Tourism and Trade Nexus in Africa: A Gravity Model Approach

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Abstract

The tourism industry is now an important economic sector in Africa. However, as with trade, Africa's global share of the tourism industry is quite small, which could be attributed to a similarly low level of both intra-regional trade and tourism. Prevailing data and studies suggest that there is a relationship between tourism and trade. The aim of this study, therefore, is to examine the empirical link between tourism and exports in Africa for the period 2006 to 2015. We estimate a structural gravity model using the Poisson pseudo maximum likelihood (PPML) estimator that allows for bilateral zero trade values between trading partners, controls for heteroskedasticity and addresses the potential endogeneity. We find that a 10 percent increase in intra-African tourism boosts the continental exports by between 1.4 and 3.2 percent. These results strongly posit that boosting regional tourism could be instrumental in catalysing intra-African trade, especially within the context of the African Continental Free Trade Area (AfCFTA).

Keywords: Tourism, trade, intra-African, AfCFTA, gravity model

Introduction

As is the case with the rest of the world, the tourism industry is now a key economic sector in Africa. The embracing of the sector could be attributed to the failure of traditional sectors (such as agriculture and the extractives industries which have hitherto dominated the economic space in the continent) to bring about meaningful economic growth and development (Rekiso, 2017). Consequently, though historically the major tourist destinations have been in the Northern, Eastern and Southern parts of the continent, now more and more African countries and Regional Economic Communities from the Central and Western parts are undertaking measures to develop their respective tourism industries. As a result, Member States drawn from Central and Western Africa have continued to sustain high tourism growth rates since embracing the sector (UNCTAD, 2017). Likewise, at the continental level, the African Union (AU), has identified the tourism industry in its Agenda 2063, as a pathway through which structural transformation marked by a shift from agrarian-based economies to those driven by manufacturing and services sectors can be achieved (AU, 2015). Accordingly, the AU has set bold targets to be met by the tourism industry including the 100% increase of its gross domestic product (GDP) contribution and doubling of intra-Africa tourism over a 10-year period (2013-2023).

With a projected annual growth rate of 5%, the tourism industry currently accounts for 8.5% of the continent's GDP, 6% of total investments valued at USD 29 billion and employs 24.3 million people or 6.4% of the total workforce (WTTC, 2019). The continent further received 78 million visitors in 2018 earning the continent USD 45 billion (UNWTO, 2019). This translated to a global share of 5% and 3% in terms of arrivals and receipts respectively and an average spend per arrival of USD 600 compared to the global average of USD 1,010 (UNWTO, 2019). The continent's low share could, among others, be attributed to the comparatively low levels of intra-regional tourism, which currently stands at just 46% compared to the global average of 80% (UNWTO, 2019). A number of factors have been identified as obstacles to regional tourism in Africa including the high costs of regional travel in particular air transport, which is exacerbated by poor connectivity, unfavourable visa regimes that restrict the movement of Africans and the lack of appropriate tourism products (UNCTAD, 2017).

In a similar breath, trade in general, in particular regional trade, has been identified as the key to unlocking Africa's potential. However, as is the case with tourism, the share of Africa's trade with the rest of the world is also quite low. It is estimated that between 2015 and 2017, the continent's trade with the rest of the world was valued at USD 780,462 million compared to USD 4,109,131 million, USD 5,139,649 million and USD 6,801,474 million for Europe, America and Asia respectively (UNCTAD, 2019). In fact, 80-90% of the total exports were to the rest of the world between the period 2000 and 2017 (UNCTAD, 2019). The low share of Africa's global trade could be attributed to the comparatively low level of intra-Africa trade with both exports and imports averaging just 15.2% compared to 67.1%, 61.1% and 47.4% in Europe, Asia and America between 2015 and 2017 (UNCTAD, 2019).

Taking cue from the rest of the world, the potential of intra-regional trade in Africa has now been recognised with all African Union member states but one having signed the agreement establishing the African Continental Free Trade (AfCFTA) and the subsequent start of trading in January 2021In line with this, there have been several other initiatives that are also expected to boost trade and by extension tourism in Africa. For example, it has been estimated that the launching of the Single African Air Transport Market (SAATM) by the AU in 2018 and its immediate signing by 23 Member States, could create over 155,000 additional jobs and contribute over USD 1.3 billion to the continent's GDP (IATA, 2019). In addition, with 30 Member States have signed the Free Movement Protocol (the Right of Establishment) by March 2018, African citizens will find it easier to move across the continent as their counterparts do in America, Asia and Europe (AU, 2018). Of interest, though is the relationship between tourism and trade. A close look at the leading tourism destinations of the world reveals a consistent pattern in that their main tourist markets are also their top trading partners and that intra-regional aspects are the main driving forces. For instance, with over 82 million visitors in 2016, France has consistently been the top tourism destination globally with the United Kingdom, Germany, Belgium, Italy and Spain being amongst its top tourist markets, countries which are also its top trading partners (UNWTO, 2019 and World Bank, 2019). The pattern is also evident in the case of the United States of America (USA) and Thailand.

A number of studies have been undertaken to understand this trend. For instance, Aradhyula and Tronstad (2003) in their study on cross-border trade between the USA and Mexico illustrated that international tourists could help overcome information gaps about market opportunities thereby facilitating new business ventures. Similarly, Brau and Pinna (2013) opine that direct contact between tourists and local markets could represent a cheap way to promote the domestic supply of certain goods in the international markets than simply activating marketing activities. They further argue that tourism can facilitate better consumer knowledge and may change consumer attitudes about foreign cultures, hence breakdown stereotypes, thereby inducing new demand for foreign products. In line with the above, most

empirical studies assessing the relationship between tourism and trade have employed cointegration techniques (Fischer & Gil-Alana, 2009; Kulendran & Wilson, 2000; Santana-Gallego, Ledesma-Rodríguez & Pérez-Rodríguez, 2011). The few studies that have used the structural gravity model have not accounted for all the estimation issues, leading to inconsistent and unbiased estimates. Moreover, we have not come across a study done in the context of the African continent. Yet a study by Viljoen, Saayman and Saayman (2019) avers that intra-African tourism flows can best be explained by the gravity theory.

The aim of this study, therefore, is to investigate the nexus between tourism and trade in Africa by use of the Poisson Pseudo Maximum Likelihood (PPML) estimator which controls for heteroskedasticity and allows for bilateral zero trade values between trading partners. We treat potential endogeneity by using country-pair fixed effects. The structure of this paper is as follows. Section 2 provides a critical review of the relevant empirical literature. Section 3 discusses the empirical estimation of the gravity model and the datasets used in the analysis. Section 4 presents our findings and Section 5 concludes.

Tourism and trade patterns

Over the past decade, intra-African tourists accounted for approximately half of the total tourist arrivals in the continent (UNWTO, 2019). This is however much lower than the proportions recorded in other regions. For instance, intra-regional tourism accounted for more than 90 percent of the total tourist arrivals into Asia (UNWTO, 2019[a]). It is imperative for African countries to promote intra-regional tourism as it can cushion them from externalities such as seasonality. Continental tourism is likely to be more evenly distributed throughout the year compared to the strong fluctuations when relying on tourists from countries in Europe and North America who travel to Africa mostly during their strong winters (UNCTAD, 2017). However, it is worth noting that intra-African tourism is concentrated in a few African countries which account for about 60 percent of the total tourist arrivals. In particular, between 2006 and 2015, South Africa accounted for around a third of the total arrivals while Nigeria and Zimbabwe accounted for 11 percent and 8 percent respectively. Tunisia and Mozambique each accounted for 6 percent of the total intra-African arrivals. Further breakdown of the data reveals an interesting pattern; the main source countries for the tourists tend to be the key trading partners for the destination countries. It is evident from Table 1 that the main countries that contribute to intra-African tourism in the top three countries are also some of these countries key export partners.

In consonance with various studies, these source countries for tourists and the trading partners (which are the tourist destination countries) tend to be neighbouring countries (Anderson, Milot and Yotov, 2011). For instance, only one of South Africa's top ten tourism source countries and export partners are outside of Southern Africa. Table 1 shows that 98 percent of South Africa's top ten tourism arrivals are from Southern Africa, while 78 percent of its top ten export partners are also in Southern Africa. This reveals the need to boost tourism within the continent by promoting not only intra-regional tourism but also inter-regional tourism. The limited movement of Africans within the continent means that few, say Southern Africans have been to Northern Africa and vice versa, hence there is limited knowledge of the opportunities available in either region. This has been exacerbated by the prevailing visa regimes which have meant that 42% of African citizens require visas before travel to other African countries (UNWTO, 2019[b]). Implementation of initiatives such as the African Union's Free Movement Protocol which aim to ease the movement of Africans around the continent will, therefore, be an important step in boosting intra-African tourism. Boosting tourism might lead to new trading partners thus engendering the levels of intra-African trade, especially in the context of the African Continental Free Trade Area (AfCFTA) (Baier & Bergstrand, 2007).

Figure 1 reveals that tourist arrivals and exports are strongly and positively related with a correlation coefficient of 0.75. To understand the true nature of this relationship, we extend our analysis to control for confounding factors and also address endogeneity issues in the subsequent sections.
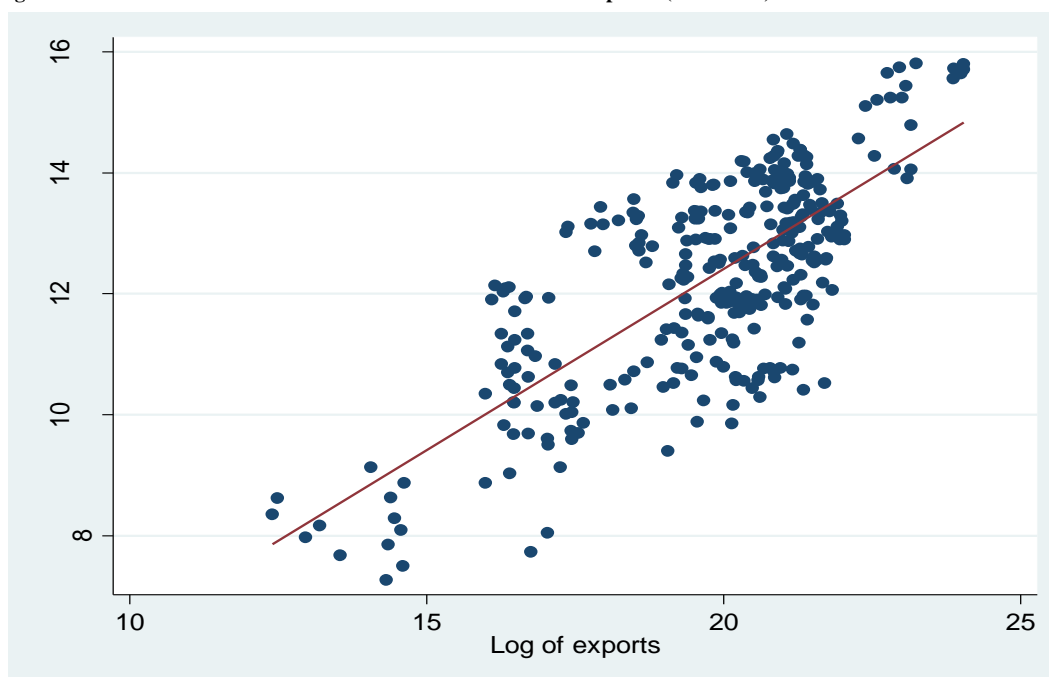
Table 1: Break down of top 3 intra-African tourist destinations by main tourists country of origin and exports destination (2006-2015, average)

Country	Country of origin of the intra-African tourists			Intra-African Merchandise Exports Destination		
	Top ten origin countries	Arrivals (thousands)	Arrivals (% share)	Top ten destinations	Trade Value (USD millions)	Trade (% share)
South Africa	Lesotho	1,607	25	Botswana	2,730	14
	Zimbabwe	1,529	24	Namibia	2,520	13
	Mozambique	1,104	17	Zambia	2,040	10
	Swaziland	844	13	Mozambique	2,020	10
	Botswana	599	9	Zimbabwe	1,920	10
	Namibia	208	3	D.R.Congo	973	5
	Zambia	168	3	Swaziland	907	5
	Malawi	145	2	Lesotho	839	4
	Angola	41	1	Angola	837	4
	Nigeria	34	1	Nigeria	753	4
Nigeria	Niger	665	28	South Africa	2,550	28
	Benin	416	17	Cote d'Ivoire	1,700	19
	Cameroon	190	8	Ghana	958	11
	Liberia	115	5	Cameroon	725	8
	Chad	97	4	Algeria	718	8
	Ghana	89	4	Eq. Guinea	716	8
	Senegal	78	3	Senegal	424	5
	Cote d'Ivoire	66	3	Botswana	338	4
	Mali	61	3	Liberia	204	2
	Togo	59	2	Niger	138	2
Zimbabwe	South Africa	1,019	54	South Africa	1,740	66
	Zambia	250	13	Mozambique	279	11
	Malawi	173	9	Zambia	246	9
	Mozambique	139	7	D.R.Congo	110	4
	Botswana	112	6	Botswana	89	3
	D.R.Congo	20	4	Malawi	26	1
	Namibia	17	1	Namibia	8	0.3
	Tanzania	16	1	Kenya	7	0.3
	Kenya	14	1	Swaziland	6	0.2
	Swaziland	12	1	Lesotho	4	0.2

Source: Authors' calculations using data from UNWTO (2012, 2014, 2019) and CEPII
Note: Purple and pink indicate mismatch between the tourism markets and the trading partners respectively

Figure 1: Correlation between intra-African tourist arrivals and exports (2006-2015)

Source: Authors' calculations using data from UNWTO (2012, 2014, 2019) and UNCTADStat
Note: Since not all countries have comprehensive tourist arrivals data in the UNWTO Yearbooks, the above calculations are based on only 35 African countries

Literature review

In recent years, there has been a growing interest in the nexus between tourism and international trade (Santana-Gallego et al., 2016). Most of the empirical research on this subject has been carried out using the cointegration and causality techniques and the results have been mixed. For instance, Fischer and Gil-Alana (2009) used a methodology based on fractional integration to assess the effect that German tourism to Spain has on German imports of Spanish wine. The results indicate that tourism has a positive impact on the travel destination economy, which lasts for many months after the tourists have already left the country. Similarly, Kulendran and Wilson (2000) used cointegration and Granger-causality approaches to investigate the relationship between trade and tourism for Australia and its four main trading partners. Their results show that travel Granger causes international trade in some cases and vice versa in others. On the other hand, there are scholars who employed panel cointegration techniques in their research. Santana-Gallego et al. (2011) used dynamic heterogeneous panel data estimators to assess the empirical link between tourism and trade among the OECD countries. Their estimates showed that inbound tourism can promote international trade and also that international flow of goods requires and may encourage tourist arrivals and departures. Likewise, Fry, Saayman and Saayman (2010) analysed the relationship between tourist arrivals and trade between South Africa and 40 African countries. They used Pedroni's test for cointegration and fully modified ordinary least squares (OLS) estimator and the results revealed that there is a two-way causal relationship between trade and tourism.

Although the relationship between tourism and trade had been traditionally neglected within standard international trade models such as the gravity model (Santana-Gallego, Ledesma-Rodríguez & Pérez-Rodríguez, 2016), researchers have started using the model the gravity theory to explain tourism flows. In fact, a study by Viljoen et al. (2019) sought to determine which trade theory could best explain intra-African tourism by applying four theoretical models of international trade to bilateral African tourism flows from 25 countries

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over a 10-year period. The results suggested that intra-African tourism flows can be best explained by the gravity theory. However, very few studies have used the gravity model to analyse the relationship between tourist flows and trade, albeit without addressing all the main challenges in the estimating techniques.

El-Sahli (2017) explored the causal effect of tourist flows on exports for the period 1995 to 2013 using a gravity model. El-Sahli controlled for the multilateral resistance, which may lead to severe biases in the estimates if not addressed (Anderson & van Wincoop, 2003) by including importer-year fixed effects and demeaning the data over the exporter dimension to account for the multilateral resistances on the exporter side as suggested by Head and Mayer (2014). To deal with endogeneity arising from both omitted variable bias and reverse causality, he used casualties from terrorism and spillovers from tourism to other countries to instrument for tourism in two different samples of countries, non-OECD and European exporters respectively. The results indicate that an increase in the number of inbound tourists leads to an increase in the exports of differentiated products. In particular, tourism boosts the exports from both the non-OECD and European exporters of processed food products and differentiated consumer products with an elasticity close to 1.

Despite addressing some of the challenges in the estimation of gravity equations (Baldwin & Taglioni, 2006), El-Sahli (2017) used the log-linear form of the OLS and the Instrumental Variable (IV) - OLS in his analysis. Yet, Santos-Silva and Tenreyro (2006) revealed that heteroskedasticity is a severe problem even in a log-linearized gravity model that takes into account multilateral resistance terms, leading to inconsistent and biased estimates. Moreover, trade data tends to be characterized by zero flows in some years or between some countries and log-linearization results in truncation of the sample as the zero trade flows are dropped from the sample, further biasing the results. Santos-Silva and Tenreyro (2006) propose the use of Poisson Pseudo Maximum Likelihood (PPML) estimator which performs very well even when the proportion of zeroes is large. The PPML estimator applied to the gravity model is expressed in a multiplicative form, accounting for heteroskedasticity.

Santana-Gallego et al. (2016) assessed whether tourism matters for trade using cross-section dataset comprising 195 countries in 2012. They employed the augmented gravity model proposed by Helpman, Melitz and Rubinstein (HMR) (2008), which is estimated in two stages: (i) a first stage selection model based on the Probit equation which determines the probability that j exports to i (extensive margin) and (ii) a second stage outcome equation which estimates the volume of trade taking place (intensive margin). To address the potential endogeneity of tourism, they used a set of instruments which included, lagged tourist arrivals such as tourism flow in 2011, number of world heritage sites declared by UNESCO per destination country and annual average temperatures in the origin and destination country. Their results suggested that a 1 percent increase in tourist arrivals increases the probability of exporting by 1.25 percent and raises the volume of exports by 9 percent.

However, Santos-Silva and Tenreyro (2015) argue that the HMR model has some shortcomings, casting serious doubts on any inference drawn from its empirical implementation. Firstly, the approach used by HMR to deal with the selectivity bias caused by dropping the observations with zero trade is only approximately correct. Secondly, and more importantly, the HMR model and associated estimator depend critically on untested distributional assumptions and their analysis shows that these assumptions are strongly rejected by the HMR data. Thirdly, the results of the two-stage estimation method proposed by HMR are very sensitive to the presence of heteroskedasticity. Moreover, additional difficulties with the HMR approach which arise for panel data estimations and when dynamic considerations are taken into account (Yotov, Piermartini, Monteiro & Larch, 2016; Wooldridge, 2002). It is evident that studies on the nexus between tourism and trade using gravity model have

accounted for some but not all the estimation issues which might lead to inconsistent and biased estimates. Furthermore, we have not come across a study done in the context of the African continent. Therefore, this study aims to contribute to literature by exploring the nexus between tourism flows within the continent and intra-African exports, while accounting for the challenges in estimation of the gravity model.

Empirical implementation
Econometric specification
We slightly modify the generic version of the structural gravity model outlined in Yotov et al. (2016) and estimate equation (1):

$$X_{ijt} = \exp\left(B_1 lnArrivals_{jit} + B_2 \ln DIST_{ij} + B_3 CNTG_{ij} + B_4 LANG_{ij} + B_5 CLNY_{ij} + B_6 RTA_{ijt} + EX_{jt} + M_{it}\right) + e_{ijt} \qquad (1)$$

Where X_{ijt} represents exports from country i to country j in year t while $Arrivals_{jit}$ is the number of tourists arriving in country i from country j. $\ln DIST_{ij}$ is the logarithm of bilateral distance between trading partners i and j and $CNTG_{ij}$ is an indicator variable that captures the presence of contiguous borders between country i and j. $LANG_{ij}$ and $CLNY_{ij}$ are dummy variables that take the value of one for common official language and presence of colonial ties, respectively. RTA_{ij} is a dummy variable that accounts for the presence of a regional trade agreement between two African countries i and j at time t by taking the value of one, and zero otherwise. EX_{jt} and M_{it} are the exporter-time and importer-time fixed effects that control for the outward and inward multilateral resistances, respectively. These are structural terms coined by Anderson and van Wincoop (2003) to imply that, *ceteris paribus*, two countries will trade more with each other the more remote they are from the rest of the world They also capture the size variables such as GDP and potentially any other observable and unobservable time-varying characteristics (these include various national policies, institutions, exchange rates, etc) for each exporter and importer that may influence the bilateral trade (Yotov et al., 2016; Olivero & Yotov, 2012). Equation (1) was estimated using the Santos-Silva and Tenreyro (2016) PPML estimator. An OLS estimator was also used for comparative purposes. However, the coefficient of the tourist arrivals variable in equation (1) is likely to be biased due to potential endogeneity issues alluded to in the literature review. We introduce the country-pair fixed effects, μ_{ij}, which treats the potential endogeneity by absorbing all the unobserved time-invariant heterogeneity (Cheng & Wall, 2005), including the time-invariant gravity covariates in equation 1 viz. $\ln DIST_{ij}$, $CNTG_{ij}$, $LANG_{ij}$ and $CLNY_{ij}$. We still use the Santos-Silva and Tenreyro (2016) PPML estimator to estimate equation (2).

$$X_{ijt} = \exp\left(B_1 lnArrivals_{jit} + B_6 RTA_{ijt} + EX_{jt} + M_{it} + \mu_{ij}\right) + e_{ijt} \qquad (2)$$

Data and summary statistics
This study covers the period between 2006 and 2015 for a total of 19 African countries - Angola, Benin, Botswana, Central African Republic, Congo, Egypt, Ethiopia, Lesotho, Madagascar, Mauritius, Morocco, Nigeria, Rwanda, Seychelles, South Africa, Swaziland, Tanzania, Uganda and Zimbabwe. The data on bilateral intra-African merchandise exports was obtained from the UN Comtrade via the World Integrated Trade Solution (WITS) database while the data on bilateral tourist arrivals was compiled from the United Nations World Tourism Organization (UNWTO) Yearbook of Tourism Statistics. Some researchers advocate

for the use import data as they tend to be more reliable because imports are monitored much more closely than exports by customs administrations, since the former are often subject to an import duty or "mirror data", that is to use imports data from destination countries as a measure of exports from origin countries so as to address the measurement error of the trade data. However, Yotov et al. (2016) argue that mirroring may not be a good idea in cases when the importing country applies very high tariffs and has weak monitoring capability at customs. In these cases, the incentive to avoid tariffs and border controls may lead to largely underestimated import data. Countries report one or more types of flows, but we use arrivals of non-resident tourists at national borders by country of residence as the main reported tourist flow. However, where unavailable, we use the other reported tourist flows. Although the UNWTO Yearbook of Tourism Statistics contains data for almost 41 African countries, countries which disaggregate the bilateral tourism data by region rather than by country are not included in the analysis. The data on bilateral distances, colonial ties, common language and contiguity were obtained from the *Centre d'Études Prospectives et d'Informations Internationales* (CEPII) website. The regional trade agreements (RTA) dummies were constructed using data obtained from the World Trade Organization (WTO) RTAs database. The summary statistics for the main variables in our analysis are presented in Table 2. The average export of all countries in our sample is around USD 58 million, with a range of between 0 and USD 5.1 billion. The mean of the dichotomous variables (contiguity, common language, common colonizer, RTAs) represent proportions i.e. shares over the total observations. We can infer that about 50 percent of the countries in our sample speak a common language while only 8 percent share a common border.

Table 2: Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Exports (USD '000)	7,420	58,100	309,000	0	5,100,000
Log Exports (USD)	5,575	14	4	0	22
Log tourist arrivals	5,253	7	3	0	15
Log distance (km)	7,420	8	1	5	9
Contiguity	7,420	0.08	0.3	0	1
Common language	7,420	0.5	0.5	0	1
Common colonizer	7,420	0.3	0.5	0	1
RTAs	7,420	0.4	0.5	0	1

Source: Authors' calculations

Results

Table 3 presents our estimation results of the impact of intra-African tourism on continental exports. Column (1) presents the results from estimation of OLS with time-varying importer and exporter effects to account for the multilateral resistance terms. The estimated coefficient of tourist arrivals suggests that a 10 percent increase in intra-African tourism leads to an increase in intra-African exports by around 3.1 percent, *ceteris paribus*. The coefficient on distance is significant and negative while that of the presence of a common border and regional trade agreement is positive and significant as expected. However, these results are likely to be inconsistent and biased due to heteroskedasticity and endogeneity. Column (2) presents the results from the PPML estimator with time-varying fixed effects which controls for not only the multilateral resistance effects but also heteroskedasticity and the presence of zero trade flows in the data. The results indicate that an increase in tourist arrivals still has a positive impact on intra-African exports. The magnitude of the estimated elasticity of tourist arrivals of

around 0.32 is slightly similar to that reported in the OLS specification. Regarding the other covariates, although contiguity becomes negative and statistically insignificant in this specification, the coefficients of distance, RTA and common language are statistically significant and have the expected signs. The estimates from column (3) reveal that once we control for endogeneity by adding the country-pair fixed effects, on top of the importer-time and exporter-time fixed effects, the magnitude of the impact of the continental tourism on intra-African exports reduces by approximately 40 percent. Specifically, a 10 percent increase in the tourism boosts intra-African exports by around 1.4 percent, *ceteris paribus*.

Table 3: The Nexus between Tourism and Exports in Africa

	(1)	(2)	(3)
	OLS (FE)	PPML (FE)	PPML (Endogeneity)
Dependent variable	Log Exports	Exports	Exports
Log tourist arrivals	0.317***	0.324***	0.142*
	(0.055)	(0.068)	(0.079)
Regional trade agreement	0.669***	0.442**	0.254
	(0.222)	(0.218)	(0.499)
Log distance	-1.903***	-0.981***	
	(0.197)	(0.283)	
Contiguity	0.963***	-0.432	
	(0.298)	(0.283)	
Common language	-0.043	0.409*	
	(0.210)	(0.229)	
Common colonizer	0.326	-0.260	
	(0.217)	(0.257)	
Constant	22.420***	24.440***	-5.793***
	(2.316)	(3.604)	(2.164)
Exporter fixed effects	Yes	Yes	Yes
Importer fixed effects	Yes	Yes	Yes
Country-pair fixed effects	No	No	Yes
Observations	4,007	5,253	5,183
R-squared	0.726	0.894	0.953

Source: Authors' calculations
Notes: Robust standard errors in parentheses are clustered by country-pair; *** $p<0.01$, ** $p<0.05$, * $p<0.1$; the coefficient estimates for the importer and exporter fixed effects and country-pair fixed effects are not reported for brevity

Discussion

This study assessed the impact of intra-African tourism on continental exports using the gravity model. This is particularly important as although gravity models have become one of the most used empirical models of international trade after the seminal work of Tinberg (1962), there has been sluggish uptake of the model in assessing the relationship between tourist flows and trade, especially in the context of Africa. Most of the extant studies tend to use time series cointegration techniques. As alluded to in the section on literature review, some estimation challenges abound in the few studies that have adopted the gravity model. Nonetheless, this study used the Poisson Pseudo Maximum Likelihood (PPML) estimator which performs very well even when the proportion of zero trade flows is large and controls for heteroskedasticity when expressed in the multiplicative form. The introduction of country-pair fixed effects addressed the potential endogeneity and eliminated the challenges of choosing valid

instrumental variables. It is thus evident that the study has contributed to the body of knowledge on the nexus between tourism and exports, especially within Africa. The findings suggest that an increase in intra-African tourism will increase continental exports. This is in consonance with findings from studies such as El-Sahli (2017) and Santana-Gallego et al. (2016) which also use gravity model techniques – albeit some limitations as captured in the literature review. The results also mirror findings from Fischer and Gil-Alana (2009) who use time-series techniques and find that German tourism in Spain leads to higher import demand for Spanish wines in Germany that lasts a few months. The results, therefore, imply that countries within the continent can utilize tourism to stimulate and boost their intra-African exports. This will be particularly handy in boosting the level of intra-African trade which is currently below twenty percent, one of the lowest amongst the world's economic blocs. More importantly, this will be a tool for exploiting the vast number of opportunities under the AfCFTA. The positive impact of intra-African tourism on continental exports further supports the clarion call for countries to accelerate the adoption of the *Free Movement of Persons Protocol*. This will be key in making African countries more open to each other and facilitating intra-Africa travel which could result in positive spillovers such as, in this case, boosting intra-Africa trade.

Conclusion

Having been embraced by the AU Member States and regional economic communities, the tourism industry is clearly now an important economic sector in Africa. As a result, there has been a gradual shift from the traditional destinations which have been dominating the tourism space, with emerging destinations in Central and Western Africa that are now characterised by rapid growth patterns. Nevertheless, Africa's share of both the global tourism industry and trade is significantly small which could be attributed to the correspondingly low levels of intra-regional tourism and trade. This study set out to investigate the nexus between tourism and trade in Africa inspired by prevailing global trends and studies. Using the PPML estimator, the study reveals that boosting intra-Africa tourism can lead to an increase in intra-Africa trade. Therefore, as the continent embarks on the implementation of the continental free trade area agreement, it will be important that emphasis is put on upholding the tourism sector as a panacea for the realisation of its goals (the agreement). Future research can incorporate disaggregated product-level trade data to assess the category of products that are most likely to be impacted by tourism. There is also scope to examine the characteristics of the firms that benefit from increased continental tourism. This will be key in determining the nexus between tourism, trade and innovation and digitization by firms, which have proven critical for trade sustenance during the COVID-19 pandemic period.

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