The African Growth Experience and Tourism Receipts: A Threshold Analysis and Quantile Regression Approach

Christian Nsiah
School of Business
Baldwin Wallace University
275 Eastland Road
Berea, OH 44017-2088
E-mail: cnsiah@bw.edu

Bichaka Fayissa
Department of Economics and Finance,
Middle Tennessee State University
Murfreesboro, TN 37132, USA.
E-mail: bichaka.fayissa@mtsu.edu.

Abstract

Using a linear estimation model, most previous studies have found a positive and statistically significant linear relationship between tourism receipts and economic growth. In this study, we apply a Threshold analysis and Quantile regression to investigate if the relationship between tourism receipts and economic growth may be nonlinear. We find the existence of a nonlinear relationship between tourism receipts and economic growth and that tourism receipts tend to contribute to economic growth relatively more below a threshold of 2.59% of the tourism/ GDP per capita ratio and less so above this threshold of the ratio. The Quantile regression results also suggest that countries tend to benefit more from tourism at the lower end than at the upper end of their GDP per capita distribution. A policy implication which may be drawn from the study is that African countries which heavily rely on tourism receipts for their economic growth have to understand that the impact of tourism receipts on growth wanes beyond the threshold. Consequently, it may be important to diversify their growth sources and to enhance tourism by committing their resources to building reliable infrastructure and security for tourist arrivals in order to realize maximum impact on their economic growth, particularly in the initial stage of their economic growth.

Keywords: *Tourism Receipts, Economic Growth, Dynamic Panel Data, Fixed and Random Effects, Threshold Analysis, Quantile Regression*

JEL Classifications: C33, F14, L83, O40, O54

I. Introduction

Over the past six decades, tourism has experienced continued expansion and diversification to become one of the largest and fastest-growing economic sectors in the world, resulting in a worldwide surge in tourism receipts from US$ 495 billion in 2000 to US$ 1.22 trillion in 2016. (United Nations Tourism Organization-UNWTO, 2017). The tourism industry has also become a major part of international trade in services, generating US$ 216 billion in exports through international passenger transport services rendered to non-residents, bringing the total value of tourism exports up to US$ 1.4 trillion, or US$ 4 billion a day on average (UNWTO, 2017). In fact, international tourism represents 7% of the world's exports in goods and services.

Tourist Arrivals in Africa are projected to increase from 18.7 million in 1995 to 134 million by 2030. In spite of its major role as an engine of the economic growth in terms of foreign exchange earnings, only few empirical studies exist that address the macroeconomic impact of tourism on economic growth and development (Sinclair, 1998; Tosun, 1999; Chen and Devereux, 1999; Dritsakis, 2004). This argument is even more pronounced relative to the limited empirical studies of the relationship between tourism and economic growth in developing countries in general, and Sub-Saharan African countries with some exceptions (Eugenio-Martin and Morales, 2004; Fayissa, et al., 2008, Croes and Vanegas, 2008; Lee and Chang, 2008).

Unlike most of the previous studies which focused on the linear relationship between tourism receipts and economic growth, the main focus of this paper is to investigate whether the contribution of tourism to the economic growth of African countries is nonlinear using a Threshold analysis. In a similar vein, the paper also examines whether the impact of tourism receipts on economic growth have differential impacts at the lower end, or the upper end of the income distribution spectrum of African countries using Quantile regression.

Our study contributes to the empirical literature of the relationship between tourism receipts and economic growth through two distinct avenues: by providing the evidence of the nonlinearity of that relationship and whether tourism receipts have a more pronounced effect at the lower end, or the upper end of the distribution spectrum of GDP per capita income of African countries. With the Threshold analysis exercise, we find the existence of a nonlinear relationship between tourism receipts and economic growth and that tourism receipts tend to contribute to economic growth relatively more below a threshold of 2.59% of the tourism/ GDP per capita ratio, and less so above this threshold of the ratio. Secondly, the Quantile regression results also suggest that African countries tend to benefit more from tourism at the lower end than at the upper end of their GDP per capita distribution. In both the Threshold analysis and the Quantile regression, we control for the conventional sources of the neoclassical growth models including investment physical and human capital, openness of the economy, and institutional factors. A policy implication to be drawn from the study is that African countries which heavily on tourism receipts for their economic growth have to understand that the impact of tourism receipts on economic growth wanes beyond some threshold level. Consequently, it may also be important to diversify their economic growth sources and increase tourism by committing their resources to building reliable infrastructure and security for tourist arrivals in order to realize maximum impact on their economic growth, particularly in the initial stage of their economic growth.

The rest of the paper is organized as follows. Section 2 provides a review of selected literature. In Section 3, we specify a Threshold Analytic framework and the Quantile regression models within conventional neoclassical growth model which incorporates tourism receipts as one of the sources of economic growth. The Threshold Analysis and Quantile regression results are reported and discussed in Section 4. The last section summarizes the results, draws conclusions, and makes some policy recommendations for promoting tourism as an economic growth and development strategy.

II. Literature Review

Many recent studies have found the positive impact of tourism of economic growth of various countries including Dritsakis (2004) for Greece, Balaguer and Cantavella-Jorda (2002) for Spain, Oh (2005) for Korea, Tosun (1999) and Gunduz and Hatemi (2005) for Turkey, Proenca and Soukiazis (2008) for Portugal, Fayissa et al. (2008) for Africa, and Fayissa et al. (2010). Comparing the relative growth performance of 14 'tourism countries' within a sample of 143 countries, Brau et al. (2003) also document that tourism countries grow faster than all the other subgroups (OECD, oil exporting, LDC, small).

Consequently, many countries have begun to consider tourism as an integral strategy for their economic growth and development strategies in terms of foreign exchange earnings, job creation, and technical assistance (Sinclair, 1998; Dieke, 2004). The common thread that runs through most of the previous studies is that tourism receipts have a positive and direct (linear) effect on the economic growth of developing countries. Chen and Devereux (1999), however, argue that tourism may reduce welfare in trade regimes dominated by export taxes, or import subsidies using a theoretical framework which demonstrates that foreign direct investment in the form of tourism is, for the most part beneficial, while tourist immiserization is also possible in sub-Saharan Africa. Consequently, we cannot, a priori, establish the nature of the impact of tourism receipts on the economic growth of sub-Saharan African economies, based on the above discussions. To address this empirical question, we now turn to Section III for the identification of appropriate empirical methodology and the description of data used in our analysis

III. Methodology and Data

Focusing on the impact of tourism receipts on economic growth in Africa, previous empirical studies have documented that receipts from the tourism industry contribute significantly both to the current level of gross domestic product and to the economic growth of sub-Saharan African countries, as do investments in physical and human capital (Fayissa et al., 2008 and Olayinka, 2013).

Assuming the existence of a linear relationship between tourism and economic growth most previous studies have invariably applied linear estimation techniques to verify the validity of the hypothesized relationship between tourism receipts and GDP growth. Owing to the fact that the relationship can be anything, but linear, Po and Huang (2008), Chang et al. (2012), and Wang (2012) have shown that the impact of tourism on economic growth may be dependent on the threshold of the tourism/GDP under consideration.

In our study, we argue that there are at least two possible sources of non-linearity in the relationship between tourism receipts and economic growth. First, non-linearity can occur due to differences in the impact of different levels of tourism expenditures on economic growth. Second, non-linearity may occur since the impact of tourism on growth may be dependent on the level of growth. This distinction is important because factors that are relevant at lower end of economic growth distribution may not be as important for the higher end of the growth distribution.

In order to analyze the possible existence of nonlinearity in the relationship between tourism expenditures and economic growth, this paper analyzes the nonlinearity caused by the difference in impact at various levels of tourism expenditures using threshold analysis. Subsequently, it also analyzes the possible difference in the impact of tourism expenditures at different levels of GDP growth using the relatively newly developed unconditional fixed-effects quantile estimation technique for panel data (henceforth, known as UQR model).

We first use the dynamic panel threshold model postulated by Kramer et al. (2013) to analyze the possible non-linear relationship between African growth experience and tourism receipts. First, we specify a baseline panel regression in Equation 1 below.

$$y_{it} = \alpha_i + \beta_0 X_{it} + \beta_1 TOUR_{it} + \varepsilon_{it} \tag{1}$$

Where Y_{it} denotes the growth rate experienced in country *i* at time period t; *i* and *t* range (*1,….N*) and (*1,…..t*), respectively. α_i and ε_{it} denote country fixed-effects and random errors, respectively. $TOUR_{it}$ denotes tourism receipts/GDP ratios in country *i* at time period *t* and X_{it} is a k-dimensional vector of time-varying control variables commonly used as economic growth determinants in previous literature.

To operationalize Equation 1, we conjecture a case of one threshold by transforming Equation 1 to obtain Equation 2 below.

$$y_{it} = \alpha_i + \beta_1 X_{it} I(q_{it} < \gamma) + \beta_2 X_{it} I(q_{it} \geq \gamma) + \varepsilon_{it} \tag{2}$$

Where I(.) is an indicator function for different regimes. Y_{it} and X_{it} are the endogenous variables with a k-dimensional vector of time-varying explanatory variables, respectively. Conversely, q_{it} and denote the threshold variable (tourism) and γ is the threshold parameter that breaks up our equation into two regimes with β_1 and β_2 coefficients for both regimes, respectively. Given one threshold, our observations are grouped into regimes based on the threshold variable q_{it} being less than or equal to the estimated threshold estimate of γ. Finally, α_i and ε_{it} denote country level fixed-effects and the disturbance terms, respectively.

Once the threshold value is identified, it is imperative to investigate if the estimated threshold is statistically significant using the F-statistic, calculated as follows:

$$F_1 = \frac{(S_0 - S_1)}{\hat{\sigma}^2} \tag{3}$$

Where S_1 and S_0 denote the residual sums of squared errors from equation 2, with and without the impact of the threshold considered, respectively. Further, $\hat{\sigma}^2$ represents the residual variance of the panel threshold estimation. Following Hansen's (1999) recommendation, we use 1,000 bootstraps on the critical values of F to test for the significance of the F-statistic in order to obtain first-order asymptotic distribution to ensure that our p-values are asymptotically valid.

The null hypothesis of the non-identification of γ (no threshold effect => linear relation) and its accompanying alternate hypothesis of the existence of at least one threshold given as follows:

$$H_0: \beta_1 = \beta_2 \qquad H_a: \beta_1 \neq \beta_2$$

Note that under the null hypothesis of no threshold effect, our model reverts to the regular linear panel model as described in Equation 1.

It is important to understand that in many applications, multiple threshold values may exist. Applying the same ideas presented in the case for one threshold, we can extend Equation 2 to accommodate higher order thresholds. For example, in the case of testing for two thresholds, our model presented in Equation 2, extends to the form Equation 4 below:

$$y_{it} = \alpha_i + \beta_1 X_{it} I(q_{it} < \gamma_1) + \beta_2 X_{it} I(\gamma_1 \leq q_{it} < \gamma_2) + \beta_3 X_{it} I(q_{it} \geq \gamma_2) + \varepsilon_{it} \qquad (4)$$

In this case, our threshold estimates of $\gamma_1$and γ_2 are ordered so that γ_1<γ_2, and thus divide our analysis into 3 different regimes with coefficients β_1, $\beta_{2,}$ and β_3, respectively. Similar to the F-test for a single threshold model, we can analyze the significance of the second threshold by estimating another F-statistics as given below:

$$F_2 = \frac{\{S_1(\hat{\gamma}_1) - S_2^r(\hat{\gamma}_2^r)\}}{\hat{\sigma}^2} \qquad (5)$$

Where $S_1(\hat{\gamma}_1)$ denotes the sum of squared errors from stage one threshold estimation. $S_2^r(\hat{\gamma}_2^r)$ and $\hat{\sigma}^2$ are the sum of squared errors and the residual variance from the second threshold estimation, respectively.

Given that the threshold effect is sequential, rejecting the null hypothesis for one level of threshold (example of the single threshold) implies automatically testing for the existence of the next threshold (example of the second threshold). In our analysis, we will test up to three thresholds.

The impact of tourism at different levels of the growth distribution should be of interest to policy makers as well. The question we seek to answer here is if tourism receipts are impactful at the lower end of the GDP growth, or more effective at the higher end of the GDP growth of countries. The answer to question obviously begs the use of quantile regression estimation.

Our second model of the unconditional quantile regression (UQR) follows the work of Firpo et al. (2009) and normalizes into a STATA via the XTRIFREG estimation function developed by

Borgen (2016). Unlike the previous quantile regression estimation methods which are conditional quantiles (See, Koenker, 2004 and Harding and Lamarche, 2009), our model is based on unconditional quantile estimates, thus, allowing us to further divide the growth structure and the composition effects into the contribution of each covariate. Thus, this methodology is advantageous because it allows us to separate the overall components of the decomposition into the contribution of a single variable, or groups of variables. It will allow us to draw conclusion on the importance of our covariates, especially our tourism proxy which remains the same along GDP growth distribution.

The estimation methodology involves the regression of the re-centered influence function (RIF) of the dependent variable (the per capita income growth rate on the explanatory variables, X) thus, allowing the estimation of the contribution of each explanatory variable for the components of the growth decomposition. To estimate our unconditional quantile regressions, we have to first derive the RIF of our dependent variable (the per capita income growth rate). The RIF for the τ^{th} quantile is specified as follows:

$$RIF(Y, q_\tau) = q_\tau + \frac{\tau - I(Y \leq q_\tau)}{f_Y(q_\tau)} \tag{6}$$

Where q_τ is the sample quantile estimated by kernel approach $f_Y(q_\tau)$ and $I(Y \leq q_\tau)$ denotes the marginal density of our dependent variable (Y) at the point q_τ and an indicator function indicating whether the outcome value is below q_τ, respectively. From Firpo et al. (2009), we can infer that the RIF allows for a linear approximation of a non-linear function and the RIF quantile regression may be implemented using linear regression of the new dependent transformed variable on the explanatory variables X_i. In our particular case, we have 23 countries for which the RIF regressions for the per capita income growth can be estimated using Equation 7 given below:

$$E\left[RIF\left(Y_{ig};q_\tau|X_{ig}\right)\right]=X_{i,g}\beta_{\tau,g} \qquad (7)$$

Where $\beta_{\tau,g}$ denotes the approximation of the marginal effects of our explanatory variables on the per capita income growth rate quantile q_τ for countries g= 1,..,23. Basically, the model fits a regression model of the RIF of the quantile marginal distribution of the dependent variable (per capita income growth rate) on the explanatory variables. Here, the RIF regressions can be interpreted as unconditional quantile regressions. Note that in RIF regressions, the dependent variable is basically replaced by the corresponding RIF of the statistic of interest.

Empirical Analysis & Data

The data used for the analysis of the 23 African countries (see appendix for list) for the periods between 1996 and 2015. We chose the 23 countries for this analysis purely due to the fact that they are the only 23 that can give us a balanced panel data for the period under consideration. We chose the 1996 to 2 2015 period because first, the country level tourism data is not available prior to 1995, and the data is available for most countries from 1996 onwards.

Our dependent variable is the per capita GDP growth rate (*PCIGR*).The main variable of interest which also serves as our threshold variable is tourism receipts as a percent of GDP (*TOURGDP*). We follow previous literature to select the most often used explanatory variables in the growth literature (See for example Barro, 2003; Islam, 1995; Khan and Senhadji, 2001; and Ndoricimpa, 2017).

Our control variables include the one period lag of the log of per capita income (*PCIL*), gross fixed capital formation (*GFCF*) to control for capital investment, government final consumption as a percent of GDP (*GOEXP*), inflation rate (*INFLA*) to control for the state of macro economy, log of trade as a percent of GDP to account for a country's openness to trade (*TRADE*), terms of trade and its standard deviation (*TOT* and *TOTSTD*, respectively) as proxies for the competitiveness of the country's goods in the global markets and their volatility, respectively, a political instability index which captures episodes of political violence and conflicts (*POLINST*), a human capital formation variable represented by mean years of schooling (*MYSCH*), an institutional variable which captures the level of democracy (*INST*), and population growth (*POPG*).

Table1: Variable Description, Summary Statistics, and Variable Source

Variables	Defintion, description and source	Mean	Std. Dev.	Min	Max
Dependent Variable					
PCIG	Growth rate of real GDP per capita [Source: World Development Index (2017)]	1.96	3.62	-22.22	30.36
Threshold Variable					
TOURGDP	Tourism expenditures as a percentage of total GDP [Source: World Bank's TCDATA360]	9.18	5.81	1.09	35.44
Control Variables					
PCIL	One period lag GDP per capita (constant 2010 US$) [Source: World Development Index (2017)]	2,013.13	2046.10	219.19	9468.94
POPG	Population growth (annual %) [Source: World Development Index (2017)]	2.36	0.86	0.13	4.77
GOEXP	General government final consumption expenditure (% of GDP) [Source: World Development Index (2017)]	14.70	4.15	5.15	31.57
GFCF	Gross fixed capital formation (% of GDP) [Source: World Development Index (2017)]	20.76	7.26	2.42	43.15
MYSCH	Mean years of schooling (years) [Source: UNESCO]	4.95	2.23	0.90	11.30
TRADE	Trade (% of GDP) [Source: World Development Index (2017)] .	71.23	30.03	20.96	170.41
TOT	Net barter terms of trade index (2000 = 100) [Source: World Development Index (2017)]	112.65	36.03	21.40	290.90
TOTSTD	standard deviation Net barter terms of trade index (2000 = 100) [Source: World Development Index (2017)] .	20.21	22.63	0.01	150.45
π	Inflation, consumer prices (annual %) [Source: World Development Index (2017)]	7.19	7.18	-35.84	46.56
πlog	Semi-log transformation of inflation rate πit= infla -1, if infla <1 and πit =log(infla) if infla >=1	1.41	2.18	-36.84	3.84
INST	An institutional variable proxied by Polity2, a political regime index that captures the level of democracy. Originally, the data ranges from +10 (strongly democratic) to -10 (strongly autocratic). We transform the data into an index {((Polity2+20)/30)*100} [Source: Polity IV Project Database]	74.15	18.65	36.67	100.00
POLINST	A political instability index (CIVTOT) which captures major episodes of political violence and conflicts. CIVTOT ranges from 0 to 10, with zero denoting no case of violence. We transform the data into an index {(((civtot+10)/11.75)*100)} [Source: Systemic Peace Database]	52.33	5.71	50.00	75.00

Notes: Data covers 20-year annual data from 1996 -2015 for 23 African countries. The first per capita income period lag is for 1995.

We follow Ibarra and Trupkin (2016) and use the semi-log transformation of our inflation rates using the following equation (6) to transform our inflation into a symmetric distribution.

$$\pi = \begin{cases} \pi_{it} - 1, if\ \pi_{it} \leq 1 \\ ln(\pi_{it}), if\ \pi_{it} > 1 \end{cases} \quad (8)$$

Where π_{it} denotes inflation rate at time *t* for country *i*. Thus, the semi-log transformation of data for the inflation rate is done following the inflation augmentation process, i.e. if the inflation rate is less than, or equal to one, we subtract 1 from it; we take the natural log of the inflation rate data if the recorded inflation is greater than one.

IV. Empirical Results

Single Threshold Analysis

To avoid selecting the number of thresholds for this model arbitrarily, we first proceed with the test for the existence of a single threshold. Our null hypothesis of is H_0: $B_1 = B_2$, indicating no threshold effect and our alternate hypothesis is H_a: $B_1 \neq B_2$, indicating a threshold does exist. If we reject the null of no threshold, we then will proceed and test for 3 thresholds and work our way up, or back down to the appropriate number of thresholds. We use 3,000 bootstrap replications to estimate and test for the existence of a single threshold effect and the results are reported in Tables 2 and 3. In Table 2, we find that a single threshold will occur at 2.59% (tourism expenditures/GDP), with a 95% confidence interval between 2.47% and 2.72%.

Table 2: Single Threshold Estimate

Model	**Threshold**	**95% Confidence Interval**	
		Lower	**Upper**
Single Threshold	2.59%	2.47%	2.72%

Note: Threshold Estimator (level =95%), with 3000 bootstrap estimates

The result of the test of the significance for a single threshold is reported in Table 3. The calculated F-statistics of greater than the critical value 16.49 (at 5%, or a p-value of 0.03) suggests the existence of at least one threshold in the relationship between the tourism receipts to GDP ratio and per capita income growth for the African countries in question and the time frame under consideration. Consequently, we reject the null hypothesis of the linear relationship between GDP growth and the tourism/GDP ratio.

Table 3: A Test for a Single Threshold Model

Threshold	RSS	MSE	F-stat	Prob	Crit10	Crit5	Crit1
Single	4392.49	9.98	17.92	0.03	13.51	16.49	23.10

Note: Threshold Estimator (level =95%), with 3000 bootstrap estimates

Multiple Threshold Analysis

We proceed to estimate double and triple threshold models to assess whether other significant subsequent thresholds exist. The results are reported in Tables 4 and 5 below. The three estimated thresholds are 2.59%, 16.45%, and 21.68% of the tourism to GDP ratios.

Table 4: Triple Threshold Estimates

Model	Threshold	95% Confidence Interval	
		Lower	Upper
Single Threshold	2.59%	2.47%	2.72%
Double Threshold	16.45%	13.92%	16.69%
Triple Threshold	21.68%	19.85%	24.54%

Note: Threshold estimator (level = 95), with 3000 bootstrap estimates

Table 5 presents the threshold effects for the three estimated thresholds. Here too, we apply the bootstrap method to approximate the F statistics and the p-values. The test statistics for the single threshold remains significant at the 5% level, but the double and triple thresholds are statistically insignificant with p-values of 0.35 and 0.29, respectively. Thus, we can conclude that there is good evidence for the existence of one threshold in the relationship between tourism receipts/GDP and per capita income growth.

Table 5: Threshold Effect Tests for Triple Threshold Model

Threshold	**RSS**	**MSE**	**F-stat**	**Prob**	**Crit10**	**Crit5**	**Crit1**
Single	4392.49	9.98	17.92	0.03	13.51	16.49	23.10
Double	4314.87	9.81	7.91	0.35	13.21	16.96	24.50
Triple	4238.78	9.63	7.90	0.29	12.59	16.38	30.49

Note: Threshold estimator (confidence level = 95), with 3000 bootstrap estimates

Thus, we now re-estimate our model with a triple threshold and the results are presented in Table 6 below. This means that that our overall sample splits between two regimes according to the threshold variable and the estimated single threshold value. Here, the first regime includes estimates for countries with tourism expenditures as a percentage of GDP per capita of less than or equal to 2.59%, the second regime which includes estimates of countries with a tourism/GDP ratio greater than 2.59% for the period under consideration.

From the Table 6, we notice that the only control variables that are significant include the lag of per capita income, government expenditures as a percent of GDP, mean years of schooling (proxy for human capital), openness to trade, and the proxy for democratic institutions (INST). The lag of per capita income has a significantly negative impact on current per capita income growth, indicative of the existence of convergence (catch up effect). For the government expenditures impact, we find that a one percent increase in government expenditure as a percentage of GDP, leads to approximately -0.258% decrease in GDP growth, indicating a significantly negative tradeoff impact between government expenditures and growth suggesting a crowding-out impact of government spending. In the case of the proxies for human capital and institutions, we find significant positive impacts. Specifically, we find that a one percent improvement in years of schooling and the democratic institutions index leads to 1.06% and 5.97% increase in economic growth, respectively.

In the case of the threshold variable, we find that the level of tourism expenditure receipts and its impact on the economic growth rate is positive and significant. However, we find that there exists some level of diminishing returns in its impact on growth. Specifically, we find that below, or at the threshold of 2.59% tourism share of GDP, a 1% increase in tourism receipt/GD results in a 0.47% economic growth impact, whereas tourism specialization values above 2.59% garners an impact of only 0.44% in economic growth for every percentage increase in tourism specialization.

To implement Equation 4 for our empirical estimation framework, we specify Equation 9 as follows:

$$\begin{aligned} yit = \alpha_{it} + \beta_1 y_{i,t-1} + \beta_2 POPG_{it} + \beta_3 GFCF_{it} + \beta_4 MYSCH_{it} + \beta_5 Trade_{it} + \beta_6 TOT_{it} \\ + \ \beta_7 TOTSD_{it} + \beta_8 \pi_{it} + \beta_9 INST_{it} + \beta_{10} POLINST_{it} \\ + \delta_1 TourGDP_{it} I(q_{it} \leq 2.59\%) + \ \delta_2 TourGDP_{it} i(q_{it} > 2.59\%) \end{aligned} \tag{9}$$

This larger impact of tourism on growth at the relatively lower end of the tourism receipts/GDP ratio indicates that the benefits of the influx of tourism expenditures on growth begin to decline after the threshold (See, Table 6).

Table 6: Full Single Threshold Panel Threshold Regression Estimates

Variable	Description	Coefficient	Std. Error	
Control Variables				
PCILag	One period lag GDP per capita (constant 2010 US$) [Source: World Development Index (2017)]	-0.192	0.024	***
POPG	Population growth (annual %) [Source: World Development Index (2017)]	0.134	0.465	
GOEXP	General government final consumption expenditure (% of GDP) [Source: World Development Index (2017)]	-0.258	0.071	***
GFCF	Gross fixed capital formation (% of GDP) [Source: World Development Index (2017)]	0.041	0.037	
MYSCH	Mean years of schooling [Source: UNESCO]	1.064	0.498	**
TRADE	Log of Trade (% of GDP) [Source: World Development Index (2017)]	2.395	1.109	**
TOT	Net barter terms of trade index (2000 = 100) [Source: World Development Index (2017)]	-0.001	0.007	
TOTSTD	Standard deviation of Net barter terms of trade index (2000 = 100) [Source: World Development Index (2017)]	-0.013	0.011	
πlog	Semi-log transformation of inflation rate πit= inflation -1, if inflation <1 and πit =log(inflation) if inflainlation >=1	-0.070	0.075	
INST	An institutional variable proxied by Polity2, a political regime index that captures the level of democracy. Originally, the data ranges from +10 (strongly democratic) to -10 (strongly autocratic). We transform the data into an index {((Polity2+20)/30)*100} [Source: Polity IV Project Database]	5.966	1.533	***
POLINST	A political instability index (CIVTOT) which captures major episodes of political violence and conflicts. CIVTOT ranges from 0 to 10, with zero denoting no case of violence. We transform the data into an index {((civtot+10)/11.75)*100} [Source: Systemic Peace Database]	1.698	2.435	
Treshold Variable				
TOURGDP	Tourism expenditures as a percentage of total GDP [Source: World Bank's TCDATA360].			
	<= 2.59%	0.467	0.067	***
	>2.59%	0.440	0.065	***
Constant		-10.493	18.035	
Statistics				
R-sq: within = 0.22; F test that all u_i=0: F(22, 422) = 5.49 Prob > F = 0.0000				

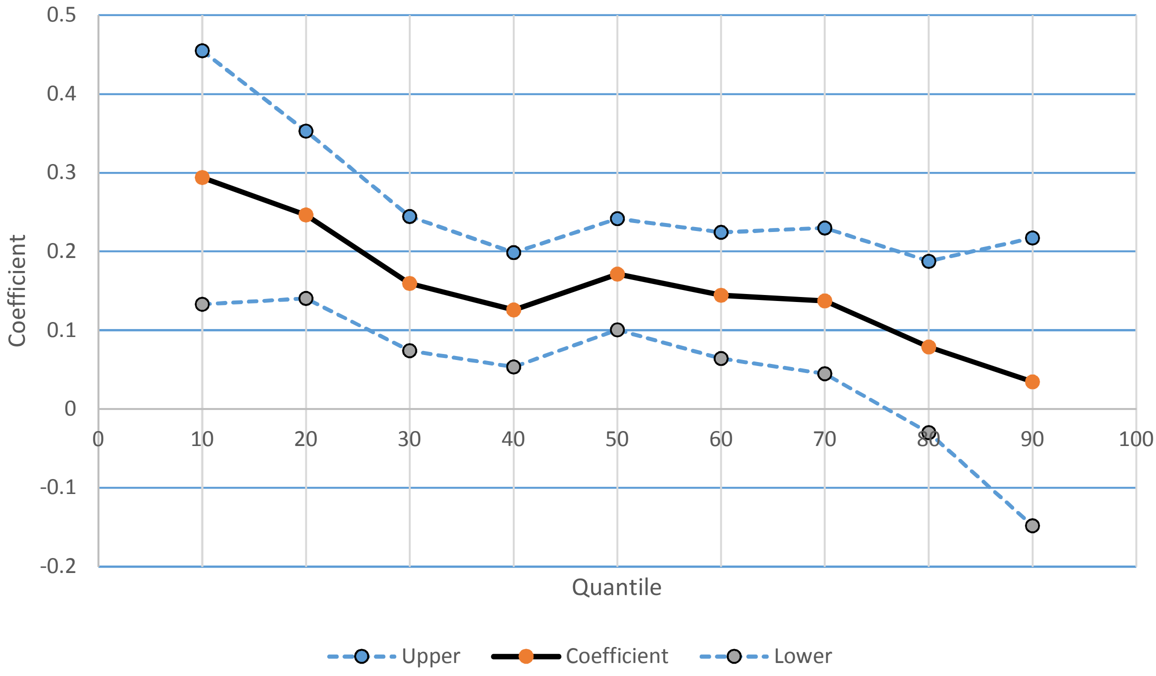
Notes: The standard errors are calculated with 3,000 bootstrap estimates. Our estimates cover 20 years annual data for 23 African countries. ***, **,*, denotes significance at the 99%, 95%, and 90% respectively.

Unconditional Quantile Regression

For our quantile regression, we apply 1,000 bootstrap replications in the derivation of our estimates and standard errors. Since our focus for this study is on the impact of tourism expenditure receipts/GDP per capita growth rate, we only present the results of the impact tourism on economic growth in Figure 1 below:

Figure 1. Impact of Tourism Expenditure on Per Capita Income: Quantile Regression Estimates

Note:



Note: the dotted lines represent the 95% confidence intervals

From Figure 1, we can deduce that there appears to be heterogeneity in the impact of tourism expenditures (% of GDP) on growth. We find that while the impact of tourism expenditure on growth is largely positive for all income growth distributions, but the magnitude of the impact is larger at lower end of the growth distribution. This implies that the lowest growth performing countries received the largest gains from tourism receipts.

V. Conclusion

Many previous empirical studies have established that there is a positive and statistically significant linear relationship between tourism receipts and the GDP per capita GDP. The main objective of this study is to re-evaluate if, indeed, the relationship between tourism receipts and the economic growth of African countries is linear, or nonlinear. To answer this question, we employ a Threshold analytic framework and Quantile regression.

We find the existence of a nonlinear relationship between tourism receipts and economic growth and that tourism receipts tend to contribute to economic growth relatively more below a threshold of 2.59% of the tourism/ GDP per capita ratio and less so above this threshold of the ratio. The Quantile regression results also suggest that countries tend to benefit more from tourism at the lower end than at the upper end of their GDP per capita growth distribution. In addition, the results show that the conventional sources of growth such as investment in physical and human capital and the ability of households to have the wherewithal of spending on health, housing, nutrition, and other household items can enhance their productivity and spur their economic growth.

A policy implication to be drawn from the study suggests that African countries which heavily rely on tourism receipts for their economic growth may coordinate the allocation of their scarce resources among the various sectors (including the tourism sector) in order to provide reliable infrastructure and security for attracting tourist arrivals for the realization of a maximum impact on their economic growth, particularly in the initial stage of their economic growth. Policy makers, however, need to understand that the impact of tourism receipts on growth wanes after a while and it may be important to diversify their growth sources.

References

Balaguer, J. and M. Cantavell-Jorda, 2002, "Tourism as a Long-run Growth Factor: The Spanish Case," *Applied Economics*, 34, No. 7 (May 202): 877-884.

Barrow, R.J (2003). Determinants of Economic Growth in a Panel of Countries, *Annals of Economics and Finance,* 4: 231–274.

Chang, C., T. Khamkaew, and M. McAleer (2012). IV Estimation of a Panel Threshold Model of Tourism Specialization and Economic Development. *Tourism Economics,* 18 (1): 5–41.

Borgen, N.T. (2016). Fixed Effects in Unconditional Quantile Regression, *The Stata Journal*, 16(2): 403-415.

Brau, R., A. Lanza, and F. Pigliaru, 2003, "How fast ar the Tourism Countries Growing? The Corss-Country Evidence,"CRENoS Centro Ricerche Economiche Nord Sud, working Paper, N0O3-09, http://www.crenos.it/working/pdf/03-09.pdf.

Chen, L. L. and J Devereux, 1999, "Tourism and welfare in Sub-Saharan Africa: a Theoretical Analysis," *Journal of African Economies*, 8:209-227.

Choe, J. I., 2003, "Do Foreign Direct Investment and Gross Domestic Investment Promote Economics Growth?" *Review of Development Economics*, 7 (1):44-57.

Croes, Robertico and Manuel Vanegas, 2008, "Cointegration, and Causality between Tourism and Poverty Reduction," Journal of Travel Research, 47 (1): 94-103

Dieke, Peter U.C., 2004, "Tourism in Africa's Economic Development: Policy Implication," *Management Decision*, 41 (3):287-295.

Dritsakis, Nikolas, 2004, "Tourism as a Long-run Economic Growth Factor: An Empirical Investigation for Greece," *Tourism Economics*, 10 (3), (September 2004):305-316.

Eugenio-Martin, Juan Luis, Noelia Martin Morales, and Riccardo Scarpa, 2004, "Tourism and Economic Growth in Latin American Countries: A Panel Data Approach," FEEM Working Paper No. 26.2004.

Fayisa B, Nsiah C, Tedesse, B (2008). The Impact of Tourism on Economic Growth and Development in Africa, *Tourism Economics,* 14(4): 807–818. DOI: 10.5367/000000008786440229.

Fayissa, B., Nsiah, C., & Tadesse, B. (2010). Tourism and Economic Growth in Latin American Countries (LAC). *Tourism Economics*, 17 (3), 1365-1373.

Firpo, S. Fortin, N.M., and Lemieux, T. (2009). Unconditional Quantile Regressions, *Econometrica,* 77(3): 953-973.

Hansen, B.E (1999). The Grid Bootstrap and the Autoregressive Model, *Review of Economics and Statistics*, 81(4): 594-607.

Harding, N., and Lamarche, C. (2009). A Quantile Regression Approach for Estimating Panel Data Models using Instrumental Variables, *Economics Letters*, 104: 133–135

Ibarra, R. and D. Trupkin (2016). Reexamining the relationship between Inflation and Growth: Do Institutions Matter in Developing Countries? *Economic Modelling*, 5: 332-351.

Islam, N. (1995) Growth Empirics: A Panel Data Approach, *Quarterly Journal of Economics*, 110(4): 1127-1170.

Khan, M. S. and A. S. Senhadji (2001). Threshold Effects in the Relationship between Inflation and Growth, IMF Staff Papers, 48(1): 1-21.

Kremer, S., A. Bick and D. Nautz (2013). Inflation and Growth: New Evidence from a Dynamic Panel Threshold Analysis, *Empirical Economics*, 44(2): 861-878.

Koenker, R. (2004). Quantile Regression for Longitudinal Data. *Journal of Multivariate Analysis*, 91(1): 74 – 89.

Lee, Chien Chiang and Chun-Ping Chang, 2008, "Tourism Development and Economic Growth: A Closer Look at Panels," *Tourism Management*, 29 (1), (February):180-192.

Ndoricimpa, A. (2017). Threshold Effects of Inflation on Economic Growth in Africa: Evidence from a Dynamic Panel Threshold Regression, African development Bank Working Paper Series, # 249.

Oh, C., 2005, "The Contribution of Tourism Development to Economic Growth in the Korean Economy, *Tourism Management*, 26 (1):39-44.

Olayinka K. I. (2013). A Reassessment of Tourism-Exports Led Growth Hypothesis in Africa, *American Journal of Tourism Research*, 2(1):130-140 DOI: 10.11634/216837861302359

Po, W-C. and Huang, B-N. (2008). Tourism Development and Economic Growth – A Nonlinear Approach, *Physica A*, 387, 5535–5542.

Proenca, Sara and Elias Soukiazis, 2008, "Tourism as an Alternative Source of Regional Growth in Portugal: a panel data analysis at NUTS II and III levels," *Portuguese Economic Journal*,7(1):43-61.

Sinclair, M.T., 1998, "Tourism and Economic Development: A Survey," *Journal of Development Studies*, 34 (5): 1-51.

UNWTO, 2006, "Africa: A Key Resource for Economic and Social Development," Global Envision, October 16, 2006.

UNWTO, 2017, UNWTO Tourism Highlights, 2017 Edition, October 2017.

Wang, Y. (2012). Research Note: Threshold Effects on Development of Tourism and Economic Growth, *Tourism Economics*, 18 (5): 1135–41.

Appendix

Table 1A. List of Countries

1	Algeria	DZA
2	Benin	BEN
3	Botswana	BWA
4	Burundi	BDI
5	Congo, Rep.	COG
6	Egypt, Arab Rep.	EGY
7	Ghana	GHA
8	Kenya	KEN
9	Madagascar	MDG
10	Malawi	MWI
11	Mali	MLI
12	Mauritius	MUS
13	Morocco	MAR
14	Niger	NER
15	Nigeria	NGA
16	Senegal	SEN
17	Sierra Leone	SLE
18	South Africa	ZAF
19	Swaziland	SWZ
20	Tanzania	TZA
21	Togo	TGO
22	Tunisia	TUN
23	Uganda	UGA