the true

[1]Mookerjee (2006) explains that there are not enough studies on the agricultural export-led growth at the time the study.

[2]Other meta-analysis studies on the export-growth hypothesis, such asTingvall and Ljungwall (2012) andSannassee, Seetanah, and Jugessur (2014) also focus on total (aggregate) export.

effect of agricultural export on economic growth is, after correction for publication bias, if any and (3) what factors account for the mixed and varying results in the literature.

To this end, we perform a meta regression analysis on 68 agricultural export elasticity of GDP collected from 16 empirical studies. Using mixed-effect multilevel meta-regression, our results suggest that the mean reported estimate of elasticity of agricultural export to GDP is moderate, after correcting for publication selection bias for both the rich and poor in Africa. We find evidence for publication selection bias in favor of the deleterious effect of export instability hypothesis, where agricultural exports retire growth. To provide understanding of the factors that matter in explaining the varying empirical results, our results indicate that publication characteristics and methodology matter for the reported elasticity of agricultural export on growth. Researchers who use VECM and publish in high impact journals tend to obtain larger estimates. The effect of agricultural export-led growth is larger in low- and lower-income countries than in upper-middle income countries. We also find that, researchers who account for trade openness tend to report larger estimates. In contrast, researchers who account for labour force participation in the agricultural export-growth model tend to report smaller estimates.

This study contributes to the literature in two major ways. First, we complement prior meta-analysis on export-led growth hypothesis (Mookerjee, 2006; Sannassee et al., 2014; Tingvall & Ljungwall, 2012) by examining agricultural export-led growth in Africa; a region where the agricultural path of development and growth is very paramount because of the relative high reliance on agricultural exports (Fosu, 1990).No study has made this distinction to understand the export-growth dynamics purely from an African perspective in a meta-analysis. Second, we contribute to settle issues surrounding the factors that account for the varied empirical results reported in the literature concerning agricultural export-led growth. Although, several attempts have been made in the literature to explain the heterogeneity in the empirical evidence regarding export-led growth (Mookerjee, 2006; Sannassee et al., 2014; Tingvall & Ljungwall, 2012), our study is the first in the area of agricultural export with emphasis on Africa.

The remaining of the paper is structured as follows. Section 2 presents the literature and hypothesis development. Section 3 presents the methodology adopted. Section 4 presents the results and discussions. Finally, section 5 concludes and outlines some policy implications.

2. Related literature and hypotheses development

2.1.Export-led growth: theory and arguments

The question of whether agricultural export is still a viable policy option to spur growth has received considerable attention in the literature. However, the empirical literature on the relationship between agricultural export and economic growth for the poor can be said to be mixed and inconclusive. We observe strong and compelling arguments being put forth in favour and against the theory of export-led growth for the poor. In the section that follows, we present a brief discussion of the arguments.

Export growth strategy is believed to cause increase in wealth per capita for the poor in the world(Foster, 2006; Fosu, 1990). Fosu (1990, pp. 831-832) argues as follow: "*first, export development allows the home country to concentrate investment in those sectors where it enjoys a comparative advantage. The resulting specialization is likely to augment overall productivity. Second, the larger international market permits economies of scale to be realized in the export sector. Third, worldwide competitive pressures are likely to reduce inefficiencies in the export area and results in the adoption of more efficient techniques in the overall traded-goods sector. Finally, a larger export sector would make available more of the resources necessary to import in a more timely manner both physical and human capital, including advanced technologies in production and management, and for training higher quality labour*". This is consistent with the export-led growth hypothesis.

In an open economy, export growth leads to increases in employment, and thus reduces poverty in the non-farm sectors(Nicita, 2008).Hence, from the welfare perspective, it is skilled workers and urban areas that benefit the most from export growth. Consequently, from a purely poverty reduction perspective, export-led growth only has a small effect on overall poverty(Nicita, 2008).Dorosh and Mellor (2013)argue that poverty reduction-growth indicators should focus on employment growth through agricultural. Indeed, agricultural export, in particular, has been found to cure lower income (Dawson, 2005; Johnston & Mellor, 1961; Sanjuán-López & Dawson, 2010). There is also evidence of a mixed effect of agricultural export in the disaggregated form (Gilbert, Linyong, & Divine, 2013; Siaw, Jiang, Pickson, & Dunya, 2018; Yifru, 2015). In short, the evidence thus far points to highly mixed and inconclusive results of the agricultural elasticity of growth.

2.2.Agricultural export-led growth hypothesis in Africa

Several studies have tested the agricultural export-led growth hypothesis in Africa but reported mixed and inclusive results. The empirical evidence ranges from either the presence or absence of agricultural export-led growth to mixed results when agricultural exports are disaggregated into the various crop groups. The first strand of the literature provides a robust and consistent empirical support for the presence of agricultural export-led growth in Africa. For instance,Alam and Myovella (2016)examined the causality between agricultural export and economic growth using time series data for Tanzania over the period 1980-2010. Results from the Vector Autoregressive (VAR) model show that agricultural exports Granger causes economic growth. Bakari (2017) investigated the long run and the short run impacts of vegetable exports on economic growth. The author applied vector error correction (VECM) model on time series data for Tunisia over the period 1970-2015 and found that vegetable exports have a positive effect on economic growth in the long run and short run. In Nigeria, agricultural exports contribute positively to economic growth, supporting the agricultural exports-led growth hypothesis (Ijirshar, 2015; Ojo, Awe, & Ogunjobi, 2014; Oluwatoyese, Applanaidu, & Abdulrazak, 2016). Moreover, in the presence of substantial mineral export, export-led growth through agriculture is found in Angola (Isaiah Zayone, Henneberry, & Radmehr, 2020).

Another strand of the literature showed that when agricultural exports are employed in a disaggregated form, the empirical results have mainly been mixed. For example,Gilbert et al. (2013) found that agricultural exports (i.e., coffee, banana and cocoa) have mixed effect on economic growth in Cameroon based on times series data for the period 1975-2009 using the VECM model. Importantly, coffee and banana exports have a positive and significant relationship with economic growth while cocoa export was found to have a negative and insignificant effect on economic growth. Similarly, Yifru (2015) provides empirical evidence from the VECM model which shows that agricultural exports(i.e., coffee, oilseed and pulses) had mixed effect on economic growth in Ethiopia during the period 1973-2013. Specifically, coffee export and oilseeds export have a positive and significant relationship with economic growth whiles pulses export was found to have negative and insignificant effect on economic growth in short run and positive but insignificant in the long run. Using time series quarterly data for Ghana from 1990-2011, Siaw et al. (2018) examined the relationship between agricultural export (i.e., cocoa, pineapple and banana) and economic growth. The findings from the ARDL model

demonstrated that cocoa export has a positive and significant impact on economic growth while the export of pineapple and banana has a negative effect on economic growth with an insignificant effect of pineapple export in both long run and short run. Additionally, processed agricultural exports have a positive relationship with economic growth whereas unprocessed agricultural exports have a negative relationship with economic growth in South Africa under a VECM framework (Mlambo, Mukarumbwa, & Megbowon, 2019).

Other studies show no effect of agricultural export on economic growth. Using panel dataset for 15 ECOWAS countries for the period 1980-2013, Edeme, Ifelunini, and Nkalu (2016)evaluated the impact of agricultural exports on economic growth. The results from fixed effects and random effects models showed that agricultural exports have not impacted significantly on economic growth. Simasiku and Sheefeni (2017) analyzed the relationship between agricultural export and economic growth in Namibia. Using time series quarterly data for the year 1990-2014 and the VECM, agricultural exports have a positive but insignificant effect on economic growth.

In short, whether agricultural export is growth in Africa is still an open empirical question. We fill this gap by testing whether the elasticity estimate of agricultural export on economic growth varies systematically depending on the characteristics of the data and publication in a meta-analysis framework. We do this by testing the following null hypothesis:

H1: There is no publication bias in the agricultural export-growth literature in Africa.

H2: There is no overall effect of agricultural export on economic growth in Africa.

3. Methodology

The collection of primary studies from which metadata is extracted is the key cornerstone of meta-analysis. We started the collection of primary studies using Google scholar search engine. Our motivation for using Google scholar stems from the broad range of papers that it covers, particularly, the rich mixture of peer-reviewed and non-peer-reviewed papers. This advantage is noted in contemporary meta-analysis practices(Asongu, 2015; Stanley & Doucouliagos, 2012), which argue for the inclusion of both published and unpublished studies as a principle of sound meta-analysis procedure that limit the impact of selection bias (Stanley & Doucouliagos, 2012).

3.1.Literature search and retrieval strategy

To retrieve the relevant studies for inclusion and in-depth analysis, we adopted a two-stage process. We began the first stage by adjusting the number of search results per page from the default 10 to 20 papers. Following this, we inserted the keywords, *"agricultural export*", "growth", "economic growth", "economic development"* and *"Africa"* into the advanced search option where we required at least one of these terms in the Title, Abstract or Keywords, of the studies. We reviewed the first 25 pages, yielding 500 hits for screening. Our screening criteria for inclusion of a paper in the final list for in-depth analysis are as follows. (1)The study should be empirical in nature and examine a sample of African countries in the broader sense of developing countries from a cross-country point of view or a single African country. (2)The study should examine the role of agricultural export in economic growth in particular, not general export or aggregate export. (3)The study should report standard errors or contain sufficient information to compute standard errors (i.e., *t*-statistics and *p*-values). (4)The study should report at least one empirical estimate quantifying the effect of agricultural export on economic growth. Consequently, the final sample of relevant studies at the end of Stage 1 included 16 studies. Appendix A contains a list of these studies.

3.2.Meta data extraction strategy

The search and retrieval process produced a total 16 studies for the extraction of meta data used in the study. We only include regression estimates associated with the relationship between agricultural export and economic growth. Other regression estimates that examine (1) threshold effect and (2) conditional effect of agricultural export on economic growth are excluded to ensure a basic level of homogeneity in our data sample (Havranek, Horvath, & Zeynalov, 2016). This criterion produced a total of 68 estimates covering the period 2010-2020. In this meta-analysis, we focus on variants of the following model used in the literature to examine the agricultural export-led growth:

$$Growth_t = \alpha + \beta_1 Agricultural\ Export_t + \sum_{j-1}^{N} \beta_j W_{j,t} + \varepsilon_t \qquad (1)$$

where *t*is a time index and *W* is a set of control variables.

3.3.Estimating the mean effect size

Consistent with previous meta-analysis studies (Mookerjee, 2006; Tingvall & Ljungwall, 2012), we adopted the partial correlation coefficient (PCC) to standardize the effect sizes collected from primary studies into a common metric as individual estimates collected are distinct in their measurement of agricultural export and economic growth, and thus, not comparable. PCC is a measure of the relationship between a dependent variable and independent variable of interest, while holding all other variables constant(Stanley & Doucouliagos, 2012). We derived the PCC for each reported regression coefficient that examine the relationship between agricultural export and economic growth using the following equation.

$$PCC_{is} = \frac{t_{is}}{\sqrt{t_{is}^2 + df_{is}}} \tag{2}$$

where PCC_{is} represents the partial correlation coefficient from regression coefficient i in primary study s.t_{is} represents the t-statistic corresponding to the regression coefficient, and df_{is} denotes the associated degrees of freedom. Following the conversion of each reported regression coefficient into PCC, we estimate the corresponding standard error using the following equation.

$$PCC\_SE_{is} = \frac{PCC_{is}}{t_{is}} \tag{3}$$

where PCC_SE_{is} represents the standard error of the partial correlation coefficient from regression coefficient i in primary study s, and t_{is} represents the t-statistic corresponding to the regression coefficient.

3.4. Assessing publication bias

Publication selection bias is a great concern in empirical literature because it conceals the true effect of policy variables and/or may cause distortion to the true effect of policy variables. Publication selection bias occurs when the various actors (i.e., authors, reviewers, editors) in the publishing process have prefers for statistically significant results or those results that are consistent with mainstream theory (Stanley, 2005). Available meta-analysis literature shows a significant presence of publication selection bias in economics (Mookerjee, 2006; Stanley & Doucouliagos, 2012; Tingvall & Ljungwall, 2012).

Following previous meta-analysis literature (H. Doucouliagos & Stanley, 2009; Stanley & Doucouliagos, 2012), we present formal tests for potential publication selection bias using Funnel Plots and Funnel Asymmetry Test (FAT). The Funnel Plot provides visual test of publication bias. In the case of the FAT, the relationship between PCC and its standard errors is examined by estimating the regression equation below.

$$PCC_i = \beta_0 + \beta_1 PCC\_SE_i + \varepsilon_i \quad (4)$$

where PCC denotes the Partial Correlation Coefficient, PCC_SE denotes the standard errors of the PCC, ε_i denotes the error term, β_0 measures overall effect of agricultural export on economic growth and β_1 measures the presence of publication bias in the literature. We estimate the FAT equation using three main econometric approaches, namely, mixed effects (ME), weighted least squares (WLS), and fixed effect (FE) regression techniques. The ME regression is the primary estimation technique while WLS and FE are adopted to ensure consistency and robustness of the estimates to alternative estimation strategies. The WLS regression technique is principally adopted in meta-analysis studies to ensure that precise studies are given more weight and to correct for the presence of heteroscedasticity (Stanley, 2008). The use of the FE technique is driven primarily by the need to account for endogeneity emanating from the omission of study characteristics that have the potential to affect both the PCC and its standard errors. Following prior studies, we use the inverse of standard error of the PCC as the primary weight (i.e., $1/PCC\_SE$), which is referred to as *precision*. Thus, the primary weighted regression is formalized as below.

$$\frac{PCC_i}{PCC\_SE_i} = \beta_1 + \beta_0 \frac{1}{PCC\_SE_i} + \varepsilon_i \frac{1}{PCC\_SE_i} \quad (5)$$

where $\frac{PCC_i}{PCC\_SE_i}$ denotes the reported *t*-statistics, PCC_SE denotes the standard errors of the PCC, ε_i denotes the error term, β_0 measures the overall effect of agricultural export on economic growth and β_1 measures the presence of publication bias in the literature. Under FAT, the following hypotheses are examined: First, we test the null hypothesis of no publication bias (i.e., $H_o: \beta_1 = 0$). As such, a rejection of the null hypothesis implies the presence of publication bias in the literature whiles the sign depicts the direction of the publication bias. A positive sign

implies a publication bias for the agricultural export growth hypothesis. If the sign is negative, that implies a publication bias for the deleterious effect of export hypothesis (Glezakos, 1973).

Second, we test for the null hypothesis that there is no overall effect of agricultural export on economic growth in Africa (i.e., $H_o: \beta_0 = 0$) in line with the evidence inMookerjee (2006). This test is called the Precision Effect Test (PET) and measures whether the overall effect of agricultural export on economic growth is statistically and significantly different from zero after accounting for publication bias. As such, if the null hypothesis (i.e., $H_o: \beta_0 = 0$) is rejected, that signifies the presence of an overall true effect of agricultural export on economic growth in Africa.

4. Results and Discussion

4.1.Publication bias for the agricultural export elasticity of GDP

The Funnel Plot in Figure 1 displays the PCC of the average elasticity estimates of agricultural export on horizontal axis and the precision (i.e., the inverse of standard error of PCCs) on the vertical axis. The Funnel Plot provides visual test of publication bias(Stanley & Doucouliagos, 2010). We can observe the PCCs are relatively asymmetrically distributed around the mean PCC. This suggests that there will be publication bias with regards to mean elasticity estimates of agricultural export on growth.

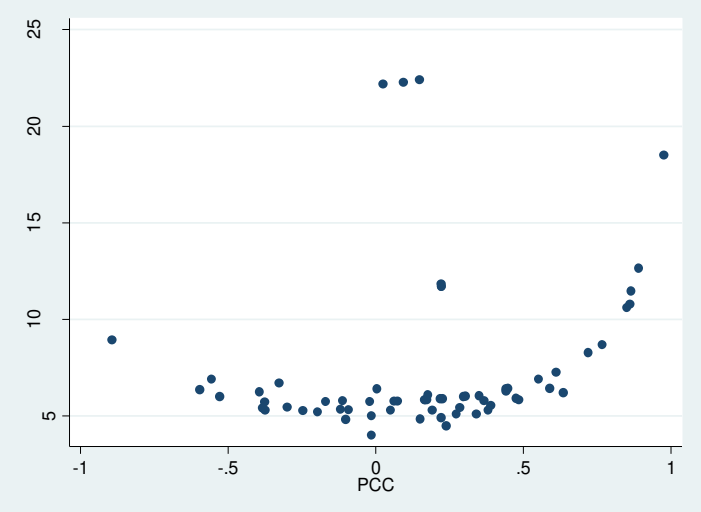

Figure 1: Funnel Plot of PCC

TABLE 1. Results of FAT and PET

	Weighted			Unweighted		
	WLS	FE	ME	OLS	FE	ME
Publication bias	-1.898	-8.020***	-8.283***	-2.812**	-4.305***	-2.916***
	(2.093)	(1.447)	(1.583)	(1.164)	(1.167)	(1.033)
Constant (true effect)	0.471	1.283***	1.476***	0.598**	0.831***	0.613***
	(0.313)	(0.192)	(0.265)	(0.214)	(0.182)	(0.170)
Number of estimates	68	68	68	68	68	68
R-squared	0.055	0.549		0.100	0.172	
Number of studies	16	16	16	16	16	16

Notes: WLS denotes Weighted Least Squares regression. FE denotes Fixed Effects regression. ME denotes Mixed-Effect multilevel regression. OLS denotes Ordinary Least Squares regression. FAT represents Funnel Asymmetry Test. PET denotes Precision Effect Test.Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 1 presents the regression analysis testing the null hypothesis of no publication bias (FAT) and the null hypothesis that there is no overall effect of agricultural export on economic growth in Africa (PET). The results of three regression estimation techniques are reported under two main approaches, namely, weighted and unweighted. Under the weighted models, we use the inverse of standard error of the PCC as the primary weight similar to prior meta-analysis studies such as Havranek et al. (2016). The results suggest significance presence of a negative publications bias, which is consistent with the deleterious effect of export instability hypothesis(Glezakos, 1973). Additionally, we find that elasticity estimate of agricultural export on economic growth is significantly positive, suggesting agricultural export-led growth in Africa(Ijirshar, 2015; Isaiah Zayone et al., 2020; Ojo et al., 2014; Oluwatoyese et al., 2016).

4.2.Meta-regression analysis explaining why agricultural export estimate vary

Next, we test whether the elasticity estimate of agricultural export on economic growth varies systematically depending on the characteristics of the data and publication. In doing this, we followHavranek, Irsova, and Janda (2012) and adopt the mixed-effect multilevel modelling.[3] The use of this methodology is motivated by the following reasons, namely, (1) the higher likelihood of dependence of estimates collected from one primary study, and (2) the substantial level of between-study heterogeneity due to the use of data from different countries in the primary studies.

[3] For detailed discussion on the ME technique in meta-analysis, interested readers may consultHavranek and Irsova (2011) and Havranek et al. (2012).

Table 2 presents the results of the meta-regression analysis of the effect of agricultural-led growth effect in Africa while controlling for other explanatory variables (i.e., estimation methods, income levels, impact factor, trade openness, capital investment, labour force participation rate). In column (1), we report results of the meta-regression where we control for data and publication characteristics. In column (2)-(4), we account for trade openness, capital investment, and labour force participation rate, respectively. Finally, in column (5), we report the full model controlling for all explanatory variables.

The results suggest significance presence of a negative publications bias after controlling for additional explanatory variables, which is consistent with the deleterious effect of export instability hypothesis(Glezakos, 1973).On the true effect of agricultural export on economic growth, we find a consistently robust positive and significant growth effect ranging from 0.48 to 1.00. From column (5), a 1-percentage point increase in agricultural export leads to a 0.76 percentage point increase in economic growth. The magnitude of the agricultural export elasticity of GDP is ten times greater than those reported inSanjuán-López and Dawson (2010).In line withH. C. Doucouliagos (2011) economic guidelines for assessing the strength of a correlation coefficient, agricultural export has a moderate effect on growth for the poor in Africa.

The estimated meta-regression coefficients for income level (i.e., *UMI_Dummy*) indicate the mean difference in the elasticity estimate of agricultural export in upper middle-income countries compared to other countries (i.e., low-income and lower-middle income countries). Interestingly, the *UMI_Dummy* variable shows that the mean agricultural export contribution to economic growth is lower by 0.72 in model (5). The net effect is that agricultural export elasticity of GDP is 0.043 [0.763+(-0.720)] in a rich country in Africa. This result compliments and extends empirical evidence inSimasiku and Sheefeni (2017) by showing that the positive growth effect of agricultural export is statistically significant for the rich in Africa. In line withH. C. Doucouliagos (2011) economic guidelines for assessing the strength of a correlation coefficient, agricultural export has a small effect on growth for the rich in Africa. This result reinforces the fact that higher income countries may achieve high economic growth from non-agricultural export (Mlambo et al., 2019; Sanjuán-López & Dawson, 2010). This is consistent with empirical evidence on the process of structural changes whereby the share of agricultural in GDP decreases as countries develop (Eberhardt & Teal, 2013).

TABLE 2. Meta-regression analysis of agricultural export led growth

	(1)	(2)	(3)	(4)	(5)
Variables	ME	ME	ME	ME	ME
1/PCC_SE (True Effect)	0.523***	0.484***	0.733***	1.004***	0.763***
	(0.172)	(0.172)	(0.220)	(0.280)	(0.184)
UMI_Dummy	-0.627***	-0.595***	-0.554**	-0.626***	-0.720**
	(0.191)	(0.199)	(0.229)	(0.169)	(0.320)
IMPACT Factor	0.084***	0.086***	0.064***	0.038*	0.048***
	(0.016)	(0.018)	(0.016)	(0.020)	(0.010)
VECM_Dummy	0.688***	0.712***	0.655***	0.596***	0.632***
	(0.171)	(0.189)	(0.166)	(0.149)	(0.108)
TRADE_Dummy		0.187			0.351***
		(0.186)			(0.105)
CAPITAL_Dummy			-0.201		0.302
			(0.152)		(0.370)
LABOUR FORCE_Dummy				-0.485**	-0.646*
				(0.222)	(0.374)
Constant (Publication bias)	-5.214***	-5.280***	-5.588***	-6.436***	-6.066***
	(1.143)	(1.174)	(1.368)	(1.429)	(1.244)
Wald $\chi 2$	408.76	354.00	626.08	162.19	151.33
p-value	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Observations	68	68	68	68	68
Number of studies	16	16	16	16	16

Notes: 1/PCC_SE denotes the inverse of standard errors associated with the partial correlation coefficients. *UMI_Dummy* is a binary variable with the value of 1 if the primary study is based on a country classified as Upper Middle-Income country by the World Bank country classification by income level and zero otherwise. *IMPACT Factor* denotes journal impact factor collected from IDEAS/RePEcas at September 25, 2021. *VECM_Dummy* is a binary variable with the value 1 if research methodology adopted in primary study is Vector Error Correction Model and zero otherwise. *TRADE_Dummy* denotes a binary variable with a value of 1 if the agricultural export-growth model estimated in primary study controlled for trade openness and zero otherwise. *CAPITAL_Dummy* denotes a binary variable with a value of 1 if the agricultural export-growth model estimated in primary study controlled for capital investment and zero otherwise. *LABOUR FORCE_Dummy* denotes a binary variable with a value of 1 if the agricultural export-growth model estimated in primary study controlled for labour force participation and zero otherwise. Robust standard errors in parentheses. *ME* denotes Mixed-Effect multilevel regression. *** p<0.01, ** p<0.05* p<0.1

Furthermore, the results indicate that there is a positive relationship between *IMPACT Factor* and mean effect of agricultural export, suggesting that high impact factor journal report a higher agricultural export led growth than low impact factor journals. Accordingly, journal

quality matters for the size of the reported agricultural export led growth in Africa. The estimated meta-regression coefficients for the estimation method (i.e., *VECM_Dummy*) indicate the mean difference in the elasticity estimate of agricultural export compared to other methods (i.e., Ordinary Least Squares, Fixed Effects, Random Effects, Vector Autoregression). We find that studies using VECM method report approximately 0.63 higher mean effect of agricultural export on growth under Model (5). Accordingly, the use of other methods in the primary studies' regression significantly reduces the size of the growth effect of agricultural export in Africa.

For the control variables, we find that trade openness is positively associated with the estimated size of agricultural export-led growth. Thus, in countries with greater trade openness, the growth effect of agricultural export is stronger. Additionally, we find that labour force participation rate is negatively associated with the estimated size of growth effect of agricultural export. Although human capital is crucial for economic growth in Africa(Gilbert et al., 2013; Siaw et al., 2018), the negative effect of labour force on the growth potential of agricultural export is suggestive that human capital development due to education, skills and training, and better health facilities for the poor in Africa.

5. Conclusion and policy implications

We perform a meta-regression analysis of 68 estimates of the relationship between agricultural export and economic growth reported in 16 studies on Africa. We complement prior meta-analysis on export-led growth hypothesis (Mookerjee, 2006; Sannassee et al., 2014; Tingvall & Ljungwall, 2012) by examining agricultural export-led growth in Africa; a region where the agricultural path of development and growth is very paramount. Our results suggest that the mean reported estimate of elasticity of agricultural export to GDP is moderate, after correcting for publication selection bias. We find evidence for publication selection bias in favor of the deleterious effect of export hypothesis, where agricultural export retard growth.

The findings reported in this study have the following implications. First, we show that export promotion should be targeted at agricultural output in low-income and lower middle-income countries whereas upper middle-income countries in Africa may focus on non-agricultural export. By this, we provide strong empirical basis for policy makers to draw on the right lessons to inform policy direction. Thus, policy decision on resource allocation could be improved. Additionally, the existence of income differential effect on the mean elasticity

estimate of agricultural export implies that agricultural export-growth strategy has a pronounced effect for the poor in Africa. The result suggests that the poor in Africa could follow an agricultural growth strategy as that presents one of the most promising means to increasing incomes for the poor (Dorosh & Mellor, 2013; Johnston & Mellor, 1961).

The findings obviously leave room for further research especially with respect to assessing how the findings in this study withstand empirical scrutiny in other continents. Moreover, additional meta studies focusing on inclusive economic growth instead of economic growth would provide more insights into the sustainable development agenda.

Appendix 1. List of references included in the meta-analysis

#	Authors
1	Sanjuán-López and Dawson (2010)
2	Siaw et al. (2018)
3	Oluwatoyese et al. (2016)
4	Mlambo et al. (2019)
5	Alam and Myovella (2016)
6	Gilbert et al. (2013)
7	Bakari (2017)
8	Bakari and Mabrouki (2018)
9	Edeme et al. (2016)
10	Ijuo and Andohol (2020)
11	Ijirshar (2015)
12	Ojo et al. (2014)
13	Simasiku and Sheefeni (2017)
14	Verter and Bečvářová (2016)
15	Yifru (2015)
16	Twumasi-Ankrah and Wiah (2016)

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