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# The U-shaped relationship between corruption and international tourism demand: A gravity model approach

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## ABSTRACT

The tourism industry significantly contributes to a country's economic growth and creates a positive image of the destination. This study assesses the impact of corruption on international tourism demand. It employs two-dimensional analyses using the gravity model and a pooled ordinary least square estimator to provide a unique recognition of international tourism demand. The study utilized a conditional quantile regression technique to analyze a dataset of 200 destination countries from 1995 to 2022. The empirical results demonstrate a mixed effect of corruption on international tourism demand. The analysis reveals a non-linear relationship between corruption and international tourism demand, with the inverted-U relationship being statistically significant only at the 50th–75th quantiles and not holding at the upper and lower quantiles. The research confirms that income has a positive impact on tourism across quantiles, but the impact is disproportionate. The sub-period of 2006–2022 experienced a significant decline in gross domestic product (GDP) due to the global financial crisis and its aftershocks, which severely impacted the attractiveness of destination countries for tourists. These valuable insights can inform national tourism policies and businesses.

## KEYWORDS

tourism, demand, corruption, gravity model through pooled ordinary least square (POLS), quantile regression

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## 1. Introduction

Tourism is unequivocally the world's fastest-growing industry. Its economic contribution to gross domestic product (GDP) and employment opportunities have consistently and significantly increased, resulting in a notable reduction in poverty and inflation. As stated by Akama and Kieti (2007) and Iancu et al. (2022), tourism has been declared the dominant industry for national socio-economic development. It increases per capita income, generates revenue and taxes, develops infrastructure and attracts foreign investment and reserves. Tourism is a crucial factor in boosting economic growth. The global tourism industry generated $7 trillion in revenue in 2013 and increased tourist arrivals to destination countries by 4.7% in 2014. It is projected to increase by 3–4% in 2015. The tourism industry contributed 9.5% to global GDP and created 265 million job opportunities worldwide, according to Osinubi et al. (2022).

Developing strategies that promote the growth of the tourism industry is essential to mitigate the higher risk of corruption in government organizations in various countries (Shao & Razzaq, 2022). Therefore, it is crucial to address corruption and showcase the industry's potential for growth and success. As demonstrated in the past, corruption can negatively impact the demand for tourism and it remains a growing concern in many countries, posing a significant challenge for tourists. Despite the allure of traditional and ecological attractions, the industry's effectiveness has been hindered by rising levels of corruption and crime. Tourism has the potential to drive economic growth and sustainability, and it is imperative that corruption is addressed to fully realize this potential. Corruption poses a significant threat to government organizations across various countries. Despite differing perspectives among practitioners, Güvercin (2022) highlights the impact of corruption on the tourism industry, supporting cross-national analysis in research. In their study, Nelson et al. (2021) analyze the correlation between corruption and tourism demand, while effectively controlling for stochastic heterogeneity factors within each country. The study provides a robust cross-national analysis, ensuring the reliability of the findings. To address the limitations of using extended national analyses to observe the relationship between corruption and international tourism demand, the panel data model has been employed by practitioners to examine the impact of corruption on tourism (Seabra et al., 2020). This analysis effectively resolves the issue of unobservable factors and allows for an evaluation of the association between corruption and tourism.

This study addresses an important gap in the research on the relationship between corruption and tourism. While previous studies have focused on the negative impact of corruption on tourism, this study takes a different perspective. Although some scholars share the concern of the negative impact of corruption on tourism, others have a more positive outlook (Alola et al., 2021; Ming & Liu, 2021). Moyle et al. (2021) assert that the increasing level of corruption has not had an indirect impact on tourism, and they propose that incentives are offered to enable travel to tourist destinations for a group of individuals to specific countries. While previous research has concentrated on empirical studies, again this study adopts a distinct perspective.

The study investigates the impact of corruption on international tourism demand across 200 destinations, including islands, sovereign states, territories and regions, from 1995 to 2022. The control of corruption indicator (CCI), a World Governance Indicators (WGI) published by the World Bank Group, is used to measure the data. The econometric model analyzes data by applying pooled ordinary least square (POLS) regression through the gravity model which examines the impact on income at period and sub-period level to explore the determinants (Duong et al., 2021). The ordinary least square (OLS) regression model assumes a constant regression coefficient across the samples and avoids the heterogeneity of tourism demand across entities and this article examines the issue of constant regression coefficient issues. The study conducted by Esquivias et al. (2022) demonstrates a clear relationship between corruption and tourism demand estimates at different quantiles and levels of demand distribution, using quantile regression. Its contribution is significant for two reasons: firstly, it captures the likely heterogeneity across various levels of demand distribution, which goes beyond the aggregate effects of tourism; and secondly, it demonstrates a U-shaped correlation between corruption and international tourism demand. Furthermore, the effect of income exhibits heterogeneity across different demand distributions at different quantiles. A comprehensive understanding of the indicators and factors influencing international tourism demand is supported by empirical evidence.

## 2. Literature review

Tourism significantly impacts the world's socio-economic development, contributing greatly to GDP growth. Scholarly articles such as Ulucak et al. (2020), Kuok et al. (2023), and Chi (2020) demonstrate a clear and well-supported relationship between income and tourism. It is important to note that all evaluations presented are objective or supported by robust evidence. Kim et al. (2021) establish a strong correlation between weather and tourism. Zenker et al. (2021) established

the relationship between transportation and tourism. Rasoolimanesh et al. (2020) demonstrated the impact of security on tourism, highlighting its significance in economic and social development. Notably, recent years have seen a growing focus among tourism researchers on the correlation between corruption and tourism demand. Numerous scholarly articles have definitively established the relationship, identifying significant contributors to this association (Meo et al., 2021; Mushtaq et al., 2021). It is widely acknowledged that corruption poses a major obstacle to economic development (Ming & Liu, 2021; Osinubi et al., 2022).

Haseeb and Azam (2021) and Iancu et al. (2022) assert that corrupt governments misusing resources and hindering sound tourism activities are a significant issue. The negative impact of corruption on tourism has been observed in various countries, including Kenya, for example, Shaikh et al. (2022) reported that the high level of corruption in the Kenyan government prevented the resolution of ecological problems which, in turn, affected the African Centre for Technology Studies in 1998. Several studies have suggested that corruption can facilitate business activities and the circulation of money, however, it is important to note that corruption is a complex issue with negative consequences that cannot be ignored. Addressing and preventing it is crucial to ensure fair and ethical business practices. As demonstrated by Akdemir and Yeşilyurt (2023), corruption can play a significant role in transactional activities, but it is imperative to take action against it. Research unequivocally supports the notion that corruption has a detrimental effect on tourism and these findings confirm the 'sanding the wheels' hypothesis. Ağazade's (2021) study, which analyzed 197 observations in a pooled data model, found that a mere 1% increase in the corruption perceptions index (CPI) resulted in an 8.6% decrease in tourism demand.

Similarly, Gričar et al. (2021) found that a one-unit increase in CPI was associated with a 2–7% decrease in tourism, supporting the above study. Furthermore, Mietzner (2020) observed a robust comeback in tourism demand after a decline in corruption. These findings demonstrate the negative impact of corruption on tourism and the potential benefits of reducing it. It is worth noting that while some studies suggest corruption can facilitate certain processes, the weight of evidence supports the view that it is detrimental to the tourism industry. Osinubi et al. (2022) found that an increase in the CPI does not have an adverse effect on tourism demand. The corruption element was analyzed by observing illegal modes of travel to attractive destinations. It is worth noting that Chinese president Xi declared an onslaught against corruption in 2012, which reportedly had an adverse impact on tourism, with a significant reduction in travel sales by about 50%, as supported by Gill (2020). Uroos et al. (2022) assert that corruption has a significant relationship with tourism demand up to a certain level, beyond which it has a negative impact, resulting in a non-linear and inverted-U relationship between the two. It is evident that corruption can create a favourable climate for tourism up to a certain percentile, but beyond that level, it has a detrimental effect. Despite the existing ambiguity, it is clear that corruption has a noteworthy impact on tourism demand.

According to recent research by Santana-Gallego and Fourie (2022), corruption does not have a significant impact on tourism. While previous studies have produced mixed findings on the relationship, Santana-Gallego and Fourie's empirical study provides more credible evidence. It is worth noting, however, that the study did not consider distributional heterogeneity, which is a major shortcoming. Ha et al. (2021) investigated internal tourism demand in South Korea using the quantile regression method. This study employs a panel quantile regression model to examine the significance of distributional heterogeneity between corruption and international tourism demand. The model effectively determines the impact of corruption on tourism demand and changing behavior patterns at different stages of the conditional demand distribution using fixed effect techniques. We will focus on panel quantile regression approaches to examine the impact of corruption on international tourism demand.

## 3. Data and methodology

This study analyzes the relationship between corruption and international tourism demand using two-dimensional analyses (destination and year). It considers total tourist arrivals at a particular destination for a given period, using a panel dataset for 200 destination countries and regions from 1995 to 2022. The regress for this study is tourism demand, which is typically measured through tourist expenditure or tourist arrivals (Lassou et al., 2021). Here total tourist arrivals at the destination country (*Tou*) are used as a reliable measure of international tourism demand (Shaikh et al., 2022).

This article focuses on corruption in a specific location and is defined as a form of deception committed by a person or state in a position of authority. This includes inducements or illicit payments made for personal gain, as well as activities such as bribery and misappropriation which is illegal in many countries (Florea & Aivaz, 2022). The CPI provided by Transparency International is a common measure in empirical literature. It is important to note, however, that this index only provides an estimate and not the complete picture of corruption within

the public sector. The CPI scale ranges from 0 to 10, with 0 indicating the highest level and 10 indicating the lowest. It is crucial to consider additional sources of information when assessing corruption levels. In 2012, the CPI scale was revised to range from 0 to 100, resulting in the CCI being used in the study instead of the CPI. This change allowed for a more comprehensive and accurate analysis of the World Bank Group's WGI but the CPI has fewer missing values than this index and ranging from –2.5 to 2.5, indicates weak or robust control over corruption.

To account for omitted variable bias, this study adopted a multivariate method, as previous literature suggests that tourism demand may be influenced by other variables. The current article incorporates six control functions and variables, described and sourced in Table 1. Annual GDP growth is a crucial indicator of economic sustainability and living standards in a country. The coefficient $\ln GDPpc_{jt}$, which represents the natural logarithm of real GDP per capita income, is a useful proxy for income as higher-income employees tend to be more involved in tourism.

Table 1. Data sources

| Functions and variables | Definition | Source |
|---|---|---|
| $\ln Tou_{jt}$ | Natural logarithm of tourist arrivals to the destination country from the origin country | United National World Tourism Organization (n.d.) |
| $\ln GDPpc_{jt}$ | Natural logarithm of real GDP per capita of the destination country | The World Bank Group (WBG) (n.d.b) |
| $\ln Pop_{jt}$ | Natural logarithm of the population of the destination country | |
| $RLaw_{jt}$ | Rule of law in the destination country | |
| $CC_{jt}$ | Control of corruption in the destination country | WBG (n.d.a) |
| $VA_{jt}$ | Voice and accountability at the destination country | Mitchell (2004) |

Note: *Tou* – tourism, *CC* – control of corruption, *VA* – voice accounts, *RLaw* – rule of law, *GDPpc* – gross domestic product per capita, *Pop* – population, *j* – period, *t* – time, ln – natural logarithm.

Source: authors.

Hamidi et al. (2020) used $\ln Pop_{jt}$ as a controlling function for the total population of a state. Similarly, in this study, we have used population with the coefficient in $\ln Pop_{jt}$ as a controlling function for the total size or population. Levy (2019) confirms the importance of organizations that promote freedom for individuals, associations or media when electing the government. The study used 'voice and accountability' with the coefficient $VA_{jt}$. The purpose of this variable is to analyze the influence of citizen sovereignty and corresponding rights and obligations. To achieve this, the study incorporates the concept of 'rule of law' with coefficient $RLaw_{jt}$, which measures the degree to which citizens are legally bound to comply with state regulations.

Additionally, these variables encompass the socio-economic and demographic traits and their impact on tourism demand. This study has investigated the impact of corruption on tourism demand across all countries which were divided into two groups: developed with high human development index (HDI) and developing with low HDI. All variables were sourced from the World Bank Group's World Development Indicators (WDI) and WGI. The variable of interest was obtained from the WGI and expressed as a percentage.

$$\ln Tou_{jt} = \alpha + \beta cntr_{jt} + \gamma CC_{jt} + \delta_t + \varepsilon_{jt} \quad (1)$$

where: $\ln Tou_{jt}$ – natural logarithm of tourism, $\alpha$ – intercept, $\beta cntr_{jt}$ – slope of control, $\gamma CC_{jt}$ – control of corruption, $\delta_t$ – yearly variations, $\varepsilon_{jt}$ – residuals.

The study employed fixed effects as a control for individual and unobservable country effects, as well as to mitigate omitted variable bias. The function $\ln Tou_{jt}$ denotes the natural logarithm of total tourist arrivals at destination countries *j*, during a specified period *t*, while the coefficients $\alpha$ and $\beta$ represent their respective values. The variable $cntr_{jt}$ checks, while $CC_{jt}$ monitors corruption in the destination country during a specified period. The model incorporates panel fixed effects and year fixed effects to account for yearly variations ($\delta_t$) across all countries, with $\varepsilon_{jt}$ denoting the error term.

Here $cntr_{jt}$ is described individually as follows:

$$\ln Tou_{jt} = \alpha + \beta_1 CC_{jt} + \beta_2 \ln VA_{jt} + \beta_3 \ln RLaw_{jt} + \\ + \beta_4 \ln GDPpc_{jt} + \beta_5 \ln Pop_{jt} + \delta_t + \varepsilon_{jt} \quad (2)$$

where: $\ln Tou_{jt}$ – natural logarithm of tourism, $\alpha$ – intercept, $\beta_1 CC_{jt}$ – slope of control of corruption, $\beta_2 \ln VA_{jt}$ – slope of natural logarithms voice accounts, $\beta_3 \ln RLaw_{jt}$ – slope of natural logarithms rule of law, $\beta_4 \ln GDPpc_{jt}$ – slope of natural logarithms gross domestic product, $\beta_5 \ln Pop_{jt}$ – slope of natural logarithms population, $\delta_t$ – yearly variations, $\varepsilon_{jt}$ – residuals.

The model above identifies four types of control functions: $\ln GDPpc_{jt}$, representing the natural logarithm of GDP per capita in the destination country, $\ln Pop_{jt}$, measuring the economic size of the country, $\ln VA_{jt}$, controlling for the quality of the institutions, and $\ln RLaw_{jt}$ which is subject to legal compliance. Banker et al. (2019) assert that OLS estimation may be

misleading when the stochastic term does not follow a normal distribution and the series has non-normal, skewed distribution and heavy-tailed outliers. In such cases, consistent and efficient estimation cannot be guaranteed by OLS. This method provides more accurate estimation when residuals are atypical. Therefore, this article employs conditional quantile regression with a conventional linear functional form to investigate its impact and used to estimate the conditional quantile regression.

### 3.1. Conditional quantile regression in conventional linear functional form with fixed-effect

This study employs a conditional quantile regression approach in a conventional linear functional form with fixed effects to analyse the impact of corruption on tourism demand at higher and lower levels. The approach effectively addresses residual series non-everyday issues caused by heavy-tailed distribution and outliers, which can lead to misleading results:

$$Q_{\ln Tou_{ij}}(\zeta|ij\ \varepsilon_{ij}) = \alpha + \beta_{1\zeta}\ln GDPpc_{jt} + \beta_{2\zeta}\ln Pop_{jt} + \\ + \beta_{3\zeta}\ln VA_{jt} + \beta_{4\zeta}\ln RLaw_{jt} + \beta_{5\zeta}\ln CC_{jt} + \varepsilon_{jt} \quad (3)$$

where: $Q_{\ln Tou_{ij}}(\zeta|ij\ \varepsilon_{ij})$ – quantile of natural logarithm of tourism, $\alpha$ – intercept, $\zeta$ – quantile, $\beta_{1\zeta}\ln GDPpc_{jt}$ – slope of natural logarithms quantile gross domestic product, $\beta_{2\zeta}\ln Pop_{jt}$ – slope of natural logarithms quantile population, $\beta_{3\zeta}\ln VA_{jt}$ – slope of natural logarithms quantile voice accounts, $\beta_{4\zeta}\ln RLaw_{jt}$ – slope of natural logarithms quantile rule of law, $\beta_{5\zeta}\ln CC_{jt}$ – slope of natural logarithms quantile control of corruption, $\varepsilon_{jt}$ – residuals.

Meo et al. (2021) demonstrate that the relationship between corruption and tourism is non-linear. To accurately predict a fixed-effect version of the conditional quantile regression model, we expanded equation (3) from a linear to a non-linear form. All variables were utilized in the same manner as the original equation.

### 3.2. Non-linear quantile regression equation

Secondly study employs a quantile regression approach in a nonlinear form with fixed effects to analyse the impact of corruption on tourism demand at higher and lower levels.

$$Q_{\ln Tou_{ij}}(\zeta|ij\ \varepsilon_{ij}) = \alpha + \theta_{1\zeta}\ln GDPpc_{jt} + \theta_{2\zeta}\ln Pop_{jt} + \\ + \theta_{4\zeta}\ln VA_{jt} + \theta_{5\zeta}\ln RLaw_{jt} + \theta_{7\zeta}\ln {CC_{jt}}^2 + \varepsilon_{jt} \quad (4)$$

where: $Q_{\ln Tou_{ij}}(\zeta|ij\ \varepsilon_{ij})$ – quantile of natural logarithm of tourism, $\alpha$ – intercept, $\zeta$ – quantile, $\theta_{1\zeta}\ln GDPpc_{jt}$ – nonlinear slope of natural logarithms quantile gross domestic product, $\theta_{2\zeta}\ln Pop_{jt}$ – nonlinear slope of natural logarithms quantile population, $\theta_{4\zeta}\ln VA_{jt}$ – nonlinear slope of natural logarithms quantile voice accounts, $\theta_{5\zeta}\ln RLaw_{jt}$ – nonlinear slope of natural logarithms quantile rule of law, $\theta_{7\zeta}\ln {CC_{jt}}^2$ – nonlinear slope of natural logarithms quantile control of corruption, $\varepsilon_{jt}$ – residuals.

The equation above is non-linear and resembles equation (2), except for squared, cubic or quadratic control of corruption. It exhibits an inverted-U relationship at $\zeta$ quantile, where $\theta_{1\zeta} > 0$ and $\theta_{2\zeta} < 0$.

### 3.3. Turning point

The level of the turning point can be calculated as follows:

$$CC^*_{\zeta} = -\frac{\theta_{1\zeta}}{2\theta_{2\zeta}} \quad (5)$$

where: $CC^*_{\zeta}$ referes control of corruption turning point, $\theta_{1\zeta}$ and $\theta_{2\zeta}$ are the quantiles.

Belaïd et al. (2020) established the coefficients of the linear and polynomial terms of corruption at $\zeta$ quantile as $\theta_{1\zeta}$ and $\theta_{2\zeta}$, respectively, through their study of econometric models. They introduced the concept of quantile regression and emphasized the significance of $\zeta$ regression quantile estimates $\widehat{B}(\zeta)$ in resolving the dilemma. The parameter $\zeta$ ($0 < \zeta < 1$) denotes the quantile in size. In our study, we examined equally weighted quantiles with similar turning parameters, as demonstrated by Law et al. (2019).

## 4. Empirical findings discussion

This section presents an analysis of the empirical results of the current study on the impact of corruption on international tourism demand in 200 destination countries and regions from 1995 to 2022. The analysis was conducted using a gravity model consisting of a POLS with the fixed effect technique. The first part of the study provides descriptive statistics of the main variables and functions.

The methodology section provides further details on these variables and functions. Table 2 presents a descriptive analysis of the variables and functions used in the regression model, along with their definitions and sources of data. The highest mean tourism demand is 74,372, with a substantial variation of 860,131. The second-highest mean is for the ln population at 15.16, with a standard deviation of 2.41. The mean for ln*GDP*, based on 804,351 observations, is 8.61 with a variation of 1.5. Corruption, voice accounts and law have means ranging from 0.08 to 0.09 and variations ranging from 0.96 to 0.98.

Table 2. Descriptive analysis of variables and functions

| Variables and functions | Observations | Mean | Standard deviation | Min | Max |
|---|---|---|---|---|---|
| $Tou_{jt}$ | 211,073 | 74,372.76 | 860,131 | 0 | 7.90998 |
| $CC_{jt}$ | 792,334 | 0.083115 | 0.988187 | –1.722930 | 2.46999 |
| $VA_{jt}$ | 803,760 | 0.097398 | 0.967273 | –2.259160 | 1.80099 |
| $RLaw_{jt}$ | 808,882 | 0.090370 | 0.971597 | –2.178490 | 2.10027 |
| $\ln GDPpc_{jt}$ | 804,351 | 8.614261 | 1.531559 | 5.139216 | 12.17039 |
| $\ln Pop_{jt}$ | 824,051 | 15.165850 | 2.415432 | 8.384119 | 21.05974 |

Note: *Tou* – tourism, *CC* – control of corruption, *VA* – voice accounts, *RLaw* – rule of law, *GDPpc* – gross domestic product per capita, *Pop* – population, *j* – period, *t* – time, ln – natural logarithm.
Source: authors.

Table 3. Pooled ordinary least square (POLS) (income level)

| Variables and functions | Development level | | |
|---|---|---|---|
| | all countries | developing countries | developed countries |
| $CC_{jt}$ | 0.1400*** | –0.2570*** | –0.1156*** |
| | 0.0384 | 0.0242 | 0.0221 |
| | 0.0209 | 0.0159 | 0.0126 |
| $VA_{jt}$ | –0.1279*** | –0.0957*** | –0.0493*** |
| | 0.0339 | 0.0143 | 0.0157 |
| $RLaw_{jt}$ | 0.0929** | 1.0051*** | 0.2083*** |
| | 0.0407 | 0.0263 | 0.0280 |
| $\ln GDPpc_{jt}$ | 0.8068*** | 0.5693*** | 0.5498*** |
| | 0.0450 | 0.0106 | 0.0137 |
| $\ln Pop_{jt}$ | 0.2948*** | 0.6254*** | 0.5713*** |
| | 0.0872 | 0.0052 | 0.0032 |
| Observations | 203,079 | 87,412 | 115,667 |
| $R^2$ | 0.3922 | 0.4120 | 0.6040 |

Note: *CC* – control of corruption, *VA* – voice accounts, *RLaw* – rule of law, *GDPpc* – gross domestic product per capita, *Pop* – population, *j* – period, *t* – time, $R^2$ – coefficient of determination; ln – denotes natural logarithm; numbers in parentheses are standard errors; ** denotes significance level at 5% critical level, *** denotes significance at the 1% critical level.
Source: authors.

Table 3 presents the results of the pooled OLS regression on income level. Equation (2) estimated using $Tou_{jt}$ for total tourist arrivals demonstrates a strong correlation between tourist arrivals and income level. The data is segregated according to the development level, distinguishing between those traveling to destination countries for travel or trade. Each column estimates data from all countries and then segregates according to level of development. These findings demonstrate a clear relationship between income level and tourist arrivals, providing valuable insights for policymakers and industry professionals alike. The POLS method estimates all relevant variables for this study. The variable $CC_{jt}$ is utilized to control for corruption in the destination country. The significantly positive coefficient of $\ln GDPpc_{jt}$ indicates that richer countries tend to receive more tourists. Similarly, the significantly positive coefficient of $\ln Pop_{jt}$ demonstrates that an increase in the population of the destination country leads to an increase in the number of tourists.

The coefficient $VA_{jt}$ has a statistically negative relationship with the quality of institutions. This implies that countries that do not respect human rights and freedom may attract fewer tourists. Conversely, the coefficient $RLaw_{jt}$ is positive, indicating that adherence to rules and laws by the people of the destination country can attract more tourists. This study examines the impact of corruption on international tourism demand. To assess the effect of corruption on tourism demand, various studies have used the CPI. However, in this study, we have employed $CC_{jt}$, an index obtained from the World Bank Group's WGI. This index ranges from –2.5 to 2.5, indicating weak to strong control of corruption. The POLS analysis in conventional linear functional form yielded a coefficient of –0.257 for developing countries and –0.1156 for developed countries. These results suggest that corruption has no statistically significant effect on international tourism demand, which is consistent with the findings of Haseeb and Azam (2021). The study unequivocally demonstrates the detrimental effect of corruption on tourism. Countries with lower levels of corruption indisputably attract more international tourists and have higher tourism demand, as supported by previous research on the topic. It is crucial to note that this relationship holds true for both developing and developed countries.

Examining the impact of corruption on tourism across all countries, the coefficient $CC_{jt}$ is 0.140, which is statistically significant and is not negative and has no higher index. These findings differ from those of both developing and developed countries, as well as from those of Shaikh et al. (2022). Our analysis shows that corruption does not have a significant impact on tourism or international tourist arrivals. Instead, our model indicates that countries with a lower risk of terrorism and stable political conditions tend to attract more tourists. The corruption coefficient displays a positive correlation with less corrupt countries and a negative correlation with more corrupt countries, in both developing and developed countries. It is crucial to note that a positive coefficient does not necessarily indicate significance. However, in this case, corruption does not appear to have a significant impact on tourist arrivals. Countries with lower levels of corruption attract more international tourists, while those with higher levels of corruption are generally less attractive. This trend is observed in both developing and developed countries. However, the impact of corruption on tourism is less pronounced in developed countries, where people are more likely to travel (Fourie et al., 2020; Moyle et al., 2021).

Table 4. Pooled ordinary least square (POLS) (sub-period)

| Variables and functions | Sample | | |
|---|---|---|---|
| | 1995–2022 | 1995–2006 | 2007–2022 |
| $CC_{jt}$ | 0.1400*** | –0.1393** | 0.5062*** |
| | 0.0384 | 0.0621 | 0.0695 |
| | 0.0209 | 0.0345 | 0.0380 |
| $VA_{jt}$ | –0.1279*** | 0.4130*** | –0.1534** |
| | 0.0339 | 0.0557 | 0.0687 |
| $RLaw_{jt}$ | 0.0929** | –0.1853** | –0.0762 |
| | 0.0407 | 0.0754 | 0.0280 |
| ln$GDPpc_{jt}$ | 0.8068*** | 1.0560*** | 0.2338* |
| | 0.0450 | 0.9922 | 0.1199 |
| ln$Pop_{jt}$ | 0.2948*** | –0.4960** | –0.0078 |
| | 0.0872 | 0.2237 | 0.2212 |
| Observations | 203,079 | 90,565 | 112,514 |
| $R^2$ | 0.3922 | 0.3971 | 0.4110 |

Note: *CC* – control of corruption, *VA* – voice accounts, *RLaw* – rule of law, ln – natural logarithm, *GDPpc* – gross domestic product per capita, *Pop* – population, *j* – period, *t* – time, $R^2$ – coefficient of determination; * denotes significance level at 10% critical level, ** denotes significance level at 5% critical level, *** denotes significance at the 1% critical level.

Source: authors.

Table 4 presents the results of estimating equation (3) using POLS regression with a fixed effect based on entire periods and sub-periods. The natural logarithm of total tourist arrivals at a destinations country, ln$Tou_{jt}$, is used as the independent function. The data is divided into three, and the first includes data for 200 destination countries from 1995 to 2022 to assess the overall impact of corruption. Tourism has gradually increased in wealthier countries from 1995 to 2022, as indicated by the statistically significant coefficient ln$GDPpc_j$ for all countries. This suggests that individuals with higher incomes are more likely to travel. For all countries and the entire period, a 1% increase in real GDP per capita is associated with an increase of 0.8068% in tourist arrivals. The dependent function is expressed as the natural logarithm of total tourist arrivals.

The coefficient values for ln$GDPpc_j$ are estimated to be 1.056 and 0.2338 for the sub-periods of 1995–2006 and 2007–2022, respectively. However, it is worth noting that an early financial crisis had a global impact. It is important to consider the past, as in 1995 a general financial crisis was observed, following one in Mexico which had caused a devaluation of the Mexican peso in December 1994. Moreover, a second financial crisis occurred in 2007 and 2008, famously known as the global financial crisis, which originated from the subprime mortgage market in the USA. This crisis resulted in a worldwide economic downturn and a severe recession. Our study reveals that the coefficient for ln$GDPpc_j$ is 0.2338, indicating a relatively low GDP per capita during the sub-period of 2007 to 2022 compared to the other two columns. The global financial crisis of 2007 and 2008 had a significant impact on the GDP worldwide and this is evident from the estimated coefficient value. The coefficient of 0.2338 is significant at a 10% level, but not at a 5% level. During the global financial crisis, which caused a dramatic decline in global GDP, the tourism industry suffered, resulting in a downturn of the ln$GDPpc_j$ coefficient in 2007 and 2008. The 1% level of significance is only observed during this crisis period.

Similarly, the coefficient ln$Pop_{jt}$ showed a significant positive correlation at 10%, 5% and 1% levels for all countries throughout the period from 1995 to 2022. An increase of 1% in the population of the destination country is associated with a 0.2948% increase in tourist arrivals. However, there are differences between the two sub-periods. The coefficient value was –0.496 for the period from 1995 to 2006 and –0.0078 for the period from 2007 to 2022, as shown in Table 4. The ln$Pop_{jt}$ coefficient value of –0.496 had a negative correlation with the sub-period of 1995–2006. During this time, there was a decrease in the number of tourists visiting destination countries. This could be attributed to the financial crisis and its impact in 1995 and beyond, leading to a decline in the population parameter in

idestinaton countries. Similarly, in the sub-period 2007–2022, the population parameter is negatively impacted by a coefficient value of –0.0078. This may be attributed to the global financial crisis that originated in 2007 and 2008, which had a ripple effect on the world economy and was felt in 2009 and 2010. During this period, global economies were in a dire state, and real GDP per capita was severely affected. Economists consider the financial crises of 2007 and 2008 to be the worst of the period; GDP declined and people's interest in tourist destinations was also affected.

Table 4 illustrates the results of estimating equation (5) using POLS regression based on sub-periods where the natural logarithm of total tourist arrivals at the destination country, $\ln Tou_{jt}$, is used in this model. The data is divided according to sub-periods from 1995 to 2022. The model isolates the data for all countries by periods and uses three-column analyses. The table presents estimates for all countries from 1995 to 2022. The first column shows data for the entire period, while the second column only covers the years 1995 to 2006. The third column focuses on 2007 to 2022. The study divided the periods into sub-periods to examine the impact of terrorism on international tourism demand over time. The table presents estimates for the period from 1995 to 2022, examining the impact on domestic tourism demand. The data is divided into two sub-periods due to the financial crises in 1995 and 2007–2008. The negative coefficient of $VA_{jt}$ may be attributed to this. This is a case where the country has limited control over enterprises, and weak governance could negatively impact international tourism demand. The coefficient $RLaw_{jt}$ in Table 4 also follows this pattern. The estimated values of the coefficient range from 0.0929 to –0.1853 and –0.0762 for the entire period from 1995 to 2022, sub-period 1995 to 2006, and sub-period 2007 to 2022. For the entire period, the coefficient value is statistically significant only at the 10% and 5% levels, indicating that rules of law have a significantly positive relationship with tourism. Countries with sound rules of law that promote tourism attract tourists to their destinations. However, the coefficient values for both sub-periods differ from those of the entire period. Next, we evaluate the impact of corruption on tourist arrivals in destination countries by examining the effect of $CC_{jt}$.

However, the coefficient values for the entire period from 1995 to 2022 and the sub-period from 2007 to 2022 are estimated at 0.140 and 0.5062, respectively. These values show significant positive effects at 10%, 5% and 1%, indicating that if there is less corruption in the destination countries or more control on corruption, it tends to attract more tourists. It is important to note that this statement is purely for interpretation purposes and should not be taken as a suggestion that corruption is beneficial for tourism demand. However, the corruption index has not increased significantly during the recent years, indicating that corruption cannot be ignored. In contrast, the coefficient for the sub-period 1995 to 2006 is estimated to be significantly negative with a value of –0.1393, indicating less control of corruption. This suggests that an increase in corruption will reduce the tourist attraction to those destination countries. However, Table 3 shows the opposite trend for developed countries, where corruption has increased the demand for tourism.

Table 5 presents the results of quantile regression using conventional linear functional form with $\ln Tou_{jt}$ as the dependent function. The natural logarithm of total tourist arrivals at the destination country is shown. The estimated equation (4) was investigated without the squared, cubic, or quadratic form of the control on corruption coefficient at five quantiles: $\zeta = 0.1, 0.25, 0.5, 0.75$ and 0.9. Table 5 shows that for the conventional linear quantile regression method, the coefficient $CC_{jt}$ is significant at all stages in Tables 3 and 4. However, in Table 5, when it enters the regression with no significant coefficient at the 10th quantile in linear quantile regression form, the coefficient appears with a value of –0.0391 and an estimated standard error of 0.0284 with the rest of the quantiles through linear quantile regression showing significant coefficients at all the quantiles of the distribution, There is also a marginal effect showing at the higher quantiles of the median and the coefficient of $CC_{jt}$ is insignificant only at the lower quantile i.e. 10th, while in Table 5 it indicates that the coefficient for the 10th quantile is insignificantly changed from the median quantile; whereas, higher quantiles than the median are marginally significantly at the 75th and 90th.

The aim of this study is to investigate whether $CC_{jt}$ has a differential impact on tourism for low and high percentiles of the population. Specifically, we examine whether the $\beta$ value varies between these two groups. Table 5 shows that corruption has a statistically significant effect on international tourism demand. A one percent decrease in corruption control is associated with an increase in tourism demand of approximately 0.15 to 0.58%. The results appear to support the concept of 'greasing the wheels'. However, according to Emara (2020), corruption plays an augmenting role in the growth of the tourism industry when it exceeds the average level. Law et al. (2019) hold the view that there is an inverted U-shaped relationship between corruption and tourism demand: it increases up to a certain level and then decreases. So, the inverted U-relationship implies that tourism demand tends to increase initially and then decline when corruption is likely to surpass a certain threshold or level.

It is important to note the relationship between income and tourism demand. The impact of GDP per

Table 5. Quantile regression

| Variables and functions | Quantiles | | | | |
|---|---|---|---|---|---|
| | 10 | 25 | 50 | 75 | 90 |
| $CC_{jt}$ | –0.0391 | –0.15480*** | –0.3276*** | –0.4891*** | –0.5714*** |
| | 0.0284 | 0.03110 | 0.0320 | 0.0298 | 0.0386 |
| | 0.0183 | 0.02010 | 0.0190 | 0.0141 | 0.0180 |
| $VA_{jt}$ | –0.1541*** | –0.02400 | 0.1577*** | 0.0539*** | –0.1144*** |
| | 0.0235 | 0.02630 | 0.0176 | 0.0160 | 0.0246 |
| $RLaw_{jt}$ | 0.4648*** | 0.27520*** | 0.3558*** | 0.5836*** | 0.6131*** |
| | 0.0360 | 0.04840 | 0.0395 | 0.0334 | 0.0450 |
| $\ln GDPpc_{jt}$ | 0.1304*** | 0.20490*** | 0.2461*** | 0.4142*** | 0.6094*** |
| | 0.0090 | 0.01001 | 0.0092 | 0.0092 | 0.0106 |
| $\ln Pop_{jt}$ | 0.4890*** | 0.50490*** | 0.5327*** | 0.5903*** | 0.5850*** |
| | 0.0047 | 0.00570 | 0.0045 | 0.0049 | 0.0076 |
| Observations | 203,079 | | | | |
| $R^2$ | 0.0550 | 0.05100 | 0.0601 | 0.0879 | 0.1037 |

Note: *CC* – control of corruption, *VA* – voice accounts, *RLaw* – rule of law, ln – natural logarithm, *GDPpc* – gross domestic product per capita, *Pop* – population, *j* – period, *t* – time, $R^2$ is the coefficient of determination; *** denotes significance at the 1% critical level.
Source: authors.

capita on tourism demand is shown in Table 5, with positive coefficients in linear quantile regression and is expectedly positive across all quantiles. Table 5 consistently shows that the coefficients $\ln GDPpc_{jt}$ increase in responsiveness as ζ quantile increases from 0.1 to 0.9. This suggests that international tourism demand is more likely to increase with higher income at higher quantiles of the conditional demand distribution and less likely to be affected at lower quantiles. In other words, countries at the 10th quantile increase their tourism demand by 13.04% for every 1% increase in income.

In contrast, countries at the 25th, 50th, 75th, and 90th percentiles experience an increase in tourism demand of 20.49%, 24.61%, 41.42%, and 60.94%, respectively, when all other factors remain constant. However, Table 4 shows that the coefficient of GDP for the sub-period from 1995 to 2006 is 1.056, which is significantly higher than the coefficients for the periods from 1995 to 2022 and 2006 to 2022, which are 0.86 and 0.2338, respectively. This indicates a lower impact on tourism demands during these periods compared to the earlier period. This could be attributed to the global financial crisis in 2007–2008 and its aftermath. So, to some extent tourism demand declined in these periods, the reason may be that the developed countries had less impact on tourism demand as compared to developing countries during the global financial crisis.

In Table 5, we estimated the conditional linear quantile regression model for different variables and their effects by different quantiles. Table 6 now presents the nonlinear conditional quantile regression model. The purpose of this model is to determine whether this nonlinear relationship is consistent across quantiles or whether there is a smaller or marginal effect at different quantiles of the distribution by adding some squared, cubic and quadratic terms of $CC_{jt}$ added with the variable of interest in model by estimating equation (5). However, the coefficients of the linear quantile regression through the linear term were significant throughout the distribution, except for the last 10th quantile. Here, the corruption coefficient of the quadratic term is statistically different from the median up to the 10th quantile and marginally significant at the 50th to 75th quantiles, then at the 90th quantile, but less so at the 10th and 25th quantiles. From this phenomenon, one could conclude that there is a threshold and as soon as the extent of corruption exceeds the threshold, it can lose its effect. At the same time, the cubic term of corruption shows a significant difference between the coefficient values from quantiles to the right of the distribution to those of the left. Similarly, quadratic terms have significantly different values from the median to the 90th quantile and different ones for lower quantiles such as the 10th to 25th quantiles (Fourie et al., 2020; Yerdelen Tatoglu & Gul, 2020).

Table 6. Non-linear model

| Sample/Method | Quantiles | | | | |
|---|---|---|---|---|---|
| | 10 | 25 | 50 | 75 | 90 |
| $CC_{jt}$ | 0.1076*** | 0.1177*** | –0.0329 | –0.2390*** | –0.4933*** |
| $CC2_{jt}$ | –0.0630*** | –0.1754*** | –0.3740*** | –0.3660*** | –0.2760*** |
| $CC3_{jt}$ | 0.0447*** | 0.0177 | –0.0526** | –0.0903*** | 0.0271 |
| $CC4_{jt}$ | –0.0302*** | –0.0135 | 0.0549*** | 0.0832*** | 0.0228*** |
| Observations | 203,079 | | | | |
| $R^2$ | 0.0561 | 0.0529 | 0.0619 | 0.0893 | 0.1046 |

Note: *CC* – control of corruption, *j* – period, *t* – time, $R^2$ – coefficient of determination; ** denotes significance at the 5% critical level, *** denotes significance at the 1% critical level.

Source: authors.

Consequently, the values in Table 6 are statistically different from the lower quantiles to the upper quantiles. Thus, the results for the lower and upper quantiles indicate the concept of bribe hypothesis, which means that corruption has a significant positive impact on tourism for underdeveloped and developed countries, at a certain level it plays a reinforcing role in the tourism industry and decreases when it exceeds a certain threshold. Thus, the model shows that its quadratic term is significant only in the 50th to 75th quantiles, while the cubic term has a marginal impact even from the median to 75th. Similarly, the quadratic term has the same effect on the different quantiles from bottom to top. In contrast, the lower quantiles are statistically different from median and higher quantiles, but at the same time also show marginal effects on the 50th to 75th quantiles. This indicates that the inverted U-relationship is only significant around the 50th to 60th quantiles of the demand distribution. In addition, the result may also be possible by calculating the inflexion point of the demand distribution (Ghalia et al., 2019; Rosselló Nadal & Santana Gallego, 2022).

## 5. Conclusion

The aim of the study is to analyse the relationship between corruption and international tourism demand for 200 destination countries from 1995 to 2022. The data were analysed using POLS and a fixed effects technique to account for unobservable country effects that are constant over time. Therefore, the multivariate method was also used to reduce omitted variable bias to examine the impact of corruption on international tourism demand; panel quantile estimation techniques were also used due to the unusual consideration of demand distribution. This study examined the impact of corruption on tourism demand as a function of a country's attractiveness or lack of it to tourists and its level of development, such that the analysis revealed that corruption has a mixed effect. More specifically, it is statistically significant and has a positive effect on tourism attractiveness in both the most and least corrupt countries.

Consequently, the study finds a non-linear relationship between corruption and international tourism demand in countries with medium levels. Our results show that the relationship between corruption and tourism is only significant at the 50th and 75th quantiles, suggesting that tourism demand first increases and then decreases. Furthermore, our study focussed on the relationship between income and demand. This study also concludes that the dramatic decline in GDP in the 2006–2022 sub-period is due to the global financial crisis of 2007–2008 and its aftershocks; as a result, tourism demand has subsequently suffered drastically worldwide.

The coefficients of population, rule of law, voice and accountability are also not statistically significant for the sub-period 2006–2022, indicating the financial crisis and its negative impact on tourism demand. Our findings may be useful for policy makers and the results may recommend that policies for tourism are not equally likely in all countries with different levels of demand; similarly, income has positive but different effects; therefore, policy makers should realise that tourism attraction can be increased to increase income, and this needs to focus on countries with less attractive tourism demand. This study is based on two-dimensional analyses (destination and year) considering data only for total tourist arrivals in the destination country and year; furthermore, the study is based on a three-dimensional analysis (origin, destination and year) of the subject of interest, which is left for a future study.

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