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# Tourism and Social Media in the World: An Empirical Investigation

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**Abstract**

The study examines the relationship between tourism and social media from a cross section of 138 countries with data for the year 2012.The empirical evidence is based on Ordinary Least Squares, Negative Binomial and Quantile regressions. Two main findings are established. First, there is a positive relationship between Facebook penetration and the number of tourist arrivals. Second, Facebook penetration is more relevant in promoting tourist arrivals in countries where initial levels in tourist arrivals are the highest and low. The established positive relationship can be elucidated from four principal angles: the transformation of travel research, the rise in social sharing, improvements in customer service and the reshaping of travel agencies. This study explores a new dataset on social media. There are very few empirical studies on the relevance of social media in development outcomes.

*JEL Classification*: D83; O30; Z32; Z38
*Keywords*: Social Media; Tourism

## 1. Introduction

Two main factors motivate this study, notably: the contemporary relevance of social media and gaps in the tourism literature. The factors are substantiated in chronological order. First, there is a growing role of social media in economic development, notably, it: (i) enables discussions that boarder beyond geographically circumscribed communities and editorial projects at scales that were recently unimaginable; brings potential rivals together, gives voice and serves as an organizational tool (Parkyn, 2017) and (ii) improves macroeconomic

development outcomes such as tourism marketing and management in various domains of the tourism industry (Zeng & Gerritsen, 2014).

Second, the bulk of the literature on the determinants of tourism has not engaged the dimension of social media (Sönmez *et al*., 1999; Seddighi *et al*., 2001; Pizam & Fleischer, 2002; Kingsbury & Brunn, 2004; Sönmez & Graefe, 1998; Saha & Yap, 2013; Alvarez & Campo, 2014; Mehmood *et al*., 2016). Moreover, the few studies that have assessed the relationship between tourism and social media have been exploratory (Leung *et al*., 2013; Zeng & Gerritsen, 2014). The sparse empirical literature on the nexus between social media and tourism is partly traceable to lack of data. To the best of our knowledge, only three studies have used a recent dataset on Facebook penetraton to proxy for social media (Jha & Sarangi, 2017; Jha & Kodila-Tedika, 2018; Kodila-Tedika, 2018). Jha and Kodila-Tedika (2018) have investigated whether social media promotes democracy, Jha and Sarangi (2017) have assessed if social media affects corruption while Kodila-Tedika (2018) has examined whether social media matters in natural resource governance. This study complements this new strand of literature by using the new dataset on Facebook penetration to assess the relationship between social media and tourist arrivals. This positioning is consistent with recent surveys of the literature on the relationship between social media and tourism which have recommended the need for literature discourses and exploratory studies to be substantiated with empirical validity because research on the nexus between social media and tourism is still in its infancy (Leung *et al*., 2013; Zeng & Gerritsen, 2014). Moreover, a recent World Bank report on digital dividends has concluded that there is not much evidence on the effect of social media on development outcomes (World Bank, 2016; Tchamyou, 2018a, 2018b; Tchamyou et al., 2018).

In the light of above, the macroeconomic literature on the consequences of social media has not sufficiently explored the tourism sector because of lack of data. As far as we have reviewed, the extant literature has focused on: the relevance of social media in the "Black Lives Matter" movements in the United States of America (Freelon et al., 2016); the consequences of producing and consuming information via social media (Stone & Wang, 2018); the importance of social media in marketing and influencing investors (Felix et al., 2017; Ramanathan et al., 2017; Cade, 2018; Colicev et al., 2018) and the role of social media in politics and governance (Udupa, 2018; Engesser et al., 2018; Hampton et al., 2017; Enikolopov et al., 2018).

Recent surveys of the literature maintain that the theoretical underpinnings on the investigated relationship are largely dominated by the theory of reasoned action (TRA),

theory of planned behavior (TPB) and technology acceptance model (TAM) which are used to explain the phenomenon of social media in travel, tourism and hospitality (Nikiforova, 2013; Cusick, 2014; Lee & Lowry, 2015). Consistent with corresponding literature (Yousafzai *et al*., 2010; Asongu *et al*., 2018), a common denominator among the theories is that the adoption of information technology is multifaceted and complex because, it entails two main dimensions: (i) a framework from managers of information and developers of systems which are articulated not on the influence of attitudes but on the formation of customers' belief and (ii) relevant features which entail composite considerations such as customers' behavioural, utilitarian, psychological, social and personal aspects.

The TRA developed by Bagozzi (1982), Ajzen and Fishbein (1980) and Fishbein and Ajzen (1975), is founded on the supposition that when it comes to acknowledging the implications of their actions, customers are rational. Ajzen (1991) has extended the TRA to the TPB by emphasising the absence of variations between customers who control their actions consciously and those that do not. In the TAM developed by Davis (1989), the assumption is that the process in which customers adopt a given technology can be elucidated by the voluntary intention of the customer to accept and use the technology. Factors from the above theories motivate the use of social media by both tourists and those engaged in tourism marketing and management.

The ways tourist companies communicate and market their services have been fundamentally transformed by social media, which is equally used by tourists in their decision making processes about tourists destinations. In essence, the use of Facebook by the hospitality and travel sectors has substantially revamped travel marketing. Accordingly, the manner in which tourists search for potential destinations depends on how tourism companies use social media (especially Facebook) to influence tourists' choice of destinations.

The study assesses the nexus between social media and tourism in a cross section of 138 countries with the data for the year 2012, using three estimation strategies, notably: Ordinary Least Squares, Negative Binomial and Quantile regressions. Two main findings are established. First, there is a positive relationship between Facebook penetration and the number of tourist arrivals. Second, Facebook penetration is more relevant in promoting tourist arrivals in countries where initial levels in tourist arrivals are the highest and low.

The rest of the study is organized as follows. The data and methodology are discussed in Section 2 whereas Section 3 presents the empirical results and corresponding discussion. We conclude in Section 4 with implications and future research directions.

## 2. Data and methodology

### 2.1 Data

This paper investigates a cross section of 138 countries with data for the year 2012 from multiple sources, namely: Qualitative assessments by the Economic Intelligence Unit (EIU) analysts' estimates; the Uppsala Conflict Data Program (UCDP) Battle-Related Deaths Dataset; the Institute for Economics and Peace (IEP); the United Nations Office on Drugs and Crime (UNODC) Surveys on Crime Trends; the Operations of Criminal Justice Systems (CTS); the International Institute for Strategic Studies (IISS), the United Nations Committee on Contributions and Quintly. The geographic and temporal scopes of the data are limited by data availability constraints. Specifically, the data on social media in terms of Facebook penetration is only available for the year 2012. Accordingly, in order to measure social media, the study uses the share of the population using Facebook. This Facebook penetration data is sourced from "Quintly" which is a social media benchmarking and analytics solution company[1]. The data on social media has been used in recent literature on the consequences of social media (Jha & Sarangi, 2017; Jha & Kodila-Tedika, 2018; Kodila-Tedika, 2018).

The outcome variable is the number of tourist arrivals which is log-transformed to be consistent with some empirical strategies employed by the study (Asongu & Nwachukwu, 2018). For example, given that count data is not consistent with a normal distribution, it important to log-transform the data before applying the Ordinary Least Squares and Quantile regressions estimation strategies. Conversely, the Negative Binomial regression can be employed for count data without log-transformation. Four non-dummy and three dummy variables are adopted as control variables in order to account for determinants of tourism and the unobserved heterogeneity. The non-dummy variables include: access to weapons, homicide rates; incarcerations rate and violent demonstrations. The dummy variables are: Europe and Central Asia; South Asia and English common law. Hence 1 is assigned to a country that belongs to these groups of countries and zero, otherwise. These control variables are consistent with the literature on tourism determinants (Sönmez *et al*., 1999; Seddighi *et al*., 2001; Pizam & Fleischer, 2002; Kingsbury & Brunn, 2004; Sönmez & Graefe, 1998; Saha & Yap, 2013; Alvarez & Campo, 2014; Mehmood *et al*., 2016). Concerning the expected signs, we anticipate that access to weapons, homicides and violent demonstrations should be negatively related to the number of tourist arrivals whereas incarcerations should have the opposite relationship. The opposite nexus is expected from the number of

[1] The data was accessed from its website (http://www.quintly.com/facebook-countrystatistics?period=1year ).

incarcerations because it reflects policy efforts devoted to reducing perceived risks. Conversely the other three positive factors logically translate perceived risks on the part of tourists. It is important to note that an increase in perceived risk should discourage tourist arrivals.

**Table 1: Definitions and sources of variables**

| Variables | Definition of variables and sources |
|---|---|
| Tourism | The number of tourists arrivals |
| Facebook Penetration | Facebook penetration (2012), defined as the percentage of the total population that uses Facebook. Quintly. |
| Access to Weapons | Ease of access to small arms and light weapons<br>Qualitative assessment by EIU analysts |
| Homicides | Number of homicides per 100,000 people<br>United Nations Office on Drugs and Crime (UNODC) Surveys on Crime Trends and the Operations of Criminal Justice Systems (CTS); EIU estimates |
| Incarceration | Number of jailed population per 100,000 people<br>World Prison Brief, International Centre for Prison Studies, University of Essex |
| Violent demonstrations | Likelihood of violent demonstrations<br>Qualitative assessment by EIU analysts |

Uppsala Conflict Data Program (UCDP). The Institute for Economics and Peace (IEP). The Economic Intelligence Unit (EIU). United Nations Peacekeeping Funding (UNPKF). GDP: Gross Domestic Product. The International Institute for Strategic Studies (IISS).

**Table 2: Summary statistics and presentation of countries**

**Panel A: Summary Statistics**

| Variables | Mean | Standard dev. | Minimum | Maximum | Obsers |
|---|---|---|---|---|---|
| Tourist arrivals | 14.470 | 1.727 | 9.305 | 18.221 | 138 |
| Facebook Penetration | 19.868 | 18.566 | 0.038 | 97.636 | 138 |
| Access to Weapons | 3.118 | 1.077 | 1.000 | 5.000 | 138 |
| Homicides | 2.799 | 1.170 | 1.183 | 5.000 | 138 |
| Incarceration | 2.209 | 0.902 | 1.174 | 5.000 | 138 |
| Violent demonstrations | 2.950 | 0.983 | 1.000 | 5.000 | 138 |

**Panel B: Sampled countries (138)**

"Albania; Algeria; Angola; Argentina; Armenia; Australia; Austria; Azerbaijan; Bahrain; Bangladesh; Belarus; Belgium; Benin; Bhutan; Bolivia; Bosnia and Herzegovina; Botswana; Brazil; Bulgaria; Burkina Faso; Cambodia; Cameroon; Canada; Chad; Chile; China; Colombia; Costa Rica; Croatia; Cyprus; Czech Republic; Democratic Republic of the Congo; Denmark; Djibouti; Dominican Republic; Ecuador; Egypt; El Salvador; Estonia; Ethiopia; Finland; France; Georgia; Germany; Ghana; Greece; Guatemala; Guinea; Guyana; Haiti; Honduras; Hungary; Iceland; India; Indonesia; Iraq; Ireland; Israel; Italy; Jamaica; Japan; Jordan; Kazakhstan; Kenya; Kuwait; Kyrgyz Republic; Laos; Latvia; Lebanon; Lesotho; Lithuania; Macedonia (FYR); Madagascar; Malawi; Malaysia; Mali; Mauritius; Mexico; Moldova; Mongolia; Montenegro; Morocco; Mozambique; Namibia; Nepal; Netherlands; New Zealand; Nicaragua; Niger; Nigeria; Norway; Oman; Pakistan; Panama; Papua New Guinea; Paraguay; Peru; Philippines; Poland; Portugal; Qatar; Republic of the Congo; Romania; Russia; Rwanda; Saudi Arabia; Senegal; Serbia; Sierra Leone; Singapore; Slovakia; Slovenia; South Africa; South Korea; Spain; Sri Lanka; Swaziland; Sweden; Switzerland; Tajikistan; Tanzania; Thailand; The Gambia; Togo; Trinidad and Tobago; Tunisia; Turkey; Uganda; Ukraine; United Arab Emirates; United Kingdom; United States of America; Uruguay; Uzbekistan; Venezuela; Vietnam; Yemen and Zambia".

Standard dev: standard deviation. Obsers: Observations.

**Table 3: Correlation matrix**

| Weapons | Homicides | Incarcerations | Demonstrations | Facebook | Tourists | |
|---|---|---|---|---|---|---|
| 1.000 | 0.580 | -0.042 | 0.493 | -0.549 | -0.433 | Weapons |
| | 1.000 | 0.190 | 0.267 | -0.376 | -0.366 | Homicides |
| | | 1.000 | -0.126 | 0.144 | 0.286 | Incarcerations |
| | | | 1.000 | -0.477 | -0.351 | Demonstrations |
| | | | | 1.000 | 0.477 | Facebook |
| | | | | | 1.000 | Tourists |

Weapons: Access to weapons. Homicides: Homicide rate. Incarcerations: Incarceration rate. Demonstrations: Violent Demonstrations. Facebook: Facebook penetration rate. Tourists: Tourists arrivals.

The definitions and sources of variables are provided in Table 1 whereas Table 2 discloses the summary statistics (in Panel A) and sampled countries (in Panel B). A correlation matrix is provided in Table 3. The purpose of the correlation matrix is to limit concerns about multicollinearity that could affect the signs of estimated coefficients when independent variables are characterised by a high degree of substitution. From the summary statistics, it is apparent that the variables are comparable from the perspective of mean values. Moreover, based on the corresponding standard deviations, the variations indicate some confidence that reasonable estimated linkages will emerge from the regressions.

## 2.2 Methodology

### *2.2.1 Ordinary Least Squares*

This study adopts an Ordinary Least Squares technique which is in accordance with the cross-sectional nature of the data structure. The adoption of the empirical strategy is consistent with recent literature with cross-sectional data, notably, in: inclusive development (Andrés, 2006), mobile phone penetration (Asongu, 2013a) and financial development (Kodila-Tedika & Asongu, 2015) studies. Equation 1 below examines the correlation between tourism and social media.

$$T_i = \alpha_1 + \alpha_2 SM_i + \alpha_3 X_i + \varepsilon_i \ , \qquad (1)$$

where $T_i$ ($SM_i$) represents the "tourists arrivals" (social media) indicator for country $i$, $\alpha_1$ is a constant, $X$ is the vector of control variables, and $\varepsilon_i$ the error term. X contains: access to weapons, homicide rate; incarcerations rate; violent demonstrations; Europe and Central Asia; South Asia and English Common law.

### *2.2.2 Negative Binomial Regressions*

A Negative Binomial estimation strategy is employed because it is consistent with count data. This strategy has been employed on count data in recent empirical literature (Choi & Luo,

2013; Choi, 2015). In the regression, the mean of y is determined by the exposure time $t$ and a set of $k$ regressor variables (the *x's*). The expression relating these quantities is presented in Equation (2):

$$\mu_i = exp\,(\ln(t_i) + \beta_1 x_{1i} + \beta_2 x_{2i} + \cdots + \beta_k x_{ki}), \quad (2)$$

where, $x_1 \equiv 1$ and $\beta_1$ is the intercept. $\beta_1, \beta_2, \ldots, \beta_k$ correspond to unknown parameters to be estimated. Their estimates are symbolized as $b_1, b_2, \ldots, b_k$. The fundamental Negative Binomial regression model for an observation $i$ is written as in Equation (3):

$$\Pr(Y = y_i|\mu_i,\alpha) = \frac{\Gamma\left(y_i + \alpha^{-1}\right)}{\Gamma(\alpha^{-1})\Gamma(y_i+1)}\left(\frac{1}{1+\alpha\mu_i}\right)^{\alpha^{-1}}\left(\frac{\alpha\mu_i}{1+\alpha\mu_i}\right)^{y_i}, \quad (3)$$

where, $\mu_i = t_i\mu$ and $\alpha = \frac{1}{\nu}$ in the generalised Poisson distribution which includes a gamma noise variable with a mean of 1 and a scale of $\nu$. The parameter $\mu$ represents the mean incidence rate of *y* per unit of exposure or time. Hence, μ is the risk of a new occurrence of the event during a specified exposure period, t (NCSS, 2017; Asongu et al., 2019).

*2.2.3 Quantile Regressions*

The two previous estimation approaches report parameter estimates at the conditional mean of tourism. While these mean effects are relevant, this study improves the estimation approaches by using Quantile Regressions which accounts for initial levels of tourism in the modelling exercise. Hence, contrary to Ordinary Least Squares (OLS) and Negative Binomial regressions, the Quantile Regressions (QR) technique articulates countries with low, intermediate and high initial levels of tourists' arrivals. It is also important to note that while estimation techniques such as OLS are founded on the assumption that error terms of tourism are distributed normally, such an assumption does not hold for QR. Hence, with the adopted approach, estimated parameters are obtained from multiple points of the conditional distribution of tourism (Koenker & Bassett, 1978). In order to complement other estimation approaches and increase the policy relevance of studies, the QR estimation approach is increasingly being employed in development literature, notably, in: finance (Asongu, 2014a), health (Asongu, 2014b) and corruption (Billger & Goel, 2009; Okada & Samreth, 2012; Asongu, 2013b) studies.

The $\theta^{th}$ quantile estimator of inclusive development is obtained by solving for the following optimization problem, which is presented without subscripts in Eq. (4) for the purpose of simplicity and readability.

$$\min_{\beta \in R^k} \left[ \sum_{i \in \{i: y_i \geq x_i'\beta\}} \theta \left| y_i - x_i'\beta \right| + \sum_{i \in \{i: y_i < x_i'\beta\}} (1-\theta) \left| y_i - x_i'\beta \right| \right], \quad (4)$$

where $\theta \in (0,1)$. Contrary to OLS which is fundamentally based on minimizing the sum of squared residuals, with QR, the weighted sum of absolute deviations is minimised. For example the 10th or 25th quantiles (with $\theta$=0.10 or 0.25 respectively) by approximately weighing the residuals. The conditional quantile of tourism or $y_i$ given $x_i$ is:

$$Q_y(\theta / x_i) = x_i'\beta_\theta \ , \quad (5)$$

where unique slope parameters are modelled for each $\theta^{\text{th}}$ specific quantile. This formulation is analogous to $E(y / x) = x_i'\beta$ in the OLS slope where parameters are assessed only at the mean of the conditional distribution of tourism. For Eq. (5), the dependent variable $y_i$ is the number of tourist arrivals while $x_i$ contains: a constant term, *access to weapons, homicide rate; incarcerations rate; violent demonstrations; Europe and Central Asia; South Asia* and *English Common law.*

## 3. Empirical results

### 3.1 Presentation of contemporary results

Table 4 presents contemporary OLS and Negative Binomial regressions on the left-hand side and right-hand side, respectively. From the table, it is apparent that there is a positive relationship between Facebook penetration and the number of tourist arrivals. This relationship is both significant in the univariate regression as well as in regressions including the conditioning information set. We notice that the magnitude of the relationship and degree of significance slightly decrease with the inclusion of more variables in the conditioning information set. This is logical because the coefficient of determination also increases concurrently with an increase of variables in the conditioning information set. Moreover, the magnitude of Facebook penetration decreases while the coefficient of adjustment increases because in the real world, the number of tourist arrivals is explained beyond the levels of Facebook penetration. The Negative Binomial regressions are consistent with OLS regressions. The significant control variables also emerge with the anticipated signs.

## Table 4: Ordinary Least Squares and Negative Binomial regressions (Contemporary)

| | Dependent variable: Tourist arrivals | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Ordinary Least Squares (OLS) LnTourist | | | | Negative Binomial Regression (NBR) Tourist | | | |
| Constant | **13.571*** ** | **15.271*** ** | **14.707*** ** | **14.804*** ** | **14.963*** ** | **16.603*** ** | **15.713*** ** | **15.732*** ** |
| | **(0.000)** | **(0.000)** | **(0.000)** | **(0.000)** | **(0.000)** | **(0.000)** | **(0.000)** | **(0.000)** |
| Facebook Penetration | **0.044*** ** | **0.030*** ** | **0.023** ** | **0.022*** | **0.031*** ** | **0.021*** ** | **0.019*** ** | **0.018** ** |
| | **(0.000)** | **(0.008)** | **(0.037)** | **(0.055)** | **(0.000)** | **(0.002)** | **(0.006** | **(0.022)** |
| Access to Weapons | --- | -0.277 | -0.171 | -0.190 | --- | **-0.346** ** | **-0.276*** | **-0.351** ** |
| | | (0.105) | (0.332) | (0.312) | | **(0.049)** | **(0.077)** | **(0.027)** |
| Homicides | --- | **-0.204*** | **-0.338*** ** | **-0.327** ** | --- | -0.183 | **-0.407*** ** | **-0.333*** ** |
| | | **(0.076)** | **(0.004)** | **(0.017)** | | (0.133) | **(0.000)** | **(0.008)** |
| Incarcerations | --- | --- | **0.542*** ** | **0.531*** ** | --- | --- | **0.690*** ** | **0.697*** ** |
| | | | **(0.000)** | **(0.000)** | | | **(0.000)** | **(0.000)** |
| Demonstrations | --- | --- | -0.145 | -0.136 | --- | --- | -0.112 | -0.093 |
| | | | (0.240) | (0.320) | | | (0.448) | (0.520) |
| Europe and Central Asia | --- | --- | --- | 0.040 | --- | --- | --- | 0.163 |
| | | | | (0.917) | | | | (0.585) |
| South Asia | --- | --- | --- | -0.288 | --- | --- | --- | 0.485 |
| | | | | (0.720) | | | | (0.396) |
| English Common Law | --- | --- | --- | -0.148 | --- | --- | --- | **-0.420*** |
| | | | | (0.591) | | | | **(0.099)** |
| Fisher | **21.75*** ** | **14.08*** ** | **17.91*** ** | **10.98*** ** | | | | |
| Adjusted R² | 0.228 | 0.283 | 0.352 | 0.356 | | | | |
| Log likelihood | | | | | -2275.045 | -2265.526 | -2250.592 | -2248.585 |
| Likelihood Ratio (LR) Chi-Square | | | | | **20.45*** ** | **39.49*** ** | **69.36*** ** | **73.37*** ** |
| Likelihood Ratio (LR) for Alpha | | | | | **1.782*** ** | **1.617*** ** | **1.384*** ** | **1.355*** ** |
| Observations | 138 | 138 | 138 | 138 | 138 | 138 | 138 | 138 |

***,**,*: significance levels at 1%, 5% and 10% respectively. As discussed in the data section, the dependent is only log-normalised for Ordinary Least Squares (OLS).

## Table 5: Quantile Regressions (Contemporary)

| | Dependent variables: Ln Tourist arrivals | | | | |
|---|---|---|---|---|---|
| | **Q.10** | **Q.25** | **Q.50** | **Q.75** | **Q.90** |
| Constant | **12.772*** ** | **13.777** ** | **15.278*** ** | **15.578*** ** | **15.614*** ** |
| | **(0.000)** | **(0.011)** | **(0.000)** | **(0.000)** | **(0.000)** |
| Facebook Penetration | 0.040 | **0.035** ** | **0.021** ** | **0.018*** | **0.036** ** |
| | (0.253) | **(0.011)** | **(0.016)** | **(0.078)** | **(0.039)** |
| Access to Weapons | -0.158 | -0.415 | **-0.298*** | -0.218 | -0.198 |
| | (0.759) | (0.112) | **(0.084)** | (0.344) | (0.552) |
| Homicides | -0.257 | 0.080 | **-0.244*** | **-0.499*** ** | **-0.485*** |
| | (0.453) | (0.679) | **(0.080)** | **(0.005)** | **(0.066)** |
| Incarcerations | 0.411 | 0.250 | **0.304*** | **0.759*** ** | **0.751*** ** |
| | (0.364) | (0.344) | **(0.050)** | **(0.000)** | **(0.009)** |
| Demonstrations | -0.052 | -0.130 | -0.103 | -0.062 | -0.008 |
| | (0.878) | (0.553) | (0.489) | (0.743) | (0.982) |
| Europe and Central Asia | -0.762 | -0.005 | 0.265 | 0.349 | 0.400 |
| | (0.398) | (0.991) | (0.447) | (0.429) | (0.588) |
| South Asia | -0.986 | -0.778 | -0.177 | 0.129 | **1.467*** |
| | (0.396) | (0.411) | (0.786) | (0.869) | **(0.078)** |
| English Common Law | -0.524 | 0.073 | -0.045 | -0.163 | -0.485 |
| | (0.529) | (0.873) | (0.889) | (0.704) | (0.518) |
| Pseudo $R^2$ | 0.202 | 0.220 | 0.255 | 0.243 | 0.253 |
| Observations | 138 | 138 | 138 | 138 | 138 |

*, **, ***: significance levels of 10%, 5% and 1% respectively. OLS: Ordinary Least Squares. R² for OLS and Pseudo R² for quantile regression. Lower quantiles (e.g., Q 0.1) signify nations where Tourist arrivals are least.

The QR results in Table 5 are also consistent with findings from OLS and Negative Binomial regressions with the exceptions of the following: (i) the relationship between Facebook penetration and tourists arrivals is significant from the 25$^{th}$ quantile to the 90$^{th}$ quantile and (ii) in terms of magnitude, the significance of the relationship is highest in the 25$^{th}$ and 90$^{th}$ quantiles. Hence, it follows that Facebook penetration is more relevant in promoting tourist arrivals in countries where initial levels in tourist arrivals are the highest and low.

### 3.2 Robustness checks with non-contemporary regressions

Table 6 and Table 7 respectively present robustness checks for Table 4 and Table 5. Consistent with recent literature (see Mlachila *et al.*, 2017; Asongu *et al.*, 2017), the independent variables are lagged by one year in order to increase control for endogeneity. The established findings are broadly consistent with those in Tables 4-5.

**Table 6: Ordinary Least Squares and Negative Binomial regressions (Non-Contemporary)**

| | **Dependent variable: Tourist arrivals** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Ordinary Least Squares (OLS) LnTourist** | | | | **Negative Binomial Regression (NBR) Tourist** | | | |
| Constant | **13.674*** (0.000)** | **15.311*** (0.000)** | **14.850*** (0.000)** | **14.944*** (0.000)** | **15.012*** (0.000)** | **16.602*** (0.000)** | **15.769*** (0.000)** | **15.784*** (0.000)** |
| Facebook Penetration (-1) | **0.043*** (0.000)** | **0.030*** (0.008)** | **0.022** (0.040)** | **0.021* (0.061)** | **0.031*** (0.000)** | **0.021*** (0.002)** | **0.019*** (0.006)** | **0.017** (0.023)** |
| Access to Weapons (-1) | --- | -0.260 (0.132) | -0.153 (0.392) | -0.174 (0.363) | --- | **-0.333* (0.054)** | **-0.267* (0.082)** | **-0.348** (0.027)** |
| Homicides (-1) | --- | **-0.207* (0.074)** | **-0.337*** (0.004)** | **-0.322** (0.020)** | --- | -0.177 (0.145) | **-0.398*** (0.000)** | **-0.318** (0.010)** |
| Incarcerations (-1) | --- | --- | **0.529*** (0.003)** | **0.512*** (0.004)** | --- | --- | **0.688*** (0.000)** | **0.685*** (0.000)** |
| Demonstrations (-1) | --- | --- | -0.175 (0.163) | -0.163 (0.244) | --- | --- | -0.133 (0.360) | -0.106 (0.453) |
| Europe and Central Asia | --- | --- | --- | 0.067 (0.859) | --- | --- | --- | 0.191 (0.508) |
| South Asia | --- | --- | --- | -0.353 (0.646) | --- | --- | --- | 0.432 (0.446) |
| English Common Law | --- | --- | --- | -0.151 (0.582) | --- | --- | --- | -0.414 (0.102) |
| Fisher | **21.80*** | **13.65*** | **17.47*** | **10.90*** | | | | |
| Adjusted $R^2$ | 0.219 | 0.273 | 0.344 | 0.349 | | | | |
| Log likelihood | | | | | -2283.051 | -2274.193 | -2258.729 | -2256.606 |
| Likelihood Ratio (LR) Chi-Square | | | | | **20.69*** | **38.41*** | **69.33*** | **73.58*** |
| Likelihood Ratio (LR) for Alpha | | | | | **1.748*** | **1.597*** | **1.358*** | **1.328*** |
| Observations | 138 | 138 | 138 | 138 | 138 | 138 | 138 | 138 |

***,**,*: significance levels at 1%, 5% and 10% respectively.

**Table 7: Quantile Regressions (Non-contemporary)**

| | Dependent variables: Ln Tourist arrivals | | | | |
|---|---|---|---|---|---|
| | **Q.10** | **Q.25** | **Q.50** | **Q.75** | **Q.90** |
| Constant | **13.400*** ** | **13.697*** ** | **15.387*** ** | **15.730*** ** | **15.724*** ** |
| | **(0.000)** | **(0.000)** | **(0.000)** | **(0.000)** | **(0.000)** |
| Facebook Penetration (-1) | 0.040 | **0.034** ** | **0.017** ** | 0.010 | **0.036** ** |
| | (0.290) | **(0.049)** | **(0.041)** | (0.447) | **(0.045)** |
| Access to Weapons (-1) | -0.158 | -0.318 | -0.289 | -0.339 | -0.245 |
| | (0.807) | (0.318) | (0.100) | (0.220) | (0.146) |
| Homicides (-1) | -0.227 | 0.039 | **-0.253*** | **-0.406*** | **-0.444*** |
| | (0.357) | (0.861) | **(0.072)** | **(0.067)** | **(0.081)** |
| Incarcerations (-1) | 0.349 | 0.235 | **0.328** ** | **0.849*** ** | **0.766*** ** |
| | (0.499) | (0.453) | **(0.036)** | **(0.001)** | **(0.007)** |
| Demonstrations (-1) | -0.223 | -0.124 | -0.110 | -0.063 | -0.016 |
| | (0.575) | (0.655) | (0.477) | (0.792) | (0.963) |
| Europe and Central Asia | -0.679 | 0.102 | 0.305 | 0.199 | 0.353 |
| | (0.499) | (0.862) | (0.377) | (0.723) | (0.622) |
| South Asia | -0.800 | -0.722 | -0.190 | -0.453 | **1.629** ** |
| | (0.445) | (0.539) | (0.769) | (0.650) | **(0.039)** |
| English Common Law | -0.834 | 0.057 | -0.135 | -0.185 | -0.605 |
| | (0.288) | (0.916) | (0.673) | (0.727) | (0.414) |
| Pseudo $R^2$ | 0.191 | 0.200 | 0.258 | 0.241 | 0.255 |
| Observations | 138 | 138 | 138 | 138 | 138 |

*, **, ***: significance levels of 10%, 5% and 1% respectively. OLS: Ordinary Least Squares. $R^2$ for OLS and Pseudo $R^2$ for quantile regression. Lower quantiles (e.g., Q 0.1) signify nations where Tourist arrivals are least.

## 4. Concluding remarks and future research directions

This study has examined the relationship between tourism and social media from a cross section of 138 countries with data for the year 2012. The empirical evidence is based on Ordinary Least Squares, Negative Binomial and Quantile regressions. Two main findings have been established. First, there is a positive relationship between Facebook penetration and the number of tourist arrivals. Second, Facebook penetration is more relevant in promoting tourist arrivals in countries where initial levels in tourist arrivals are the highest and low. It what follows we discuss attendant policy implications.

In this study, the established positive relationship between Facebook penetration and tourism can be elucidated from four principal angles: the transformation of travel research, the rise in social sharing, improvements in customer service and the reshaping of travel agencies (Carnoy, 2017). The points are substantiated in chronological order.

First, Facebook penetration has substantially transformed travel research because of *inter alia*: online reviews have been democratized; travelers rely to the Facebook pages of tourism companies to search for accommodation and future travel destinations and, potential tourists also rely on online peer exchanges on Facebook for travel inspiration and validation.

Second, the rise of social sharing through Facebook enables, *inter alia*: the possibility of potential tourists to have insights from past tourists into the experiences that they can

expect in the destination site or country. Accordingly, the content of Facebook for a given travel destination is considerably influential and accessible because it can either inspire potential guests to book for destinations or put them off, contingent on how users share their experiences. Such sharing is done by means of videos and photos during travels. According to Carnoy (2017) as high as 97% of millennials share videos and photos related to the travel via social media platforms such as Facebook, hence, peer-to-peer online web content influences potential guests. It is in this light that many resorts and hotels are using social media campaigns and contests to leverage on the social activity of their guests.

Third, Facebook penetration enhances customer service in the tourism industry. This is essentially because customer satisfaction and services have also been improved by the social media. It is for this reason that many brands use Facebook to increase awareness and clarify confused and unsatisfied customers. Tourism companies also use Facebook to address complains in a genuine and sincere manner as well as to develop a solid reputation among potential and current customers. Accordingly, timely responses to questions and complaints from current and potential tourists by tourism companies through Facebook can help to better inform future customers.

Fourth, Facebook penetration is increasing tourists' arrivals because it is also reshaping travel agencies. Accordingly, the rapid diffusion of information through social media has obliged travel agencies to adapt in the transition to digital agencies from traditional brick-and-mortar agencies. These digital agencies which depend on their Facebok pages for publicity now account for a considerable percentage of airline booking, package bookings and cruise bookings.

A caveat of the study is that, we have established relationships which cannot be extended to causality. As more data become available, it will be worthwhile to improve the study to establish causality for more robust policy implications. Moreover, with the availability of data, fixed effects estimations can be used to effectively estimate the impact of regional dummies and overcome the problems related to accounting for geographical factors.

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