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FDI SPILLOVER EFFECTS IN SUB-SAHARAN AFRICA: A META-ANALYSIS

Adamu Jibrilla[1] and Dunusinghe, Priyanga [2]

adamjibril85@gmail.com[1],pmdunu@yahoo.com[2]
Department of Economics, Adamawa State University, Mubi[1]
Department of Economics, University of Colombo[2]
P.O. Box 1490, Colombo 03, Sri Lanka.

Abstract

This study employs meta-analysis to examine the effect of FDI spillovers on firms in Sub-Saharan Africa (SSA).Previous FDI spillover studies in SSA have produced mixed results making it difficult to guide policymaking. Evidence has shown that among other factors, publication bias has made some authors to report only results that are consistent with theory or those that are statistically significant. We account for different study characteristics of the previous studies to examine the reason for the mixed findings and find thatthere is no evidence of statistically significant FDI spillover effect in SSA and the reported effects in the existing literature suffer from positive publication bias. This means that studies that reported results with positive estimated coefficients were more likely to be accepted for publication. We recommend that on the one hand, authors should try to report results dictated by the data instead of theory and on the other hand, policymakers should treat research findings with extreme caution. More research in this area is encouraged in SSA for a much better understanding of the existing discrepancies in the FDI spillover studies.

Keywords: FDI, Technology Spillovers, Meta-analysis, Publication bias, SSA.

1. INTRODUCTION

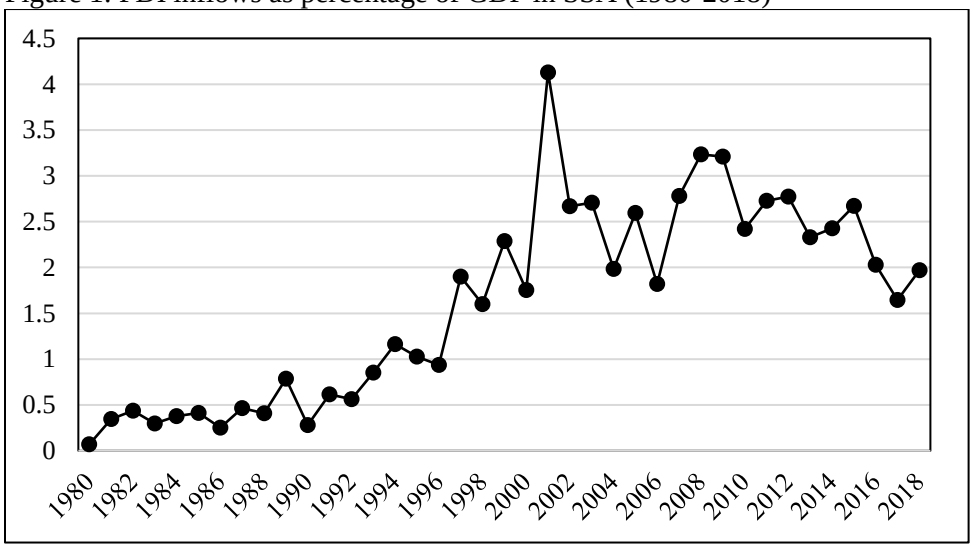
Foreign direct investment (FDI) has been acknowledged by researchers and policymakers as an important instrument of development and a good channel for the transfers of capital, technology and knowledge from industrialised economies to developing countries to boost productivity, employment, economic growth and even infrastructures through both the direct and spillover effects (Javorcik, 2004; Markusen & Venables, 1999; Moran, 2011; Saggi, 2002).

Over the past few decades, Sub-Saharan Africa (SSA) has experienced increasing FDI inflows as reported in figure 1as the share of FDI inflows in GDP of the region continued to follow an upward trend from 0.07 percent in 1980 to its highest value of 4.13 percent in 2001[1] and then settled to 3.24 percent and 2.00 percent in 2008 and 2018 respectively. During this period, majority of SSA countries relaxed their investment restrictions and started to pursue more liberal investment policies which include providing incentives for foreign investors in virtually all sectors. The increasing FDI inflows in the region attracted much attention of researchers who examined different dimensions of FDI effects on the region including the spillover effects of FDI on the performance of local firms.

However, the existingstudies provide mixed and inconclusive findings regarding the spillover effects of FDI on the performance of firms in SSA possibly due to country specific factors, data, or methodologies employed. Some studies find positive while others have reported zero and even negative results on the effect of FDI spillovers in the region.Therefore, it becomes imperative to combine these findings in order to determine the causes of the discrepancies in the results and the extent to which these findings can be utilized for policymaking and guide future research.

[1] The higher value of FDI inflows of 4.13 as a percentage of GDP recorded in 2001 has been most due to the favourable investment policies adopted by most countries in the Sub-Saharan African region around late 19s. The discovery of oil and other mineral resources in some African countries during this period also contributed to this high percentage of FDI inflows in the GDP of the region.

Figure 1: FDI inflows as percentage of GDP in SSA (1980-2018)



Source: Authors' plot based on data from WDI (2019)

Thus, the aim of this is to employ the use of meta-analysis by combining the existing FDI spillover studies in SSA to ascertain the rationale behind such differences in the studies and the extent to which findings these FDI spillover studies in SSA can be generalised and if they can be reliable for policymaking. This study is structured as follows: background, review of literature, methodology, findings and discussion as well as conclusion.

Meta-analysis technique has been employed to integrate and summarize the estimates of the previous empirical studies as suggested in the literature. Despite the significant recognition of this meta-analysis, there is paucity of studies using this approach in SSA.

Meta-analysis has become a popular approach in applied economics in recent years for integrating and summarizing several empirical studies and resolving inconsistencies arising from the existing studies (Havranek & Irsova, 2010; Meyer & Sinani, 2005). The pioneer economics studies that employed meta-analysis approach are Ashenfelter et al. (1999) to estimate returns to schooling, Gorg and Strobl (2001),

Djankov and Murrel (2002) for enterprise restructuring analysis in transition economies, Gallet and List (2003) for cigarette demand and De Mooij and Ederveen (2003) for elasticities of tax-rate (Meyer & Sinani, 2005). Since then, many studies in economics have employed the use of meta-analysis.

Meta-analysis is used to statistically integrate the empirical estimates of many previous studies that investigated the same phenomenon. Therefore, the meta-analyst collects many existing empirical studies and analyse them to determine the rationale behind the inconclusiveness in the findings. It majorly determines the authenticity of the reported effects (genuine effect) and whether such reported effects are due to publication selection bias.

Publication selection bias is an important concern in meta-analysis because some authors, editors and reviewers may be more likely to publish certain FDI spillover estimates than others. They may likely prefer certain spillover estimates in terms of signs and statistically significance, and in most cases tempted to report and publish positive spillover estimates, especially for developing countries. In other words, researchers, reviewers and editors may be more likely to accept and publish estimates that demonstrate statistical significance and or that are consistent with the predominant theory (Hampl, Havranek & Irsova, 2019).

2. LITERATURE REVIEW

Foreign direct investment has been recognized in both policy and academic contexts as an essential medium of technology and knowledge transfers from developed nations to developing countries through the cross border activities of multinational enterprises. FDI spillovers have been acknowledged as a transfer of knowledge and technology from foreign-owned firms to domestic owned firms (Hanousek, Kocenda & Maurel, 2010) either through the horizontal channels or through the supply chain relationships (Vertical channels). The main argument in the literature for expecting the transfers of technology and ideas from foreign subsidiaries to local firms is the possession of superior technology by

foreign owned firms and also that these firms outperform domestic firms as demonstrated in many previous empirical studies (Sgard, 2001; Javorcik, 2004).

FDI spillovers through the horizontal channels appear to the most controversial and complex channel of technology transfers due to the complexity of the transmission channels. The dominant transmission channels of horizontal spillovers as identified in the literature are competition, imitation or demonstration, and labour turnover or labour mobility (Crespo et al. 2009; Javorcik, 2004,2007).

It has been argued in the literature that the entrance of foreign multinational enterprises into a particular industry in a host country triggers competition in the industry forcing the domestic firms to upgrade their technologies, efficiently employ existing resources, improve their performance and subsequently improve their innovation and productivity (Lenaerts & Merlevede, 2011; Javorcik, 2007, Blomstrom & Kokko, 1998; Crescenzi et al., 2015). Initially, competition from multinational enterprise may have a crowding out effect on domestic firms where the activities of foreign owned firms would force the inefficient and unproductive local firms out of business allowing only the competitive ones (Narula & Marin,2005; Markusen & Venables, 1999).

The demonstration effect or imitation channel of horizontal spillover is an important channel where domestic firms learn technologies introduced by foreign owner firms through learning-by watching or by imitating the technologies of the foreign firms. This channel proved effective in many emerging economies and it works best for domestic firms that have adequate absorptive capacity.

Labour turnover or mobility has been regarded as an essential horizontal FDI channel of technology and knowledge transfer. The literature demonstrates that technology or knowledge may spill over from foreign to domestic firms through the movement of workers from foreign multinational enterprises (previously working for foreign owned firms) to locally owned firms. The idea is that those workers might have received training and become more familiar with some of the advanced technologies used by

foreign firms, and this knowledge is subsequently transferred to domestic firms which is expected to improve their productivity and innovation.

Researchers have argued that it is likely that labour turnover may favour foreign multinational enterprise since they are likely to pay higher wages than domestic firms (Heyman et al. 2007; Taylor & Driffield, 2005, Vahter & Masso, 2018) making it easier for them to attract the most productive workers from locally owned firms. Both anecdotal and empirical evidences have shown that foreign owned firms pay higher wages than domestic firms and therefor they tend to draw the most productive employees from domestic firms (Sinani & Meyer, 2004; Crespo & Fontoura,2009; Saggi, 2002). However, the hiring and firing of workers by foreign firms and voluntary quitting of jobs by workers of foreign firms may facilitate such labour movement from foreign to domestic firms thereby increasing the productivity of the latter since these workers might have already acquired knowledge from previous employers (Gorg & Strobl,2005; Girma, 2003; Glass & Saggi, 2002).

Given all this, there are mixed findings regarding the effect of horizontal FDI spillover on productivity of firms in the host countries. Some studies find empirical evidence in support of positive horizontal spillover effects (Vahter, 2004; Ayyagari & Kosova, 2010; Damijan et al.,2003b), others find negative effect through this channel (Konigs, 2000; Atieno, 2015) and yet there are studies that find no effect at all (Damijan et al.,2003a).

Other important channels of FDI spillovers are the supply chains, also called vertical spillover channels which occur through the backward and forward linkages between foreign owned firms and locally owned firms in the downstream and upstream sectors. The backward FDI spillovers arise as a result of backward linkages between foreign owned firms and their domestic suppliers of intermediate inputs in the downstream sector. The forward spillovers on the other hand are due to the linkages between foreign owned firms and their domestic customers of intermediate inputs in the upstream sector. Both these supply chain relationships result in the transfer of technology and knowledge from foreign to domestic

owned firms through offering of training, technical assistance, deadlines, other related supports provided by the multinational enterprises to their domestic suppliers and customers in the host countries.

Researchers have argued that backward spillover channel is more effective in transferring technology and knowledge because foreign subsidiaries have no incentive to prevent such knowledge to their domestic suppliers since they also benefit from the high quality of inputs from such relationship as a result of the training and guidelines and other technical assistance provided by them. Majority of FDI spillover studies find evidence in support of positive backward spillover effect in the host countries (Boly et al.,2015; Javorcik, 2004; Lenearts & Merlevede, 2017) while very few find evidence of negative backward spillover effect (Di Ubaldo et al., 2018; Dogan, Wong & Yap, 2017). Some of the main reasons attributed to the negative backward spillover effect include proximity to home countries of foreign subsidiaries, internalisation of supply chain and lack of absorptive capacity by the domestic firms.

Forward FDI spillover channel is the least considered channel in the literature but it also tends to be effective for technology transfer since domestic customers benefit from the high quality of inputs they buy from foreign owned firms which may reduce damages and improve productivity. Some of the few studies that provide evidence of forward FDI spillovers include (Lenearts & Merlevede, 2011).

2.1 FDI Spillovers in Sub-Saharan Africa

The rising importance of FDI inflows in Sub-Saharan Africa over the past few decades has attracted the attention of researchers to examine the effect of FDI on the economy of the region as well as the spillover effect of FDI on the performance of firms in the region. The first study that deeply examined the spillover effect of FDI in SSA was by Amendolagine et al. (2015) using a novel cross sectional data collected by UNIDO[2] (2010) on 19 SSA countries. They find evidence of a positive backward spillover effect which

[2]United Nations Industrial Organisation (UNIDO) collected a unique firm level dataset from 19 Sub-Saharan African countries in 2010 which gave many researchers the opportunity to undertake extensive studies on FDI spillovers in the region.

was attributed to high demand of local inputs by foreign owned firms as well as firms owned by Africans in diaspora.

Gorg and Seric (2015) used the same dataset of UNIDO (2010) to examine the linkages between foreign subsidiaries and the performance of local firms in SSA taking into account the role of assistance either from foreign owned firms or from the government. They find evidence of both forward and backward spillover effect in increasing the innovation and productivity of domestic firms in the region. Similarly, Amendolagine (2016) and Amendolagine et al. (2016) examine the spillover effect of FDI in the region by considering the role of investor's country of origin. They show that foreign multinational investors that originated from OECD[3] countries generate more domestic linkages and FDI spillovers compared to firms that originated from BRICS[4] countries. In contrast, Seyoum et al. (2015) examined the effect of Chinese foreign investments on local firms in this case of Ethiopia and find evidence that foreign firms are more productive than domestic firms and they generate positive spillover effects for domestic firms that have adequate absorptive capacity.

Using multilevel analysis, Sanfilippo and Seric (2015) examined the spillover effect of FDI on performance of firms in SSA where they emphasized on the role of agglomerations and find a negative correlation between horizontal spillover and performance of local firms. This result was attributed to the negative competition effect associated with FDI where foreign subsidiaries take away the market shares of domestic firms and crowd out domestic investors.

Atieno (2015) also finds a negative horizontal spillover effect but positive backward spillover effect in the case of Kenyan manufacturing sector. This confirms the argument that backward spillover is most likely to take place due to the fact that foreign owned firms may not want to prevent knowledge spillover to their domestic suppliers because they equally benefit from such relationship. Malikane and Chitambara

[3]This stands for the Organisation for Economic Cooperation and Development and its members consists of developed countries.
[4]This refers for countries of Brazil, Russia, India, China and South Africa which are regarded to be developing countries which are on the path to becoming developed.

(2018) also finds a positive but weak evidence of FDI spillovers in SSA countries conditional on the technological gap between foreign and domestic owned firms. Similar outcome was also shown by Danquah and Amakwah-Amoah (2017) in a group of 45 African countries while Barasa et al. (2019) find a negative outcome for the FDI spillovers for countries within the region.

These differences in the findings have been a matter of concern for both researchers and policy makers because it is difficult to understand the right findings for policy prescriptions. Hence, researchers over the last few years have adopted the use of meta-analysis in the field of economics in order to better understand the genesis of these discrepancies and the possible way forward and how it can be beneficial for policy making especially in developing countries.

2.2 Meta-Analysis and FDI Spillovers

Since the pioneer use of meta-analysis in the empirical investigation of phenomena in economics and business (Ashenfelter et al.1999; Gorg & Strobl, 2001), many researchers have adopted this research approach in order to understand the rationale behind the divergent findings in the existing FDI spillover literature. Gorg and Strobl (2001) employed meta-analysis to examine the effect of research design and data on the reported FDI spillover effects and showed that model specification and data type (cross-sectional and panel) have influence on the heterogeneity in the previous studies. They also indicated the presence of publication bias in their primary studies.

Similarly, Hanousek, Kocenda and Maurel (2010) employed meta-analysis to examine the direct and indirect effects of FDIin emerging European markets and showed that both the direct and indirect effects become weaker over time. They also detected the presence of publication bias and also showed that research design has effect on the existing empirical results in the literature. This is similar to Demena and Bergeijk (2016) who also examined the effect of FDI spillover on the performance of firms in developing countries and found that FDI spillover effects are affected by publication bias, arguing that such bias overstates the spillover effects.

Harvanek and Irsova (2010) studied the meta-analysis of horizontal FDI spillovers and found a significant effect of research design and publication bias on the results of the previous spillover studies. Wooster and Diebel (2006) examined the spillover effect of FDI on productivity in developing countries using meta-analysis in which they accounted for a variety of research design to determine the aspect that influence the size, significance and sign of FDI spillover effects. Theyfound that the mixed results of the FDI spillovers in developing are partly due to model specification.

3. METHODOLOGY

This study reviews the existing meta-analyses and primary[5] studies in order to analyse the sources of heterogeneity in the existing studies and to understand the genuine spillover effects and whether there is presence of publication bias. All relevant and known published and unpublished FDI spillover related studies in SSA have been identified and reviewed. In line with standard methodology for collecting data for meta-analysis, the relevant primary studies were identified with the use of extensive search engines through the Google scholar, Scopus and Econlit using keywords such as “FDI spillovers in SSA or in Africa”, “effects of FDI spillovers on productivity of domestic firms in SSA or in Africa”, “FDI productivity spillovers in SSA”.Although numerous FDI studies appeared, only studies that relate to FDI spillovers, productivity and domestic linkages, and have reported both the estimates and their standard errors were included in the sample.

Therefore, a total of 18 primary studies as presented in table 1 met our criteria which provided the required data of 1104 observations[6] in which 69 percent is journal and 31 percent consists of working papers and theses. There are thirty-one (31) potential sources of heterogeneity identified, including journal quality coded from the primary studies.

[5]Primary studies are the existing studies that have investigated the FDI spillover effects in SSA which we have used to construct a database for the analysis in this study. We follow the established methodology to arrive at the final dataset used for the analysis.

[6] The 1104 observations were arrived at after eliminating outliers in the data which we considered to impact tremendously on the outcome of the analysis.

Since the essence of meta-analysis is generally to ascertain the genuine effect and whether there is no publication bias, funnel asymmetry test (FAT) and precision-effect test (PET) have been used in line with previous meta-analyses to determine the publication bias and genuine FDI spillover effects. Funnel plot has been used to obtain the visual suggestion of the degree of publication bias in the primary studies. We address the issue of within-study dependency and between-study heterogeneity by estimating the study-clustered standard errors andby employing the mixed-effects multilevel (MEM) modelling approachand Ordinary Least Squares (OLS). The standard meta-regression model (MRM) is specified as follows:

$$e_{ij} = \alpha + \beta se_{ij} + u_{ij} \quad (1)$$

Where e stands for the FDI spillover estimates from primary studies, se stands for the standard errors and u represents the disturbance terms.

It is expected that e_{ij} (spillover estimates) varies randomly around α, and the standard errors (se_{ij}) approaches zero and e_{ij}be independent of their standard errors. We divide equation (1) by the se_{ij} to adjust for the possibility of heteroskedasticity and this method yields the following standard meta-regression model in the form of weighted least square model in which the t-statistics is now the response variable.

$$t_{ij} \equiv (e_{ij}/\, se_{ij}) = \alpha + \beta(\frac{1}{se_{ij}}) + \gamma \boldsymbol{X}_{ij} + \varepsilon_{ij} \quad (2)$$

Where t_{ij} represents the t-statistics of spillover estimate i from study j and ε_{ij} is ratio of the error term to standard errors in equation (1). The slope of equation (2) estimates the magnitude and direction of a genuine spillover effect (PET) while the constant or intercept term tests for publication bias in the effect (FAT). X_{ij} consists of control variables that account for different sources of heterogeneity in the previous empirical findings of the FDI spillover effects.

The use of t-statistics for meta-analysis has been reported by previous studies (Gorg & Strobl, 2001; Meyer & Sinani, 2005) as appropriate because it is dimensionless as against the magnitude of spillover estimates. We model a list of possible heterogeneity sources, and by following previous meta-analyses, these sources are based on specifications, estimation techniques, data and publication characteristics of the primary studies. All estimations have been carried out using Stata 15.

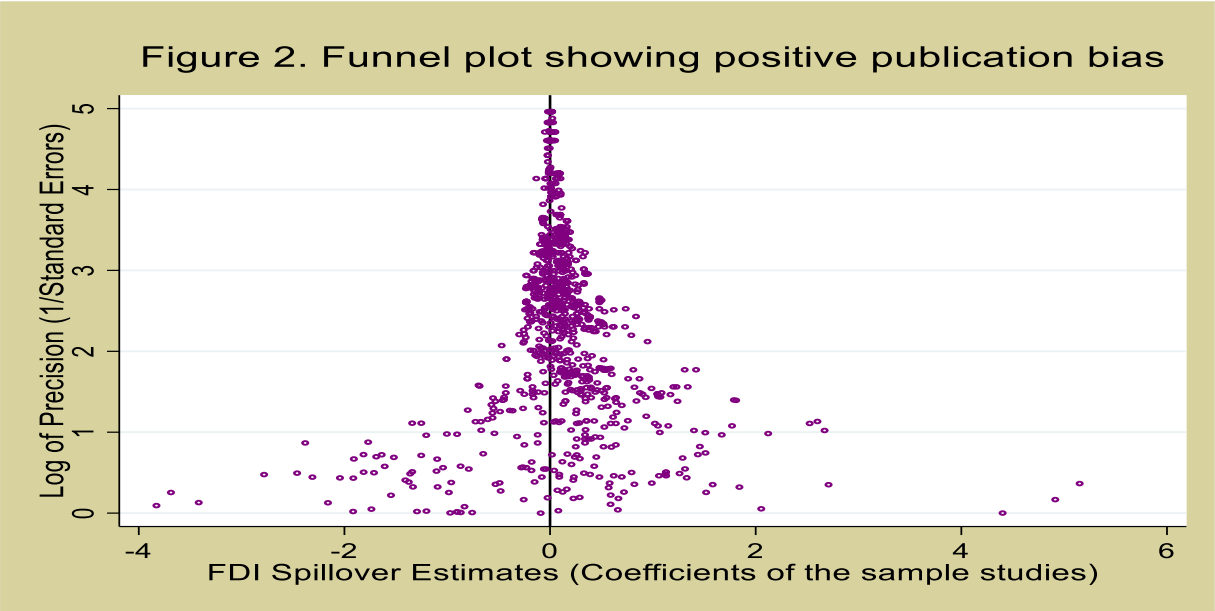
Table 1: Primary Studies from SSA Employed in the Analysis

S/N	Authors	Country of study	Frequency of FDI Spillover Estimates	Percent	Cumulative percent
1	Amendolagine et al. (2013)	SSA	64	5.80	5.80
2	Amendolagine et al. (2017)	SSA	98	8.88	14.67
3	Atieno (2015)	Kenya	77	6.97	21.65
4	Blanas et al. (2019)	SSA	29	2.63	24.28
5	Boly et al.(2015)	SSA	25	2.26	26.54
6	Demena (2016)	SSA	23	2.08	28.62
7	Dunne and Masiyandima (2014)	SADC	56	5.07	33.70
8	Dutse (2012)	Nigeria	6	0.54	34.24
9	Gold et al. (2017)	SSA	118	10.69	44.93
10	Gorg and Seric (2015)	SSA	188	17.03	61.96
11	Gorg and Strobl (2005)	SSA	74	6.70	68.66
12	Mugendi (2014)	Kenya	12	1.09	69.75
13	Mugendi and Njuru (2016)	Kenya	3	0.27	70.02
14	Perez and Seric (2015)	SSA	28	2.54	72.55
15	Sanfilippo and Seic (2015)	SSA	122	11.05	83.61
16	Seyoum et al. (2015)	Ethiopia	75	6.79	90.40
17	Waldkirch and Ofosu (2010)	Ghana	91	8.24	98.64
18	Yauri (2006)	Nigeria	15	1.36	100.00
	Total		1,104	100.00	

Note: SSA stands for Sub-Saharan Africa while SADC stands for Southern Africa Development Community.

4. RESULTS AND DISCUSSION

In line with previous studies, the funnel plot for determining the publication bias has beenpresented in figure 2 which appears to be full and symmetrical. However, the right portion of the funnel seems to be a little heavier than the left portion, suggesting the presence of a positive publication bias of the FDI spillover estimates. This indicates that studies that reported negative FDI spillover estimates were less likely to be accepted for publication or authors were less likely to report negative estimates.



Source: Authors' plot using data constructed from primary studies

Since visual inspection of the plot may likely be subjective, we present the formal publication bias test using funnel asymmetric test (FAT) as shown in table 2to confirm the result shown by the funnel plot.

Table 2. Bivariate Meta Regression for FAT and PET Tests

	All samples	Peer-reviewed studies	Studies in High Ranking Journals
	Dependent variables: t-statistics		
Publication bias (FAT)	$0.950^{***}(0.365)$	$0.848^{*}(0.458)$	$0.751(0.528)$
Genuine effect (PET)	$-0.002(0.007)$	$0.002(0.010)$	$0.005(0.010)$
Observations	1104	764	814

Note: ***, * stands for 1% and 10% level of significance respectively. Mixed-effects multilevel estimation technique with study-clustered standard errors is used to correct for possible heterogeneity as well as within-study dependency.

The FAT reveals that a positive publication selection bias is strongly significant for the full sample, confirming the result of funnel plot in figure 2, though the bias decreases with the quality of studies published. Peer-reviewed papers show evidence of a weak positive publication bias whereas studies published in leading journals show no evidence of a significant publication selection bias. The magnitudes of the bias also decrease accordingly.

Similarly, the precision-effect test (PET) which estimates the genuine effect, shows that for the full sample, FDI spillover effect is negative while it is positive for both peer-reviewed and leading journals.

However, the coefficients are not statistically significant. This result implies that the reported FDI spillover effects in SSA may be due to publication bias but studies published in leading journals are free from such selection bias. The insignificance of the genuine-effect coefficient implies that no significant positive FDI spillover effect has taken place in the Sub-Saharan African region.

Table 3. Reduced-form Multivariate Meta-Regression for Sources of Heterogeneity

	Model 1 Mixed-effect multilevel (MEM)	Model 2 Ordinary Least Squares (OLS)
	Dependent variable: t-statistics	
Bias (intercept)	$6.434^{***}(0.028)$	$6.441^{***}(0.056)$
Specification		
Joint ventures	$3.129^{***}(0.136)$	$3.176^{***}(0.201)$
Absorptive capacity	$2.871^{***}(0.064)$	$2.883^{***}(0.101)$
Firm age	$0.520^{***}(0.123)$	$0.480(0.376)$
R&D	$0.685^{***}(0.116)$	$0.720^{***}(0.136)$
Firm size	$-2.319^{***}(0.065)$	$-2.302^{***}(0.202)$
Exporter	$-0.348^{***}(0.093)$	$-0.364^{***}(0.107)$
Estimation method		
FGLS	$-6.491^{***}(0.304)$	$-6.583^{***}(0.339)$
Random effect	$-4.096^{***}(0.279)$	$-4.178^{***}(0.336)$
Tobit	$-2.967^{***}(0.048)$	$-2.986^{***}(0.176)$
GMM	$3.343^{***}(0.084)$	$3.323^{***}(0.052)$
Data		
Time span	$-1.062^{**}(0.030)$	$-1.071^{**}(0.047)$
Cross section	$-3.140^{***}(0.123)$	$-3.175^{***}(0.149)$
Panel	$3.246^{***}(0.182)$	$3.304^{***}(0.397)$
Country specific	$2.964^{***}(0.173)$	$3.017^{***}(0.196)$
Sample size	$0.0002^{***}(0.0001)$	$0.0002^{***}(0.0001)$
Publication		
Peer-reviewed journal	$-3.454^{***}(0.108)$	$-3.485^{***}(0.133)$
Leading journal	$0.815^{***}(0.086)$	$0.840^{***}(0.173)$
Observations	1013	1013
Sd (Residual)	2.356 (0.170)	
95% Conf. Interval	[2.046 , 2.713]	

Note: Note: ***, * stands for 1% and 10% level of significance respectively. Mixed-effects multilevel estimation technique with study-clustered robust standard errors is used to correct for possible heterogeneity as well as within-study dependency reported in model 1. Model 2 is estimated using OLS with study-clusteredrobust standard errors as robustness check and the results do not appear to differ significantly. FGLS stands for feasible generalised least squares and GMM stands for generalised method of moment. General -to-specific modelling approach is used to arrive at the reduced form models which provided only significant estimates. The genuine effect (precision variable) is dropped because it appears to be statistically insignificant repeatedly.

There are many factors that can explain the heterogeneity in the existing empirical spillover findings in SSA. These factors incorporate the research design and other factors that could affect the results of previous studies.

We account for most of these factors following previous studies and report the reduced-form multivariate meta-regression results for the potential sources of heterogeneity as presented in table 3. Generally, we control for model specifications, estimation methods, data type, and quality of publication of the studies.

The study characteristics or sources of heterogeneity appear to have divergent influence on reported FDI spillover effects. The specification of the studies has a strong influence on reported FDI spillovers in SSA as joint venture, absorptive capacity, firm age as well as research and development increase the reported FDI spillovers whereas firm size and exporter firms reduce them.The reported FDI spillover estimates in SSA are also strongly influenced by estimation methods with studies using GMM being 3.3 percent more likely to find positive FDI spillovers. On the other hand, studies that employ FGLS, random effects and tobit methods tend to find negative spillover effects.

Similarly, reported FDI spillover effects also depend on the characteristics of data usedas such effects decrease with the time-span of the dataand cross-section studies, whereas panel and country-specific studies increase the spillover effects. In other words, studies employing longer time span and cross-sectional data are strongly likely to report negative FDI spillovers while panel, country-specific and studies that employ large sample are more likely to find positive spillovers.In the same vein, while studies published in peer-reviewed journals are more likely to report negative spillovers than working papers and theses, those published in leading journals increase the chances of finding positive FDI spillovers in SSA and they are free from publication bias.

However, accounting for the study characteristics,does not reduce the positive publication bias rather the bias increases for the full sample.This indicates that studies are more likely to report positive FDI spillover estimates irrespective of the significant influence of the sources of heterogeneity or the study

design. The results show that, on the average, for every FDI spillover study undertaken, the positive publication selection bias increases by 6.4units, holding other factors constant. Therefore, the lack of evidence for the genuine effectmay largely be due to the publication selection bias which means that significant FDI spillover effect might not have taken place in SSA. This indicates that FDI in SSA does not significantly improve the productivity of domestic firms which may partly to the high concentration of foreign multinational enterprises in the extractive industries and the infrastructure deficiency in the region.

5. CONCLUSION

This study uses meta-analysis to analyse the findings of the previous FDI spillover studies in SSA. The study reveals important findings that are consistent with majority of the previous meta-analyses in the field of FDI spillover literatureand have potential policy implications. Essentially, the reported positive spillover effectsin the primary studies cannot be supported statistically and these studies have been found to suffer from severe positive publication bias with the exception of studies published in high ranking journals. However, positive FDI spillover effects in SSA are more likely to be country-specific and among panel studies, depending on the sample size, ownership structure, research and development, as well as absorptive capacityof firms.

There is no evidence of a significantly genuine effect from FDI spillovers in SSAand there is a large case of publication selection bias. This has a great policy implication especially in the time when Sub-Saharan African governments are in need of a policy guide. Therefore, results from the existing FDI spillover studies in Sub-Saharan African countries must be treated with extreme cautions and policymakers should rely more on studies published in high and reputable journals because this finding shows that publication bias is likely in studies published in these journals.

Since studies published in other journals are mostly contaminated with publication bias, their findings may be less reliable for policymaking. This is because the reported FDI spillover estimates may not

necessarily represent the true reflection of the reality of benefits that domestic firms gain from the foreign presence since researchers may be more likely to report positive results.

It is important that researchers and publishers adhere to research and publication ethics rather than giving too much preferences to studies that produced estimates which are in line with existing theory. This may aggravate the proliferation of publication bias among the researchers and publishers which may be misleading for policymaking. There is also a need for more studies on FDI spillovers in SSA using the meta-analysis techniques to provide much better understanding of the differences in the existing empirical literature as research in this area is very limited in SSA.

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