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The Number of Tourist Arrivals, Governance and Their Impact on Threatened Bird Species: Worldwide Evidence

Muzafar Shah Habibullah*
Fakulti Ekonomi Dan Pengurusan Universiti Putra Malaysia, 43400 UPM Serdang
Selangor Darul Ehsan, Malaysia

Badariah Haji Din
School of Government, Universiti Utara Malaysia, Malaysia

Wei-Chong Choo
Fakulti Ekonomi Dan Pengurusan Universiti Putra Malaysia, 43400 UPM Serdang
Selangor Darul Ehsan, Malaysia

Siow-Hooi Tan
Multimedia University, Malaysia

Abstract

The number of international tourist arrivals is crucial for the tourism sector. However, there are positive and negative sides of tourism. Unsustainable tourism will result in the destruction of the forest and consequently led to biodiversity loss. The great benefits of forest which is a home for a wide variety of animals and plants which help to stored carbon, preventing the risk of flood and drought to occur, influencing climate change, stabilizing soils as well as providing food and a place for the indigenous people to live. As long as these benefits are being concerned, the role of international community is needed to prevent them from any harm in the future. The government of both the developed and developing nations recognized the importance of sustainable biodiversity for the national ecosystem as well as to the global environment. In this study we also investigate the response of biodiversity loss (measured by the number of threatened bird species on six measures of governance: voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption. The OLS outcomes suggest that tourism exhibit positive relationship with biodiversity loss. On the other hand, the six governance indicators suggest that good governance reduces biodiversity loss. Our further analysis using quantile regression estimates suggest that tourism affect positively biodiversity loss for all quantiles (0.05 0.25 0.50 0.75 0.90 0.95); while governance affect negatively biodiversity loss only at certain quartiles. One main policy implication of this study is that sustainable tourism is important to mitigate biodiversity loss, and effort for biodiversity conservation is supported by this study.

Keywords: Biodiversity loss; Threatened bird species; Tourism; Governance; Cross-country analysis.

1. Introduction

Numerous studies in the growth literature suggest that poor government, in terms of government corruption, or poor enforcement laws for property rights, lead to a reduction in economic growth (Jalilian *et al.*, 2006); (Pelligrini and Gerlagh, 2004); (Mauro, 1995); (Aidt *et al.*, 2008); (Abe and Wilson, 2008); (Blackburn and Forgues Puccio, 2009). World Bank (1994) defined governance as the ability and aptitude of a government to exercise its power to plan, construct and carry out policies and discharge functions as well as managing economy and social resources for a country's development. A country that demonstrates sound public sector management (efficiency, effectiveness), accountability, exchange and free flow of information (transparency), and a legal framework for development (justice, respect for human rights and liberties) signify 'good' governance (United Nations Economic and Social Council, 2006).

According to North (1990), poor quality governance increases uncertainty, unpredictability, instability, and with these, transaction costs. It discourages domestic and foreign investments, for example, which ultimately affect economic growth. Therefore, sustained long-term economic growth, as the ultimate goal of any government of any nation, cannot be achieved without a stable economic and political climate, and without protection of property rights (Marby and Ulbrich, 1989).

However, the issue of governance affecting biodiversity loss and deforestation has been studied recently. Moreover, the positive relationship has long been recognized between good governance and environmental management, forward-looking behaviors, effectiveness and implementation of public policies. Therefore, general conclusion can be made where better institutions are associated with reduction in deforestation Damette and Delacote (2012). For example, (Deacon, 1994;1995;1999) points out that greater ownership security leads to lower deforestation. In this study, he examines the hypothesis where insecure ownership leads to increase in deforestation

*Corresponding Author

by regressing cross-country data. Furthermore, deforestation and political variables (constitutional changes, guerilla warfare and revolutions reflecting insecure ownership) were found to be linked as well, as mentioned by Deacon (1994). Besides, property rights, land use conflict, political stability and the rule of law are other institutional factors that are significant in determining deforestation (Alston *et al.*, 1999;2000; Damette and Delacote, 2012; Godoy *et al.*, 1998; Mendelsohn and Balick, 1995). For example, Mainardi (1996) reveal that unstable political issue in a country lead to more deforestation to occur. As mentioned by Didia (1997) and Mather and Needle (1999), deforestation is also likely to be high when there is a poor developed democracy.

For the case of Brazil, (Laurance, 1998;1999) points out that, the rates of forest loss in the Brazilian Amazon have increased throughout the 1990s due to poor prosecution of forest protection regulation. Another reason is that the application of these policies is believe to be inconsistent across government departments. In another study, (Bhattarai and Hammig, 2001) conclude that political institutions variable (the sum of political rights and civil liberties indices) impacted deforestation for the Latin American and African countries. They suggest that strict application of rules in order to empower citizen that lead to better institution will significantly lead to improvement in forest conservation.

On one hand, Rademaekers *et al.* (2010) conclude that poor governance, corruption, low capacity of public forestry agencies, land tenure uncertainties, as well as insufficient natural resource planning and monitoring are main key drivers for deforestation. On the other hand, Kissinger *et al.* (2012) also identify that weak forest sector governance and institutions including conflicting policies beyond the forest sector and illegal activity due to weak enforcement affect deforestation. According to Smith and Walpole (2005) corruption could retard growth, lead to fuel poverty, and impeded conservation efforts which in the end have the potential impact on biodiversity loss. Besides, biodiversity loss and other environmental problem including pollution, soil erosion and climate change also could be a result from less strict environmental rules due to corruption (Damania *et al.*, 2003). The other studies suggest that corruption is a major determinant of loss in tropical forest due to unsustainable or illegal loggings are Huber (2001); Jepson *et al.* (2001) and McCarthy (2002).

The general objective of this paper is to investigate the effect of good governance and tourism on biodiversity loss measured by the number of threatened bird species in 141 countries. The content of this study is structured as follow. The part of related literature review will be discussed in the next section, followed by methodology (section 3), results discussion (section 4) and conclusion in the last section.

2. Review of Related Literature

World Tourism Organization (2002) stated that "tourism is activities of persons travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes". The role of tourism in that particular country is essential since it is considered among the largest industry in the world and able to reduce the rate of unemployment as well United Nations (1999). It is also perceived as one of the important factors in contributing to positive growth through increase in foreign exchange earnings, brought prosperity to many nations, creates more jobs coupled with business opportunities for the local. The main contributions of travel and tourism sector can be seen in terms of total gross domestic product (GDP) and total employment. As reported by World Travel & Tourism Council (2015), the contribution of travel and tourism sector to total gross domestic product (GDP) and employment are equal to 9.8 per cent and 9.4 per cent (equivalent to 276.8 million jobs creation) respectively in 2014. Since international tourist involve in buying both goods and services in travel destination, tourism is also categorized under an export industry. Regarding to this matter, the percentage of visitors' exports is about 5.7 per cent of worldwide exports of goods and services. Considering its positive impact, it is about 4.3 per cent of global capital investment has been created by travel and tourism industries.

The year 2014 has proved to be a remarkable year when the numbers of foreign tourists in the world were equal to 1133 million, coupled with USD1245 billion in international tourism receipts (United Nations World Tourism Organization, 2015). The international tourism receipts refers to income generated from tourist consumption in selected travel destination including food and drink, accommodation, local transport, entertainment, shopping and other services and goods. Europe receive large numbers of arrivals as compared to other regions (581.8 million) followed by Asia and the Pacific (263.3 million), the Americas (181.0 million), Africa (55.7 million) and the Middle East (51.0 million). Overwhelmingly, Asia and the Pacific remained the highest growth in international arrivals from year 2005 to 2014, which reported at 6.1 per cent growth followed by Africa (5.4 per cent), Middle East (4.7 per cent), the Americas (3.5 per cent), and Europe (2.8 per cent). However, the biggest increase in terms of tourism receipts was recorded in Middle East (+5 per cent), followed by the Asia and the Pacific region (+4 per cent), Europe and the Americas (+3 per cent), and Africa (+2 per cent) between 2013 and 2014. Nonetheless as highlighted by United Nations World Tourism Organization (2015), the largest share in international tourism receipts in 2014 was conquered by Europe with 41 per cent of the market share; followed by the Asia and the Pacific (30 per cent), the Americas (22 per cent), Middle East (4 per cent) and Africa (3 per cent).

Tourism is invariably linked with the positive contributions towards the economy. However, the positive relationship is not always the case. The negative consequences have been observed as well on the environment and loss in biodiversity becomes the most important effect. Therefore, tourism sector as well as tourism-related activities are claimed to be the major caused to the environment and increased in threatened species. Christ *et al.* (2003) list out several tourism-related activities that lead to biodiversity loss in a study led by the Conservation International (CI) and United Nations Environment Programme (UNEP) on the threats of tourism on biodiversity conservation, such as (i) total landscape transformation caused by habitat disturbance in order to developed more tourism facilities and infrastructure in a massive and unplanned manner that led to deforestation and drainage of wetlands; (ii)

depletion of resources which is limited for the indigenous and local people (e.g. water and electricity consumption); (iii) the issues of littering and water pollution; (iv) sewage runoff from tourism-related facilities; and (v) damage to coral reefs by the activities of careless tourists (United Nations Environment Programme, 2013). 'Yet, on average, the number of international tourist arrivals in the word is expected to grow by more than 3% or 43 million per year in terms of numbers in the period 2010-2030 (United Nations World Tourism Organization, 2011). Consequently, massive increase in arrivals constitute a long term negative effect towards environment (Buckley, 2004; Pickering and Hill, 2007).

Numerous studies are documenting the effect on the number of threatened species caused by tourism. For instance, wildlife watching tourism has been postulated to increase in the number of threatened species. The adverse effects due to wildlife tourism and related human activities is clearly explain by Green and Higginbottom (2001) into three main categories, where wildlife feeding, unwanted and disturbance noisy activities as well as spotlighting can significantly reduce their population. Second, an unintended event (road accidents) and deliberate killing for safety reasons (intentional hunting, fishing, collecting, trampling of wildlife) also lead to wildlife injury and reduce their survival rate. Next, the negative effect on wildlife could nonetheless be increase through declining in their total population, unable to protect themselves from predators and the weather, or reduction of prey species due to habitat disruption for the purpose of infrastructure including the development of tourism facilities.

Trails and trail users can also affect wildlife (Helmund, 1998; Tyser and Worley, 1992). Trails may degrade or fragment wildlife habitat triggering avoidance behavior in some animals, and food-related attraction behavior in others. Furthermore, wildlife disturbance can also link further into natural landscapes that can cause physical injury to rare or endangered species. On the other hand, visitors who feed wildlife, intentionally or from dropped food can endangers the health and well-being of the animals. Therefore, feeding activities can have significant effects for the lives of animals (Roe *et al.*, 1997). Tourist vehicles sometimes separate their young and their mother and can lead to death of the young (Edington and Edington, 1990; Stuart-Dick, 1987). Moreover, reduction in the number of wildlife availability is highly associated with the introduction and/or spread of diseases, particularly the threat of disease transmitted from human (Butynski and Kalina, 1998; Ferber, 2000).

3. Methodology

According to Butler (2006), "the term biodiversity or biological diversity refers to the totality (numbers) and variability (types) of living organisms in the ecosystem, region and environment (Butler, 2006). Human will eventually perish without biodiversity". The existence of biodiversity is very important in order for human to survive. As stated by Convention on Biological Diversity (CBD) the definition of biodiversity includes diversity at the gene, species and ecosystem levels; the types of species; and the habitats and ecosystems within which they live which consist of terrestrial rainforests, the freshwater lakes, the river systems, the coral reefs and the marine ecosystems. The healthy ecosystems enable to meet human requirements for daily consumption and help them to live such as food, clean air, and water. The rainforest, accounted for more than 50 per cent wide variety of the plants and animals which support the greatest diversity of living organisms on Earth even though it cover not more than 2 percent of Earth's surface (Butler, 2014). As stated by United Nations Environment Programme (2014), the biodiversity loss among other things; affect food production, reduces the productivity of ecosystems, interferes with essential ecological functions, reduce ecosystem stability and increase its vulnerability to natural disasters (e.g. floods, droughts, hurricanes etc).

In line with the study by Naidoo and Adamowicz (2000), Halkos (2011), Munch (2009), the determinants of biodiversity loss, ($birds$) as a function of gross domestic product per capita ($income$), the number of international tourist arrivals ($tourists$), and governance ($governance$) can be modeled as follows:

$$birds = f(income, tourists, governance) \quad (1)$$

Specify in a stochastic form as,

$$birds_i = \alpha + \beta income_i + \theta tourists_i + \varphi governance_i + \varepsilon_i \quad (2)$$

where $\alpha, \beta, \theta, and\ \varphi$ represents the tested parameters, ε denotes as the error term, while i indicates the number of selected countries $(1,2, \dots 141)$. It is predicted a *priori* that $\theta > 0$, and $\beta, \varphi < 0$. $birds_i$ is biodiversity loss measured by the number of threatened bird species. Real gross domestic product per capita is used to symbolize the level of economic development and/or national income which is denotes as $income_i$. The focal variables of this study is $tourists_i$, represent as a proxy for tourism is measured by the number of international tourist arrivals. It is expected that a higher number of tourist arrivals have a positive impact on the number of threatened bird species. In contrast, good governance is expected to mitigate biodiversity loss. In other words, the practice of good governance will reduce the number of threatened bird species.

For the governance indicator, we used six governance measures – voice and accountability, political stability, government effectiveness, regulatory quality, rule of law and control of corruption were used which was based on the database - World Governance Indicators provided by the World Bank Kaufman *et al.* (2008). The indicators were constructed by Kaufman and his colleagues based on several different sources and using the linear unobserved components model to aggregate those various sources into one aggregate indicator. Kaufman *et al.* (2008) define governance as, "Governance consists of the traditions and institutions by which authority in a country is exercised. This includes the process by which governments are selected, monitored and replaced; the capacity of the government to effectively formulate and implement sound policies; and the respect of citizens and the state for the institutions that govern economic and social interactions among them." Accordingly, the six governance measures included in the study are: voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption.

In this study the data for the number of threatened bird species, the number of international tourist arrivals, gross domestic product per capita and governance indicators are obtained from the World Development Indicators and World Governance Indicators available in the World Bank database. The reference year is 2013, and our sample consists of 141 countries. All series are converted into natural logarithm.

4. The Empirical Results

Equation (2) is estimated using Ordinary Least Squares (OLS). The OLS approach estimates the effect of the independent variables on the mean of the conditional distribution of the dependent variable. This study also employed quantile regression which, in contract, allowing the effect of the explanatory variables on the entire conditional distribution of the dependent variable (Koenker and Basset, 1978). Furthermore, the tested parameters are allowed to differ at different points of the conditional distribution of the dependent variable. Therefore, a number of different quantile estimations provide full explanation of the underlying conditional distribution.

The quantile regression is defined as follows

$$bird_i = x_i'\beta_\tau + \mu_{\tau i} \quad (3)$$

$$Quantile_\tau(bird_i|x_i) = x_i'\beta_\tau \quad (4)$$

where x_i' equals a vector of explanatory variables as defined above, β_τ equals the vector of parameters associated with the τ-th percentile, and $\mu_{\tau i}$ equals an unknown error term. The $Quantile_\tau(bird_i|x_i) = x_i'\beta_\tau$ equals the τ-th conditional quantile of $bird$ given x with $\tau \in (0,1)$. By estimating β_τ, using non-identical values of τ, quantile regression allows parameters to be varies across different quantiles of threatened bird species. In other words, repeating the estimation for different values of τ between 0 and 1, we trace the distribution of $bird$ conditional on x and generate a much more complete picture of how explanatory variables affect the dependent variable.

The τ-th quantile regression estimate β_τ, by solving the following minimization problem

$$min_\beta \left[\sum_{i \in \{i: bird_i \geq x_i'\beta} \tau|bird_i - x_i'\beta| + \sum_{i \in \{i: bird_i < x_i'\beta\}} (1-\tau)|bird_i - x_i'\beta| \right].$$

The median regression occurs when $\tau = 0.5$ and the coefficients of the absolute values both equal one.

Our results are presented in Tables 1 to 6 respectively, with each governance indicators: corruption, government effectiveness, politics and violent, rule of law, regulatory quality, and voice and accountability. In the second column is the OLS regression result. The results suggest that all three explanatory variables are significant in all six tables, except for income with rule of law. Income impacted negatively the number of threatened bird species. It suggest that on average as a nation becomes wealthier, conservation of biodiversity takes place and as such lower the number of threatened bird species. On a similar note, the governance indicators suggest that good governance able to lower the number of threatened bird species. All six governance indicators - corruption, government effectiveness, politics and violent, rule of law, regulatory quality, and voice and accountability indicate negative relationships with the number of threatened bird species. On the other hand, the number of international tourist arrivals and the number of bird species show positive relationship, thus clearly indicates that mass tourism is unsustainable and will lead to higher number of threatened bird species.

Table-1. Regression results for threatened bird species, with corruption

Independent	**OLS**	**Non-parametric quantile regression**					
variables		5th quantile	25th quantile	50th quantile	75th quantile	90th quantile	95th quantile
Constant	0.834	0.615	0.558	1.912***	0.695	0.104	-0.610
	(1.435)	(0.754)	(0.762)	(2.631)	(0.749)	(0.100)	(0.413)
Income	-0.188**	-0.262**	-0.136	-0.269***	-0.171	-0.065	0.108
	(2.514)	(2.077)	(1.362)	(2.961)	(1.473)	(0.519)	(0.593)
Tourists	0.236***	0.229***	0.190***	0.195***	0.265***	0.290***	0.263***
	(6.930)	(4.637)	(4.978)	(4.858)	(5.764)	(4.959)	(2.853)
Corruption	-0.229**	-0.113	-0.319***	-0.203***	-0.206	-0.214	-0.420
	(2.257)	(0.744)	(2.760)	(2.631)	(0.749)	(0.100)	(0.413)
Adjusted R^2	0.272	0.267	0.259	0.186	0.127	0.105	0.099
SER	0.778	1.243	0.920	0.822	0.899	1.405	1.773
Quasi-LR statistics	-	43.58 [0.000]	72.31 [0.000]	50.79 [0.000]	23.79 [0.000]	12.07 [0.007]	8.132 [0.043]
Wald slope equality test			21.82 [0.112]				
Wald symmetric test			35.64 [0.000]				

Notes: Asterisks ***,**,* denote statistically significant from zero at 1%, 5% and 10% level respectively. Figures in round bracket (.) are *t*-statistics, while figures in square bracket [.] are *p*-values.

The estimated results of the quantile regressions are shown in columns 3 to 8 in each table, respectively for 5th, 25th, 50th, 75th, 90th, and 95th quantiles. As for the income variable, conservation on biodiversity is only effective for small number of threatened bird species. Income is negative and significant at 5th, 25th and 50th quantiles. Generally, for higher quantiles of 75th, 90th and 95th, income has no effect on the number of threatened bird species. An interesting observation show by the quantile regression results as to income with rule of law: where income is not significant in the OLS estimation but the quantile estimation results suggest that income is negative and significant at 5th, 25th and 50th quantiles at the 10 per cent level. On the hand, governance impacted negatively the number of threatened bird species at the lower quantiles of 5th, 25th and 50th for corruption, government effectiveness, and voice and accountability; while at higher quantile of 75th, 90th and 95th for political stability and absent of violence. Rule of law able to mitigate the number of threatened bird species at 25th, 50th, 75th and 95th quantile. As for the tourism sector, our proxy using the number of international tourist arrivals clearly suggest that mass tourism has "destructive" effect on biodiversity – increase in the number of threatened bird species. The results are consistent in all six measures of governance indicators, where the impact of tourism show positive impact on the number of threatened bird species for all quantiles – 5th, 25th, 50th, 75th, 90th and 95th. Thus, it is obvious to pin down on the tourism sector that can play a very important role in conservation and mitigating biodiversity loss.

Table-2. Regression results for threatened bird species, with government effectiveness

Independent	**OLS**	**Non-parametric quantile regression**					
variables		5th quantile	25th quantile	50th quantile	75th quantile	90th quantile	95th quantile
Constant	0.430	0.242	0.605	1.160	0.296	-0.179	-2.708
	(0.602)	(0.257)	(0.745)	(1.303)	(0.204)	(0.130)	(1.196)
Income	-0.185**	-0.228*	-0.194**	-0.250***	-0.171	-0.075	0.268
	(2.437)	(1.974)	(2.254)	(2.709)	(1.229)	(0.594)	(1.224)
Tourists	0.263***	0.239***	0.222***	0.237***	0.294***	0.317***	0.318***
	(7.316)	(6.841)	(6.130)	(5.430)	(5.247)	(4.663)	(3.783)
Government	-0.263**	-0.226	-0.292**	-0.245*	-0.230	-0.252	-0.636
effectiveness	(2.482)	(1.425)	(2.372)	(1.745)	(1.016)	(0.903)	(1.315)
Adjusted R^2	0.269	0.264	0.245	0.177	0.122	0.104	0.120
SER	0.780	1.204	0.937	0.818	0.899	1.397	1.843
Quasi-LR statistics	-	47.18 [0.000]	64.74 [0.000]	46.79 [0.000]	23.11 [0.000]	12.12 [0.006]	10.04 [0.018]
Wald slope equality test			20.78 [0.144]				
Wald symmetric test			28.51 [0.004]				

Notes: Asterisks ***, **,* denote statistically significant from zero at 1%, 5% and 10% level respectively. Figures in round bracket (.) are *t*-statistics, while figures in square bracket [.] are *p*-values.

Table-3. Regression results for threatened bird species, with politics & violence

Independent	**OLS**	**Non-parametric quantile regression**					
variables		5th quantile	25th quantile	50th quantile	75th quantile	90th quantile	95th quantile
Constant	1.428***	1.400**	1.985***	2.428***	1.149	0.875	0.733
	(2.936)	(2.373)	(3.507)	(4.152)	(1.361)	(0.943)	(0.752)
Income	-0.215***	-0.426***	-0.338***	-0.302***	-0.147	0.057	0.090
	(3.451)	(3.675)	(4.546)	(3.592)	(1.131)	(0.600)	(0.845)
Tourists	0.211***	0.271***	0.211***	0.185***	0.221***	0.161**	0.178**
	(6.053)	(4.402)	(4.558)	(3.918)	(3.902)	(2.371)	(2.217)
Politics &	-0.223**	0.109	-0.107	-0.146	-0.320	-0.512**	-0.653**
violence	(2.596)	(0.444)	(1.104)	(1.401)	(1.548)	(2.193)	(2.295)
Adjusted R^2	0.274	0.264	0225	0.173	0.126	0.141	0.146
SER	0.777	1.298	0.945	0.800	0.915	1.402	1.745
Quasi-LR statistics	-	40.95 [0.000]	57.10 [0.000]	43.27 [0.000]	23.22 [0.000]	18.28 [0.000]	12.87 [0.004]
Wald slope equality test			26.78 [0.030]				
Wald symmetric test			24.31 [0.018]				

Notes: Asterisks ***, **,* denote statistically significant from zero at 1%, 5% and 10% level respectively. Figures in round bracket (.) are *t*-statistics, while figures in square bracket [.] are *p*-values.

5. Conclusion

The main interest of this study is to determine the impact of tourism and good governance on the number of threatened bird species for 141 countries. In this study we used the number of international tourist arrivals to proxy for the tourism sector; while using six different measures for the governance indicator - voice and accountability, political stability, government effectiveness, regulatory quality, rule of law and control of corruption. Other explanatory variable included in the study is income per capita. We found that using OLS the number of international tourist arrivals increases the number of threatened bird species, while income and governance reduces the number of threatened bird species.

Table-4. Regression results for threatened bird species, with rule of law

Independent	**OLS**	**Non-parametric quantile regression**					
variables		5th quantile	25th quantile	50th quantile	75th quantile	90th quantile	95th quantile
Constant	0.284	0.488	0.532	1.270	-0.123	-0.216	-1.380
	(0.455)	(0.492)	(0.637)	(1.578)	(0.161)	(0.258)	(1.046)
Income	-0.126	-0.258*	-0.184*	-0.177*	-0.098	-0.056	0.140
	(1.572)	(1.942)	(1.737)	(1.716)	(1.056)	(0.518)	(0.906)
Tourists	0.237***	0.237***	0.220***	0.187***	0.278***	0.301***	0.293***
	(6.925)	(5.350)	(4.928)	(4.595)	(6.528)	(6.152)	(4.849)
Rule of law	-0.343***	-0.131	-0.321**	-0.376**	-0.445***	-0.281	-0.512*
	(3.196)	(0.745)	(2.414)	(2.565)	(3.082)	(1.570)	(1.710)
Adjusted R^2	0.294	0.267	0.251	0.194	0.152	0.121	0.146
SER	0.766	1.234	0.921	0.805	0.879	1.323	1.711
Quasi-LR statistics	-	43.96 [0.000]	64.66 [0.000]	52.86 [0.000]	30.69 [0.000]	15.14 [0.001]	12.63 [0.005]
Wald slope equality test			27.53 [0.024]				
Wald symmetric test			33.12 [0.000]				

Notes: Asterisks ***, **,* denote statistically significant from zero at 1%, 5% and 10% level respectively. Figures in round bracket (.) are *t*-statistics, while figures in square bracket [.] are *p*-values.

Table-5. Regression results for threatened bird species, with regulatory quality

Independent	**OLS**	**Non-parametric quantile regression**					
variables		5th quantile	25th quantile	50th quantile	75th quantile	90th quantile	95th quantile
Constant	0.440	1.074	0.653	0.960	-1.189	-0.371	-1.099
	(0.571)	(1.241)	(0.821)	(0.949)	(1.196)	(0.358)	(0.555)
Income	-0.201***	-0.336***	-0.245***	-0.260***	-0.069	-0.084	0.052
	(2.626)	(3.096)	(3.417)	(3.134)	(0.764)	(0.692)	(0.253)
Tourists	0.273***	0.243***	0.250***	0.261***	0.338***	0.329***	0.333***
	(7.613)	(6.096)	(6.455)	(5.196)	(6.208)	(4.613)	(3.657)
Regulatory	-0.269**	-0.060	-0.305	-0.318	-0.454***	-0.252	-0.357
quality	(2.231)	(0.356)	(0.821)	(0.949)	(2.700)	(1.166)	(1.040)
Adjusted R^2	0.274	0.263	0.243	0.196	0.145	0.105	0.085
SER	0.777	1.244	0.933	0.806	0.917	1.325	1.789
Quasi-LR statistics	-	43.30 [0.000]	63.76 [0.000]	51.64 [0.000]	30.24 [0.000]	13.04 [0.004]	6.423 [0.092]
Wald slope equality test			23.62 [0.071]				
Wald symmetric test			26.83]0.008]				

Notes: Asterisks ***, **,* denote statistically significant from zero at 1%, 5% and 10% level respectively. Figures in round bracket (.) are *t*-statistics, while figures in square bracket [.] are *p*-values.

Our further analysis using quantile regression indicates that tourism affected positively the numbers of threatened bird species for all six quantiles; income per capita (negatively) at lower quantiles (5^{th}, 25^{th}, 50^{th}), and governance (negatively) at lower quantile and higher quantile depending on the governance indicator used. Lastly, the governance indicators suggest that quality government as a key driver in mitigating biodiversity loss. Our analysis clearly indicates that using estimates from OLS may have serious "bad" policy implications on the number of threatened bird species, compared to the quantile regression method that can capture properly the dimension of the threatened bird species. As for tourism, our study supports the effort for biodiversity conservation and sustainable tourism worldwide.

Table-6. Regression results for threatened bird species, with voice & accountability

Independent	**OLS**	**Non-parametric quantile regression**					
variables		5th quantile	25th quantile	50th quantile	75th quantile	90th quantile	95th quantile
Constant	1.372***	1.316*	1.373**	2.577***	1.291	1.393	1.000
	(2.735)	(1.827)	(2.156)	(4.865)	(1.649)	(1.225)	(0.852)
Income	-0.248***	-0.287***	-0.256***	-0.320***	-0.259**	-0.068	-0.045
	(3.346)	(3.364)	(3.528)	(4.153)	(2.249)	(0.728)	(0.474)
Tourists	0.235***	0.198***	0.206***	0.183***	0.280***	0.203***	0.236***
	(6.471)	(4.187)	(4.623)	(4.810)	(4.741)	(2.794)	(3.370)
Voice &	-0.155*	-0.155	-0.176**	-0.164*	0.014	0.024	0.103
accountability	(1.786)	(1.288)	(2.132)	(1.880)	(0.078)	(0.118)	(0.468)
Adjusted R^2	0.261	0.273	0.229	0.183	0.112	0.092	0.082
SER	0.784	1.231	0.935	0.824	0.945	1.449	1.735
Quasi-LR statistics	-	43.47 [0.000]	60.14 [0.000]	53.50 [0.000]	21.76 [0.000]	11.68 [0.008]	8.68 [0.033]
Wald slope equality test			25.66 [0.041]				
Wald symmetric test			33.73 [0.000]				

Notes: Asterisks ***, **,* denote statistically significant from zero at 1%, 5% and 10% level respectively. Figures in round bracket (.) are *t*-statistics, while figures in square bracket [.] are *p*-values.

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